EXCELLENCE IN EDUCATION

Paris-France (July 1-4, 2008)

EDITOR

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PARIS DESCARTES

ICIE
THE INTERNATIONAL CENTRE FOR INNOVATION IN EDUCATION

Excellence in Education 2008:
Future Minds and Creativity

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Committees

Foreword

"And in order to succeed in later life, you need creative skills because look at how fast the world is changing."

Robert Sternberg

"It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science."

Carl Sagan

On behalf of both the International Centre for Innovation in Education (ICIE) and the Université Paris Descartes, I would like to welcome you to our conference proceedings entitled "*Excellence in Education 2008: Future Minds and Creativity".*

This conference was an arena in which we shared our concerns, innovative educational practices, strategies and theories as we envision new horizons for a different world.

While somewhat bleary eyed from editing well into the night and over weekends, and extremely grateful to those of you who actually read the precise conference paper instructions, we are overwhelmed and excited by the vastness of our field, by the fascinating and important studies we undertake, by the global scope of our work, by the community connections we make, by the thought-provoking questions we ask and by the diverse dynamic theories with which we engage.

Within the framework of the "*Excellence in Education 2008: Future Minds and Creativity*", we have slotted only one paper presentation into each 30 minutes time period. This means, however, that with a conference this size - 235 papers, three symposia and 17 posters – we have more concurrent sessions which makes choice difficult. In an attempt to address this, we have arranged for quite diverse themes and topics in each block. We have also incorporated elements into the overall design of the conference which are intended to enhance informal discussions, dialogue, and enjoyment.

No conference happens without the tireless work of many people and we conclude by acknowledging those who were truly on the front lines. We are most grateful to the members of the organizing committee.

Many thanks also go to those who took the lead in organising the pre-conferences, including: Sandra Linke, Sonia White, Heinz Neber, Donald J. Treffinger, Ken McCluskey, and Todd Lubart.

We are extremely grateful for the participation of each of our presenters and our keynote speakers: Joan Freeman, Jerome Clayton Glenn, Robert J. Sternberg, Joseph S. Renzulli, Ken McCluskey, Steve Smith, Donald J. Treffinger, Douglas A. Bernstein, and Jean-Pol Tassin.

We are also most grateful to François Marty, Université Paris Descartes (Directeur de l'Institut de psychologie, université Paris Descartes), for his kind support.

The conference excelled due to the critical and enthusiastic guidance of Todd Lubart (Head of the Organizing Committee) who shared responsibility and brought ideas, energy and skills to both the conference and the Proceedings. From the moment he came on board and his wisdom became clear, we simply implemented the old proverb: For those who excel at their work we have nothing to give, but more work.

We were also exceedingly fortunate to have the assistance of Sandra Linke.

Finally, a note of thanks to all of you for attending this year's conference. As conference attendees participated in various conference strands, they were challenged to reflect upon the meaning of "excellence in education" and its impact within educational systems and educational communities, and think about ways they can help support, mentor, and encourage both instructors and learners.

On behalf of the International Centre for Innovation in Education, I would like to congratulate all the participants for their valuable contribution to the conference. Without the energy and input of the delegates, no conference can succeed.

Based on feedback from the participants, I believe that we all left the Conference very much inspired by what we had heard and discussed. I also believe that the Conference has paved the way for further dialogue, interaction and international collaboration to reinvent educational systems towards more participatory and sustainable development. I hope that we have collectively started the process of removing the walls that often surround education institutions.

This volume, a collection of keynote speeches and papers presented at the Conference, will serve to continuously remind and inspire us to keep that vision alive.

I recommend these proceedings to you; and take the opportunity to extend an invitation to all to join us for the upcoming conference to be held in Ulm. Both Ulm University and the International Centre for Innovation in Education (ICIE) are very excited about the upcoming conference at Ulm, Germany (August 24-27, 2009). Action plans are certainly underway.

Taisir Subhi Yamin
Editor,
Director, ICIE
Ulm-Germany

Conference Feedback

"Thank you very much for inviting me to the Congress and for the warm hospitality extended to me during my stay in Paris. You have done a magnificent job of organizing this event and promoting awareness about creativity and giftedness to the European community as well as others that were there from other parts of the world. I am proud to have been a part of the first ICIE congress and hope to continue to work with you in the future."

Joseph S. Renzulli

"It is fair to say that this Conference has set a high standard. Overall the Conference was very successful in achieving its objectives."

Ken McCluskey

"I really enjoyed the Paris conference and was very glad to see so many people I knew. Well done!"

Joan Freeman

"It was very interesting the congress you have organized. Great names in the field of giftedness and creativity!! Congratulations!"

Sara Ibérico Nogueira and Leonor Almeida

"Congratulations for a very well-planned, informative, and stimulating conference. I'll give it a rating of 10 on a ten-point scale; one of the best international conferences I have attended."

Flor Reyes

"The conference was really very useful, interesting and valuable. I will share the new ideas with my university colleagues."

Daiva Karkockiene

"Thanks for this excellent conference!!"

Hanna David

"... what a powerful job you all did in Paris ... I can't tell you how much I appreciate being part of the move and I hope I may contribute to its energy! Congratulations to you and everyone involved .... Thank you so much for involving me ... I deeply appreciate the honor and opportunity ... it was great ... not soon forgotten ...."

Trevor J. Tebbs

"Thank you very much for the wonderful conference."

Vladislav Rajkovic

"Thank you for the wonderful conference. It was a pleasure to meet fellow colleagues from around the globe. Especially those who are working with or for the gifted pupils. I hope to take part in other ICIE events."

Ruta Gouriou

"I really enjoyed the conference, which I thought was well-organized, interesting and informative."

Ioannis (John) Kougias

"You offered all of us a precious opportunity to meet with this wonderful tapestry of academicians. Our days in Paris were wonderful and I believe that every one of us has won new friends. Your organization was excellent and I wish you more success in the forth coming conferences."

Elnour Hamad

“Big name speakers. Inspirational presentations and talks. The opportunity to talk to people from other countries about their work. The time and opportunity we had to discuss amongst ourselves what we'd seen and heard and to formulate plans for the future of our work.”

Jane Maguire

“Thanks very much for organising such an excellent conference.”

Patrick Costello

“I extend my thanks and gratitude for your organisation of ICIE Conference. It was enlightening to listen to some of the keynote speeches and the presentations which were applicable to my own interests and areas of research.”

Audrey Beaumont

“I think your conference went very good. You did a marvelous work and got it right. Congratulations!!”

Christer Johannesson

“Thanks for making the conference interesting and enjoyable.”

Lynn D. Newton

“I appreciated your extreme geniality and inspiring professionalism which were instrumental to the success of the Conference.”

Miloud Barkaoui

Excellence in Education 2008:

Future minds & Creativity

Paris-France (July 1-4, 2008)

Sandra Linke
Organizational Committee member

"To raise new questions, new possibilities, to regard old problems from a new angle, require creative imagination and marks real advance in science." **Albert Einstein**

Partnership

This conference was a partnership between the International Centre for Innovation in Education (ICIE) and the Université Paris Descartes. The partnership came about through the ICIE and the university educational institutions interest in promoting excellence in education. It was organized by both Prof. Dr. Taisir Subhi Yamin (Scientific Director, ICIE) and Prof. Dr. Todd Lubart (Chairman of the Organizing Committee).

The ICIE

The International Centre for Innovation in Education (ICIE) is committed to the development of all learners as productive world citizens and leaders for the future. The next, second International Conference will take place in Ulm in 2009. It is already planned and will provide a conference programme with the highest calibre of: Nobel Prize winners, keynote speakers, invited speakers, and a large number of scholars and presenters alongside a selection of exhibitors.

The mission of the ICIE is to empower every person to become a responsible, self-directed, lifelong learner through a positive partnership of families, teachers, scholars in gifted education, ministries of education and community.

The ICIE is committed to the following aims and objectives: **Screen** and identify the gifted and talented as early as possible; **Enhance** the general public awareness and create a climate of acceptance and recognition that gifted, creative, and talented children are valuable global asset whether disabled or able bodied, from advantaged or disadvantaged backgrounds, or from developing or developed countries; **Initiate**, conduct, and support research into the nature of giftedness, talent, and creativity, and the education and development of gifted, creative, and talented children; **Disseminate** the findings of research and provide a database for researchers; **Establish** means for a continuing worldwide exchange of ideas, experiences, and teaching and teacher-training techniques relevant to gifted, creative, and talented children; **Persuade** governments to recognize gifted children as a category for special attention in normal educational programmes, and to cooperate with national and other organizations for gifted and talented children who share these purposes (e.g., The National Research Center on the Gifted and Talented (NRC/GT), and The International Association of Educators for World Peace); **Design**, develop and organize activities, forums and programmes that bring together gifted, creative and talented children worldwide; **Assist** educational system in capacity building and qualify teachers to work with the gifted and talented children; and **Provide** guidance, counselling, and consultation.

Conference Aims and Objectives:

The theme of the conference "Excellence in Education: Future Minds and Creativity" reflects the aims and objectives of the conference to learn from each other on how to improve collaboration, and to: ● Encourage volunteer spirit; ● Promote excellence and sustain quality; ● Connecting Communities; ● Strive for improvement; ● Evolve responsibly; ● Meet community expectations of quality; ● Sustain competitiveness and viability; and ● Balance innovation with core essentials.

Categories and programme:

The conference took place in Paris and started on July 1, 2008. More than **235** papers were discussed during the conference. The conference's statistics reveal that: seven categories were addressed (e.g., *Creativity and Innovation***;** *Gifted Education***:** models of excellence in education;

Learning Environment: standards and curricula, tasks and materials, and communication; *Technology and e-Learning*; *Instructors and Teacher*: competencies, teaching methods, and staff development; *Learner*: competencies, individual differences, intervention and development; *Programme Development*: examples, planning models and components, implementation and evaluation; *Integrated Services*: guidance and counselling, community services, and mentorship; and *Future Trends*: globalisation and networking); **18** pre/ post-conference workshops were conducted; **10** keynote speakers were invited; **350** participants have joined this conference representing **56** countries; **17** posters were presented; **3** seminars were organized; and a number of social events were held for all the participants.

The conference did provide the participants with the opportunity to: ● **Explore** the latest developments in Education; ● **Examine** the need for sustainable educational systems; ● **Integrate** the latest technology into the education system; ● **Debate** the future of education – What are the challenges ahead? ● **Learn** from innovative case studies where educational institutions and LEA's have taken the initiative; ● **Engage** in a series of seminars designed to debate the theory and practice of real improvement in education; ● and **Participate** in pre-conference workshops designed to develop participants' competencies, exchange interdisciplinary ideas in small groups and discuss personal experiences in depth.

Thanks to the very active participation from around the world, we assume that the most important questions on how to improve collaboration were addressed.

Keynote Speakers:

Living With Gifts and Talents

In the first keynote speech, "*Living With Gifts and Talents*", **Joan Freeman** looked at what can and did happen to the gifted and talented throughout life from early childhood to mature adults. She examined how pressures, promises and opportunities influence the way individuals approach the world and how that affects the development of their exceptional potential.

Future Possibilities for Education and Learning by the Year 2030

In the second keynote speech, "*Future Possibilities for Education and Learning by the Year 2030*", **Jerome Clayton Glenn** (Director, the Millennium Project) addressed a number of questions, including: What might surprise us today about 2030? What are some of the educational and learning possibilities by the year 2030? What might we do today to take advantage of these emerging possibilities? Which country would be in a better position for the emerging global knowledge economy? Which country would have produced more students ready for today's complexities and opportunities?

To answer these questions, the keynote speaker reported the outcomes of the Millennium Project which reviewed futurist thought to design a Real Time Delphi which collected the judgments of 213 experts around the world. This project assessed 19 possibilities: 1. National programs for improving collective intelligence; 2. Just-in-time knowledge and learning; 3. Individualized education; 4. Use of simulations; 5. Continuous evaluation of individual learning processes designed to prevent people from growing unstable and/or becoming mentally ill; 6. Improved individual nutrition; 7. Genetically increased intelligence; 8. Use of global on-line simulations as a primary social science research tool; 9. Use of public communications to reinforce pursuit of knowledge; 10. Portable artificial intelligence devices; 11. Complete mapping of human synapses to discover how learning occurs and thereby develop strategies for improvement of learning; 12. Means for keeping adult brains healthier for longer periods; 13. Chemistry for brain enhancement; 14. Web 17.0; 15. Integrated life-long learning systems; 16. Programs aimed at eliminating prejudice and hate; 17. E-Teaching; 18. Smarter than human computers; 19. Artificial microbes enhancing intelligence These possibilities present a broad array of policy choices and options which can inform the policy-making process.

Educating for Creativity

Educating for creativity can change for the better the way students think. It is therefore alarming that most schools, if anything, discourage such education. In his keynote speech, "*Educating for*

Creativity", **Robert J. Sternberg** described some basic principles of educating for creativity. Then he described results of studies on (a) teaching for creativity and (b) assessing for creativity, showing that concrete empirical data support the viability of educating for creativity. Finally, he presented the general implications for education and society, including the tragedy of cognitively rigid leaders who waste a lot of useful potential and put the world in peril on a daily basis.

Application of the Schoolwide Enrichment Model

"Differentiation" is on of the contemporary buzzwords in curriculum and instruction, but the reality is that most teachers simply do not have the time necessary to do it well! Remarkable advances in instructional communication technology (ICT) have now made it possible to provide high levels of enrichment services to students who have access to a computer and the Internet. In his keynote speech, "*Application of the Schoolwide Enrichment Model*", **Joseph S. Renzulli** described a theory based and research supported program plan called the Schoolwide Enrichment Model and an Internet based application that is built on a learning theory that focuses on the development of creative productivity through the application of knowledge rather than the mere acquisition and storage of knowledge. The program, called the Renzulli Learning System (RLS; www.renzullilearning.com), goes beyond the popular "worksheets-on-line" or courses on line that, by and large, have been early applications of ICT in most school situations. The RLS is a comprehensive program that begins by providing a computer-generated profile of each student's academic strengths, interests, learning styles, and preferred modes of expression.

Recognizing and Nurturing Talent in At-Risk Populations

In the fifth keynote speech, "*Recognizing and Nurturing Talent in At-Risk populations*", **Ken McCluskey** focused on several made-in-Canada projects in which Creative Problem Solving and mentoring have been employed effectively with at-risk populations: Lost Prizes turned around the lives and increased the productivity of many talented but troubled dropouts; Northern Lights increased the graduation rates of needy Native youth; and Second Chance markedly reduced recidivism among Native inmates. Current mentoring initiatives targeting students at risk for school failure, dropping out, alienation, and gang involvement are also considered.

The Science of Creative Thinking

Although the concept seems vague and elusive to most people, creativity can be studied scientifically. Creativity encompasses many different cognitive structures, such as conceptual combinations, pre-inventive forms, and mental sets, and processes, such as analogical transfer, restructuring, abstraction, and remote association. There is no Unitary "creative process"; the science of creative cognition deals with the complex interacting components of creative thinking, as is done in other areas of cognitive experimental science, such as memory, language, or decision-making. In his keynote speech, "*The Science of Creative Thinking*", **Steve Smith** considered these cognitive elements of the creative process, focusing especially on cross-disciplinary principles of creativity and innovation, and he addressed several common paradoxes of creativity. In addition, he described experimental studies of creative cognition, many focusing on the question of how creative ideas pop into one's head. His approach has focused on the theory that moments of insight represent escape from initial fixation, and that fixation can be caused by implicit memory processes that are difficult to deliberately overcome. So-called "incubation effects" can be caused by escape from fixation, when seductive but obstructing approaches initially used are finally forgotten. He described studies that align experimental methods across levels of complexity, ranging from naturalistic settings to controlled laboratory conditions; such alignment permits laboratory studies to make more ecologically valid conclusions.

Recognizing and Nurturing Creativity: Powerful Tools for Managing Change

The contemporary Creative Problem Solving (CPS) model, drawing on more than five decades of theory, research, and practice, has evolved into a powerful, multi-faceted system for enabling individuals and groups (of all ages and in all settings) to think creatively and critically, solve complex

problems, and deal effectively with the realities of rapid change. In his keynote speech, "*Recognizing and Nurturing Creativity: Powerful Tools for Managing Change*", **Donald J. Treffinger** addressed methods and tools that build on research and provide practical guidance for individuals and groups in education, business, or other organizations.

Active Learning and Passive Students

In the next keynote speech, "*Active Learning and Passive Students*", **Douglas A. Bernstein** introduced a variety of classroom active learning methods will be suggested for use in teaching introductory to advanced courses. This was a talk for faculty and/or graduate teaching assistants who were looking for ways to combat the passivity of students who expect to do no more than sit and listen during class.

Ontogeny of Psychism: Proposition of Two Modes of Information Processing

In the course of his keynote speech, "*Ontogeny of Psychism: Proposition of Two Modes of Information Processing*", **Jean-Pol Tassin** suggested the existence of two modes of processing information in the central nervous system. A rapid mode, called analogical, where information is processed and recorded unconsciously, and a slow cognitive mode, where information is consciously analysed before being stored. In a newborn, only the analogical mode is functional and the cognitive mode develops as the individual matures. In an awake adult, the two modes are in constant fluctuation. According to Jean-Pol Tassin, intelligence would correspond to the capacity of each individual to take advantage of these two modes of information processing. Three criteria may be crucial: the rate and the quantity of information which can be processed in the analogical mode, the time length during which cognitive mode can be maintained and the conditions which control the oscillations between the two modes. Among these three criteria, the first two ones are probably genetically determined.

Creative Fun-damentals: Story, Improvisation, and Sample Behaviours to Enhance Creativity

In the last keynote speech, "Creative Fun-damentals: Story, Improvisation, and Sample Behaviours to Enhance Creativity", Greg Farley presented a number of simple behaviours which could be employed to enhance creativity.

If you are interested in the content of the abstracts and conference programme, you are kindly invited to access the following website: www.icieconference.net

The Coming Conference

The coming conference is a partnership between the International Centre for Innovation in Education (ICIE) and Ulm University in addition to a number of European and international institutions. "Excellence in Education 2009: Leading Minds Creating the Future" will take place in Ulm-Germany (August 23-27, 2009).

The International Centre for Innovation in Education (ICIE)

Mission

To empower every person to become a responsible, self-directed, lifelong learner through a positive partnership of families, teachers, scholars in gifted education, ministries of education and community. The ICIE will be committed to the development of all students and teachers as productive world citizens and leaders for the future.

Vision Statement:

We believe that: everyone can learn; education is learner-centered; education prepares learners for solving real life problems; continual personal and professional growth is vital; technology is essential to education; education can actively link the community; assessment and evaluation are critical steps in the cognitive process.

Aims and Objectives:

The ICIE could establish a link between regional programmes designed to serve the gifted, creative, and talented children. ICIE is committed to the following aims and objectives:

Screen and identify the gifted and talented as early as possible;

Enhance the general public awareness and create a climate of acceptance and recognition that gifted, creative, and talented children are valuable global asset whether disabled or able bodied, from advantaged or disadvantaged backgrounds, or from developing or developed countries;

Initiate, conduct, and support research into the nature of giftedness, talent, and creativity, and the education and development of gifted, creative, and talented children;

Disseminate the findings of research and provide a database for researchers;

Establish means for a continuing worldwide exchange of ideas, experiences, and teaching and teacher-training techniques relevant to gifted, creative, and talented children;

Persuade governments to recognize gifted children as a category for special attention in normal educational programmes, and to cooperate with national and other organizations for gifted and talented children who share these purposes (e.g., The National Research Center on the Gifted and Talented (NRC/GT), and The International Association of Educators for World Peace);

Design, develop and organize activities, forums and programmes that bring together gifted, creative and talented children worldwide;

Assist educational system in capacity building and qualify teachers to work with the gifted and talented children; and

Provide guidance, counseling, and consultation.

Our Values and Beliefs:

Value Education: We value lifelong learning opportunities that respond to the needs of gifted, creative and talented students and their parents and teachers and are accessible, affordable, and of the highest quality;

Value Students: We value students as the primary reason we exist. We respect their diverse life experiences, value their achievements, and appreciate their contributions to our learning community;

Value Excellence: We invite innovation, support creative problem-solving, and encourage risk-taking;

Value Cooperation: We value teamwork, cooperation, and collaboration as a part of our continuous improvement efforts;

Value Honesty and Integrity: We believe academic and personal honesty and integrity are essential elements in our educational environment;

Value Freedom: To foster our virtual educational environment, we respect individual rights and the privacy of our customers, and encourage dialogue and the free exchange of views;

Value Fairness: We advocate fairness and just treatment for all customers;
Value Responsibility: We are all responsible for making our learning experiences significant and meaningful. We are accountable to our customers for the efficient and effective use of resources; and
Value Public Trust: We honor the trust placed in us by you to prepare our children for their role as productive world citizens.

ICIE Fields of Work

The ICIE will be able to have contracts in the following fields:
(1) All types of educational consultation;
(2) Staff Development and Capacity Building;
(3) Developing Curricula and Instructional Materials;
(4) Developing e-Learning courses;
(5) Developing e-learning systems for both Universities and Schools;
(6) Conducting evaluation studies and research;
(7) Introducing Renzulli Learning System into the European Educational Systems;
(8) Publishing books, handbooks, journals, newsletters and other materials;
(9) Developing European programmes for the gifted and talented children; and
(10) Organizing conferences and semi-conferences in Europe.

Contact Us

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(C.6) Livio Riboli-Sasco & Francois Taddei, Training in scientific research for motivated high-school and undergraduate students.

(C.7) Lynn Hogue, Arlyne Sarquis, Weighing Risks and Promoting Scientifically Sound Choices.

(C.8) Ozlem Yagcioglu, How to Motivate and Assess Students in the English Preparatory Classes and in the Undergraduate Level of the English Medium Programmes at Dokuz Eylul University.

(C.9) Gillian Eriksson, Developing Inter-Cultural Excellence and Creative Productivity in graduate online Gifted Education programs.

(C.10) Larisa V. Shavinina, Excellence in Education: Lessons from Early Childhood and Adolescent Education of Nobel Laureates in Science.

(C.11) Aytekin Isman, Hasan Basri Gunduz, Ozlem, Barriers to adopting technology for school administrators candidates.

(C.12) Connie Phelps & Jon Hake, The Online Learning Curve.

(C.13) Luz Pérez, The Constructive Self-regulated, Interactive, and Technological Model.

(C.14) Marija Cubric; Maria Banks; Angela Bond; Jane Fletcher; John Hobson; Sheila Luz; Karen Robins, Scaling up wiki-based blended learning environment.

(C.15) Nicolas Berchenko, & Eugene Szeregij, e-Learning in nanotechnology.

(C.16) Berezovska I. & Y. Oryshchyn, General physics teaching in the context of the contemporary humanistic paradigm.

(C.17)

(C.18) Ahmed Al Hamad, Norlaily Yaacob, A. Y. Al-Zoubi, and Asma Al Hamad, An Online Evaluation of a 'User Modelled' Personalized e-Learning Recommender System.

(C.19) Aytekin Isman and Hale Alibaba Erden, Evaluation of the Intelligent Classes in North Cyprus.

(C.20) Constantinos Apostolopoulos; Michalis Kassotakis; Dimitrios Zbainos, Formative Peer Evaluation of Teaching: a Process that Improves Instruction Practice in Greek Secondary Education.

(C.21) Janna Wardman, Secondary Teachers' Attitudes to Full-Year Acceleration.
(C.22) Melda N. Yildiz, Power of Social Interaction Technologies in the Curriculum: Liberating Education from a Textbook Format.
(C.23) Seyed Mahdi Sajjadi, Religious Education and Information Technology: Problems and Challenges.

(C.24) Suzan Duygu Eristi, Teaching Art in a Multicultural Performance by Using ICT.
(C.25) Terrance A. Thomas, ATS and ACE: University/School Partners for GATE.
(C.26) Hanna David, Perfectionism of the gifted religious child in Israel.
(C.27) André Giordan; Monique Binda, Modes of learning: how to change the education to the gifted people?
(C.28) Onur AGAOĞLU; Fatma CAN, First Step into Gifted & Talented Education: An Orientation Model for Gifted and Talented Children in Türkiye.
(C.29)
(C.30) Anthoula Fakoudi and Filiz Polat, Greek teachers' attitudes towards giftedness. The case study of Chios.
(C.31) Şule Güçyeter and Şule Demirel, Teachers' Attitudes toward Gifted Education in Turkey.

(C.32) Wei Wen Lin, Stories of creative teachers in Taiwan: Adversities, transforming and creating.
(C.33) Biswanath P. Bandyopadhyay, Lynette Krenelka, Successful Blended Learning Strategies for the Undergraduate Distance Engineering Degree Program.
(C.34) Fred A. Bonner II Felicia M. Nave, Mary V. Alfred, Chance W. Lewis, Sherri S. Frizell, An Empirical Investigation of the Success Factors Impacting Academically Gifted African American Students in Science, Technology, Engineering and Mathematics (STEM) Disciplines at Historically Black Colleges and Universities (HBCUs).
(C.35) Lynn Hogue; Arlyne Sarquis, Connecting Chemistry Across Borders.
(C.36) Carole R. Beal, and Mike Birch, Technology-based resources for students' problem posing in mathematics.
(C.37) Nadine Dittert & Heidi Schelhowe, Creating instead of consuming - An approach to make children understand tomorrow's technology.
(C.39) Zuraidah Abd Rahman, Hanafi Atan, Omar Majid, Ahmad Hj Mohammad, K. Ramanathan, The Problem Based Learning Approach in Distance Education: The Relationship between Knowledge Construction in the Wiki and the Asynchronous Collaboration in the Learning Management System.
(C.40) Jafar Asgari Arani, Medical Students' EMP Learning through Interactive SMS Platform.

(D.1) Yuh-Yin Wu & Molly Hsieh, Taking over a school: A virtual role play in real life of a pre-service teachers' practicum project.

(D.2) Heinz Neber and Michael A. Anton, Promoting pre-experimental epistemic activities in chemistry education.
(D.3) Kyoung-Mi Kim & Seung-Urn Choe, Middle School Teacher's Teaching Experience of Scientific Inquiry.
(D.4) Sooyoun Han, A Teacher Training Model of 'Teacher-Researcher-Artist' Collaboration for Gifted Education in Arts in Korea: The possibilities and significance.
(D.5) Aytekin Isman, Ozlem CANAN, Onur ISBULAN, Zeliha DEMIR, The efficiency of educational technology and material course.
(D.6) Sandra Linke, Gifted Education in Germany.
(D.7) Connie Phelps; Janet Holland, Around the World with 360 Degree Panoramic Images.
(D.8) Elnour Hamad, Synergizing Selected Visions in Education, Theology and Spirituality for Lessening Skepticism toward the Arts among Muslims.

(D.9) Nguyen Viet Anh & Dam Ho Si, Rules for Adaptive Learning Activities in Web-based Training Course.
(D.10) Ling-Yu Melody; Wen Jun-Yen Wu, The Importance of Technological Creativity as Perceived by Enterprises and Technical Teachers in Taiwan, R. O. C.
(D.11) Christer Johannesson, Saturday Courses for Children in order increases their interest for Science and Technology.
(D.12) Jerome Lo, Curriculum Development Specialist (Education Technology).
(D.13) Regis Blain, Cyclothymia and artistic creativity in gifted adolescents: Evaluation and potential channelization.
(D.14) Mireya Sandoval Aspront & Julieta Flores Michel, New Technologies and continuum education: The role of the Institutions of higher education in the development of work competencies for a non academic population.
(D.15) Ronald Sterkenburg, The Challenges of Increasing Student and Faculty Participation in Study Abroad Programs.

(D.16) Jamila Ammar, L'impact de l'histoire et l'épistémologie des sciences sur le développement du potentiel créatif des étudiants: cas de la microbiologie.

(D.17) Tan Wee Chuen, Hanafi Atan, Baharrudin Aris, Mohd Salleh Abu, The Dynamic Attributes of Learning.

(D.18) Greet de Boer, and Karen van den Broek, From dream to reality (1).

(D.19)

(D.20) Eva Vondrakova, Club of Parents of Gifted Children and its Functions.

(D.21) Selma Mokrani Barkaoui, The Dynamics of Excellence in the Teaching of Literature: Issues and Challenges.

(D.22) Maureen Lilion Klos, Different Hats: Multilingualism a Resource to Draw on or Drawback for Learners of Diverse Englishes.

(D.23) Miran Chun Kyungbin Park, Female Middle School Students' Affective Characteristics Related to Science and Technology Career.

(D.24) Ozlem Yagcioglu, How the First Class Students in the Department of Computer Education and Instructional Technology at Dokuz Eylul University are Learning English During the 2007-2008 Academic Year.

(D.25) Lee Martin, How can we develop creative potential when we were told creativity is magical?

(D.26) Christer Johannesson, Weekend Courses for Children.

(D.27) Dimitrios Zbainos & A. Anstasopoulou, The role of creative music activities in Greek compulsory education: An investigation of Greek music teachers' perceptions.

(D.28) Hedviga Ortancikova, Logical games as additional method by teaching algorithm.

(D.29) Ioannis Kougias; Dimitrios Kalogeras; Georgios Polyzos; Vassilios Triantafillou, Open Source Code and Informatics in enhancing the teaching of mathematics.

(D.30) Mi-Ja Nam, Heesook Yoon, Dae Hong Jeong, Hee K. Chae, Comparison between Textbooks' Description and Teachers' Conception of Chemical Reaction Rates and Improvement of an Experiment Condition On the Reaction between HCl (aq) and Mg (s).

(D.31) Michael F. Shaughnessy, Marcel V.J. Veen, Meta-Cognition- A Review of Recent Research and an Examination of it's Importance in Gited Education.

(D.32) Hanna David, The Talented Arab Girl: Between Tradition and Modernism.

(D.33) Jerri L. Frantzve, Deborrah M. Himsel, Lisa R. Martin & Victoria Davis, Global Action Learning: In and Out of the Classroom.

(D.34) Sevim İnal; Oya Buyukyavuz, Identifying Turkish Students' Learning Style Preferences and the relationships between their Gender, Class level and Culture.

(D.35) Aynur Yürekli & Gülriz İmer, Teacher Trainees' Educational Software Development self-Efficacy with respect to Different Variables.

(D.36)

(D.37) Miloud Barkaoui, The Intelligent Cultural Classroom: Strategies for Innovation and Assessment.

(D.38) Bachira Tomeh, Collaborative Learning: What About Limitations and Drawbacks?

(D.39) Numan Mohammed Saleh AlMusawi, Teachers' Attitudes toward Gifted Education in Bahrain and Kuwait and their Relationship to some variables.

(D.40) Cuche Catherine, Brasseur Sophie, Genicot Anne-Sophie, Braconnier Victor, Goldschmidt Isabelle, School adaptation of gifted and talented children.

(E.1) Christy Rochelle Bressette, Success in Community-based Aboriginal Education.

(E.2) Hanafi Atan, Foo Kok Keong, Baharudin Aris, Wong Su Luan, Omar Majid & Zuraidah Abd Rahman, The Different Roles of Pedagogical Agents in the Open Source Learning Management System.

(E.3) Kim-wah CHUNG; Alicia Ji QI, Education as Basic Social Protection for Rural Children.

(E.4) Majida Mehana, Challenges of Practicing Early Childhood Education.

(E.5) Dimitrios Zbainos; Hara Hala, Assessing co-operative teaching: Greek pupils' attitudes towards it.

(E.6)

(E.7) Uros Rajkovic, Olga Sustersic, Vladislav, Educational Aspects of Three Methods of Accessing International Classification for Nursing Practice.

(E.8) Jason C. Chan, Systems View of Non-Main Stream Creative Literature in Yuan, Ming and Qing Dynasties of China.

(E.9) Juliana D. Yousif, The Status of Education in Iraq: Past Worries and Future Aspirations.

(E.10) Khalil Ibrahim Al-Kanaani, The Role of Globalization Education on Developments and Productivity.

(E.11) Flordeliza C. Reyes, A Model of Teaching Expertise: The Philippine Experience.

(E.12) Yonglei Tao and Yanxia Jia, Facilitating Communication Between Students and End-Users in Collaborative Design Projects.

(E.13) Maria de Fátima Goulão, To teach to learn in the society of the knowledge: What it means to be Professor?

(E.14) Rosamaria Cisneros Kostic, The Paradoxical Stage of Teaching- What makes the classroom similar to the Flamenco Performance Arena?

(E.15) Yong Se Kim; Jung Ae Park, Toward a Creative Design Learning Framework.

(E.16) Al-Zoubi A. Y., Jarir Nsour and Hatem Bakhiet, Design and Implementation of Remote Experiments for an Electronic Engineering Laboratory.

(E.17) H. Pires; M. Rebocho; A. A. Candeias; G. Franco; M. Charrua; H. Barahona; O. Matos; E. Pires; F. Leal; M. Mira, Parents' perception about socio-emotional competences in Portuguese gifted children.

(E.18) Fatin Aliah Phang binti Abdullah, Patterns of Physics problem-solving among secondary school students - a metacognitive perspective.

(E.19) Rachel Zahn, Balance as a Function of Intelligence: proprioception and its relationship to excellence.

(E.20) Jolana Laznibatova, Lubica Vrankova, Grammar and High School for gifted children: Support and Education of Gifted Children in Slovakia**.**

(E.21) Pin-Chen Lin, Students' attitude toward science and NOS in Taitung, in Taiwan.

(E.22) Ronald Tang Wai-yan, Ethical leadership: the foundation of excellence and creativity in education.

(E.23) Violeta Arancibia, D. Preiss, M.MuÃ±oz, R. Rosas, E.San MartÃn, S.Valenzuela, Use of Creativity Test to identified 6 to 10 years-old talented children of low-income schools in Chile.

(E.24) Wieslawa Limont, Specific and creative abilities.

(E.25) Evelyne Treinen, & Barbot Baptiste, Effect of stimuli on figural divergent thinking abilities among adolescent.

(E.26) Saphia Richou, The Millennium Global Prize on the 15 Challenges of the Millennium Project: Educating school children to prepare the future.

(E.27) Anna Kutna, Models of education technologies in universities.

(E.28) Hassan Sharafuddin, Internet, Information Technology and Higher Education in Yemen.

(E.29) Iman Sadek Zainy Alansari, Prompt and Relevant Feedback in e-Learning.

(E.30) Manzil Maqsood, Developing a Quality Maturity Process Model to improve the use of ICT in Primary School Systems of Developing Countries.

(E.31) Porandokht Fazelian, Instructional Design Based on Humanistic Views.

(E.32) Sabah Balta, "Prospective University Student's Way of Internet Use While Preparing Their Projects: Case of Tourism & Hotel Management Department at the Yasar University in Turkey".

(E.33) Abdullah Fahad Almoziraee, Learning from Multimedia Presentation: A Cognitive Load Theory Approach.

(E.36) Robert D. Knecht, Situational Leadership and Project Scheduling Keys to Engineering Design.

(E.34), (E.35) Meeting: Excellence in Education 2009

(E.37) Evgenia T. Meletea, Traditional Heritages and Sciences Influences from Genetics to Education.

(E.38) Frances R. Spielhagen, Motivation in the Middle: Academic Engagement among Young Adolescent Students.

(E.39) Gaetano Bruno Ronsivalle; Piera Vivolo; Antonella De Luca; Sara Bianchi, Diagnostic evaluation of competences. A new model based on Complex Systems Theory.

(E.40) Li-juing Wu and Wan-Ting Peng, The stories of homework from Taiwan: Nature vs. Nurture.

(F.1) Kwang Il, Kang and Mi Hee Ban, A teaching strategy using blending module of art and biology for the science gifted students with individual difference.

(F.2) Sancho, M.T.; Fernández-Muiño, M.A.; Rovira, J.; Alonso-Torre, S.R.; Cavia, M.M., of the Subject "Food and Culture" Lectured at the University of Burgos (Spain) to the European Higher Education Space.

(F.3) Dora Balic-Zunic, Motivation in the early learning of the foreign language other than English.

(F.4) Anthoula Fakoudi; Filiz Polat, Greek teachers' attitudes towards giftedness. The case study of Chios.

(F.5) Eva Vondrakova, GC Education: Experience, Policy, Plans, and Cooperation**.**

(F.6) Brasseur Sophie, & Gregoire Jacques, The development of the emotional intelligence of gifted adolescents.

(F.7.1) Sara Ibérico Nogueira; Leonor Almeida, Qualités psychométriques du Test for Creative Thinking – Drawing Production: études avec des enfants Portugais du premier et du deuxième cycles d'études.

(F.7.2) Sara Ibérico Nogueira ; Leonor Almeida, Evaluation de la Créativité: le Test for Creative Thinking-Drawing Production (TCT-DP). Concept, application et études portugaises.

(F.8) Alonso-Torre, S.R.; Cavia, M.M.; Fernández Muiño, M.A.; Sancho, M.T., Adaptation of the Subject "Human Nutrition" Lectured at the University of Burgos (Spain) to the European Higher Education Space.

(F.9) Min Soo Jung, Miran Chun, Hee.K Chae, Questioning Styles in Korean gifted education programs for the scientifically gifted: Focus on Chemistry.

(F.10) Maciej Karwowski; Izabela Lebuda; Ewa Wiśniewska, Creativity and Effectiveness of Functioning in Polish School: The role of the Level and Style of Creativity

(F.11) Chin-hsieh Lu, Embodiment: The way of creative problem-finding.

(F.12) Daiva Karkockienė, Some features of Creativity fostering program among middle and upper school age students (12-17 y.o.).

(F.13) Sing Lau & Toby Tong, What Makes Creative Teaching Possible among Primary and Secondary School Teachers in Hong Kong.

(F.14) Magdy Kheir Eldeen Kamel; Ahmed Hassan Hemdan; Tarek Salaam Sayed, The Effect of Using Dimensions of Thinking Model in Developing Map Reading Skills and Creative Thinking Abilities of Elementary students.

(F.15) Kirsten Jæger, Problem-based learning facing globalized education. Can PBL deliver global excellence?

(F.16); (F.17) Excellence in Education 2009.

(F.18) Florbela Nunes & Adelinda Candeias, Creativity and Competitiveness - analysis of the factors facilitators or inhibitors, from a case study with an artist.

(F.19) Bader Nasser Al-Barak; Mohamed Roshdy Ahmed Al-Morsi, Obstacles Against Creativity in Family and School Environments: A case study about Kuwaiti primary students**.**

(F.20) Sayed Mahdi Golestan Hashemi, Educational Creatology: TRIZ and Creative Learning.

(F.21) Sumalee Waiyarod, Enhancing Creative Productivity by Using 4E-C Learning Model for Scientifically Gifted and Talented Students.

Pre-Conference Workshops — July 1, 2008

Tuesday (July 1, 2008: 9-12):

Code	Title	Conductor
W1	Advanced Models in e-Learning & School Management.	**Taisir Subhi Yamin** (Université Paris Descartes; France) **Sandra Linke** (Universität Braunschweig; Germany)
W2	Programming for Talent Development: Issues and New Directions.	**Donald J. Treffinger** (Centre for Creative Learning; U.S.A.)
W3	Creating Creative, Cooperative Environments Creatively and Cooperatively.	**Ken McCluskey** (University of Winnipeg, Canada)
W4	Definitions of Giftedness and Cultural Perspectives: How our community values underpin the 'who', 'what', and 'why' in developing identification procedures and provisions for gifted.	**Sonia White** (Auckland University, New Zealand)
W5	Problem-Based Learning: An Experienced-Based Introduction.	**Heinz Neber** (University of Munich, Germany)
W6	Creativity: Giftedness and Education.	**Todd Lubart** (Université Paris Descartes; France)

Tuesday (July 1, 2008: 14-17):

Code	Title	Conductor
W7	ADHD: Disorder or Gift?	**Ken McCluskey** (University of Winnipeg, Canada)
W8	How to Conceive and Identify Giftedness and Talent.	**Maria Pereira-Fradin & Xavier Caroff** Université Paris Descartes; France
W9	Building Programmes for the Gifted: Types and Components.	**Heinz Neber** (University of Munich, Germany)
W10	Programming for Talent Development: Issues and New Directions.	**Donald J. Treffinger** (Centre for Creative Learning; U.S.A.)
W11	Definitions of Giftedness and Cultural Perspectives: How our community values underpin the 'who', 'what', and 'why' in developing identification procedures and provisions for gifted.	**Sonia White** Auckland University, New Zealand
W12	Creativity: Giftedness and Education.	**Todd Lubart** (Université Paris Descartes; France)

First Day (Wednesday) July 2, 2008

- **07:30 – 08:45** Registration
- **08:45 – 09:30** Opening Ceremony
- **09:30 – 10:30** Keynote Speaker, **Joan Freeman**: *Living with Gifts and Talents*
  Chair: **Taisir Subhi Yamin**
- **10:30 – 10:45** Coffee Break

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
10:45 – 12:30	Creativity Chair: **Beth Howell** (A.1) (A.2) (A.3) (A.4)	Gifted Education Chair: **Fred A. Bonner** (B.1) (B.2) (B.3) (B.4)	e-Learning & Ed. Tech. Chair: **Catherine Renoult** (C.1) (C.2) (C.3) (C.4)	Capacity Building Chair: **Heinz Neber** (D.1) (D.2) (D.3) (D.4)	General Topics Chair: **Christy Bressette** (E.1) (E.2) (E.3) (E.4)	Symposium (1) Chair: **Se-Hwa Wu** **Jing-Jyi Wu**

- **12:30 – 13:30** Lunch
- **13:30 – 14:30** Keynote Speaker, **Jerome Clayton Glenn**: *Future Possibilities for Education and Learning by the Year 2030*
  Chair: **Alain Kokosowski**

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
14:30 – 15:45	Evaluation Chair: **Marcelino Pereira** (A.5) (A.6) (A.7) (A.8)	e-Learning & Ed. Tech. Chair: **Wan Ng** (B.5) (B.6) (B.7) (B.8)	Capacity Building Chair: **Lynn Hogue** (C.5) (C.6) (C.7) (C.8)	General Topics Chair: **Connie Phelps** (D.5) (D.6) (D.7) (D.8)	Evaluation Chair: **Uros Rajkovic** (E.5) (E.6) (E.7) (E.8)	Poster (F.1) (F.6) (F.12) (F.2) (F.7.1) (F.7.2) (F.3) (F.8) (E.20) (F.4) (F.9) (F.5) (F.10)

- **15:45 – 16:00** Coffee Break

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)
16:00 – 17:00	Creativity Chair: **Lynn Newton** (A.9) (A.10)	Gifted Education: Chair: **C Weixlbaumer** (B.9) (B.10)	Excellence Chair: **L. Shavinina** (C.9) (C.10)	e-Learning & Ed. Tech. Chair: **Ling-Yu Melody** (D.9) (D.10)	General Topics Chair: **Juliana Yousif** (E.9) (E.10)

- **17:00 – 18:30** Keynote Speaker, **Robert J. Sternberg**: *Educating for Creativity*
  Chair: **Todd Lubart**

- **18:30 – 20:00** Cocktail & Music

Second Day (Thursday) July 3, 2008

- **08:30 – 10:00** Keynote Speaker, **Joseph S. Renzulli**: *Application of the Schoolwide Enrichment Model*
  Chair: **Taisir Subhi Yamin**
- **10:00 – 10:15** Coffee Break

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
10:15 – 12:15	Excellence Chair: **Huda Buslama** (A.11) (A.12) (A.13) (A.14) (A.15)	Gifted Education Chair: **Zafra Lerman** (B.11) (B.12) (B.13) (B.14) (B.15)	e-Learning & Ed. Tech. Chair: **Luz Pérez** (C.11) (C.12) (C.13) (C.14) (C.15)	Capacity Building Chair: **R. Sterkenburg** (D.11) (D.12) (D.13) (D.14) (D.15)	General Topics Chair: **Rosamaria Kostic** (E.11) (E.12) (E.13) (E.14) (E.15)	Creativity Chair: **Sing Lau** (F.11) (.....) (F.13) (F.14) (F.15)

- **12:15 – 13:15** Lunch
- **13:15 – 14:15** Keynote Speaker, **Jean-Pol Tassin**: *The Development of Thought: Two Modes of Information Processing*
  Chair: **Xavier Caroff**

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
13:15 – 14:15	(A.16) (A.17)	(B.16) (B.17)	(C.16) (C.17)	(D.16) (D.17)	(E.16) (E.17)	(F.16) (F.17)

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
14:15 – 15:45	Capacity Building Chair: **Theresa Lewis** (A.18) (A.19) (A.20) (A.21)	General Topics Chair: **C. Johannesson** (B.18) (B.19) (B.20) (B.21)	Evaluation Chair:**Janna Wardman** (C.18) (C.19) (C.20) (C.21)	Excellence Chair: **Greet de Boer** (D.18) (D.19) (D.20) (D.21)	Practices Chair: **Pin-Chen Lin** (E.18) (E.19) (.....) (E.21)	Creativity Chair: **Adelinda Candeias** (F.18) (F.19) (F.20) (F.21)

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	Lecture Hall (F)
15:45 – 17:15	Creativity Chair: **Iman Osta** (A.22) (A.23) (A.24) (A.25)	Gifted Education Chair: **Eva Vondrakova** (B.22) (B.23) (B.24) (B.25)	e-Learning & Ed. Tech. Chair: **Muntasser Khater** (C.22) (C.23) (C.24) (C.25)	Capacity Building Chair: **Maureen Klos** (D.22) (D.23) (D.24) (D.25)	Creativity Chair: **Wieslawa Limont** (E.22) (E.23) (E.24) (E.25)	Symposium (3) Chair: **Evgenia T. Meletea**

- **17:15 – 18:15** Keynote Speaker, **Ken McCluskey**: *Recognizing and Nurturing Talent in At-Risk Populations*
  Chair: **Bachira Tomeh & Sandra Linke**
- **19:00 – 22:00** Dinner

Third Day (Friday) July 4, 2008

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)
08:00 – 09:45	General Topics Chair: **Silvia Friedl** (A.26) (A.27) (A.28) (A.29) (A.30)	e-Learning & Ed. Tech Chair: **Ezz Hattab** (B.26) (B.27) (B.28) (B.29) (B.30)	Gifted Education Chair: **Hanna David** (C.26) (C.27) (C.28) (C.29) (C.30)	Practices Chair: **Ioannis Kougias** (D.26) (D.27) (D.28) (D.29) (D.30)	Educational Systems Chair: **H. Sharafuddin** (E.26) (E.27) (E.28) (E.29) (E.30)

- **09:45 – 11:00** Keynote Speaker, **Greg Farley**: *Creative Fun-damentals: Story, Improvisation, and Sample Behaviours to Enhance Creativity*
  Chair: **Olwen Wolfe**

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)
09:45 – 11:00	Excellence Chair: **Gillian Eriksson** (A.31) (A.32) (A.33)	Twice Exceptional Chair: **Trevor J. Tebbs** (B.31) (B.32) (B.33)	Practices Chair: **Wei Wen Lin** (C.31) (C.32) (C.33)	Gifted Education Chair: **Jerri Frantzve** (D.31) (D.32) (D.33)	General Topics Chair: **Sabah Balta** (E.31) (E.32) (E.33)

- **11:00 – 11:15** Coffee Break
- **11:15 – 12:30** Keynote Speaker, **Steve Smith**: *The Science of Creative Thinking*
  Chair: **Todd Lubart**
- **12:30 – 13:30** Lunch
- **13:30 – 14:30** **Animation: The Red Zebra**
- **14:30 – 15:45** Keynote Speaker, **Donald J. Treffinger**: *Recognizing and Nurturing Creativity: Powerful Tools for Managing Change*
  Chair: **Guy Aznar**
- **15:45 – 16:45** Keynote Speaker, **Douglas A. Bernstein**: *Active Learning and Passive Students*
  Chair: **Franck Zenasni**

Time	Lecture Hall (A)	Lecture Hall (B)	Lecture Hall (C)	Lecture Hall (D)	Lecture Hall (E)	
15:45 – 16:45	Twice Exceptional Chair: (A.34) (A.35)	Creativity Chair: **José de Valverde** (B.34) (B.35)	Practices Chair: **Lynn Hogue** (C.34) (C.35)	Practices Chair: **Sevim İnal** (D.34) (D.35)	Meeting Excellence in Education 2009. (E.34); (E.35)	
16:45 – 18:30	Excellence Chair: **Edward Guiliano** (A.36) (A.37) (A.38) (A.39) (A.40)	Practices Chair: **Simon Taylor** (B.36) (B.37) (B.38) (B.39) (B.40)	e-Learning & Ed. Tech. Chair: **Carole R. Beal** (C.36) (C.37) (C.38) (C.39) (C.40)	Gifted Education Chair: **Victor Braconnier** (D.36) (D.37) (D.38) (D.39) (D.40)	General Topics Chair: **F. R. Spielhagen** (E.36) (E.37) (E.38) (E.39) (E.40)	Symposium (2) Chair: **Se-Hwa Wu** **Jing-Jyi Wu**

- **18:30 – 19:00** Closing Ceremony; Excellence in Education 2009

Keynote Presentations

Gifted Lives Over Time

Joan Freeman

Abstract

The major benefit of longitudinal studies is in tracking behaviour as it develops so that early indicators may be recognised, successful developmental procedures promoted for the benefit of others and inappropriate ones discarded. But unless one compares the gifted with other growing children within the context of child development, it is difficult to know what effects can be attributed to giftedness and what to other matters in a child's life.

This study began in 1974 with 70 triads of matched children aged 5-14. One child had been labelled 'gifted', one was unlabelled but equally gifted but unlabelled, and the third was taken at random, all from the same school class. The children labelled gifted were found to have significantly more emotional problems than the non-labelled gifted, though these normally vanished with increasing independence. The effective dynamics for adult success at all levels of ability have been opportunity, hard work, emotional support, and a positive outlook.

Introduction

The main advantage of longitudinal studies of gifts and talents is to watch the development of behaviour, to see the effects of different kinds of upbringing and education on children as they grow up to adulthood. With careful observations, it should be possible to promote what appears to have been successful and discard the mistakes. The main problem with long studies over many years, though, is that when they started things were different. Long-term research is always old-fashioned in the present day, and with the benefit of hindsight it is easy to say - I wouldn't start from there if I were you.

Gifted and talented children are normally selected by their high achievements, either on IQ tests, other forms of attainment or teacher recommendation. But long-term research shows that giftedness may take many different forms. It may be that future gifts are not recognisable at the time the research began so they would not be identified. Who could have predicted the coming of information technology as a career when I started my follow-up in 1974? No school was even teaching it at that time. Gifts may appear in quite unexpected situations and at different points during a lifetime. Grandma Moses, the American folk painter, blossomed in her seventies and became a world figure until she died at 101. Mary Wesley also became a best selling English writer in her seventies. Because of this time-lag in identification, it means that theories and educational programmes designed for children precocious in conventional areas may well miss out those whose gifts do not fit.

The long-term view is also useful for examining the justification for theory and special educational provision for the gifted. How will the ideas of Multiple Intelligences fare, for example, in another thirty years? A recent UK review of international research on Accelerated Learning found little evidence of its effectiveness , though for many schools it is the programme of choice for the gifted and talented (Comford Boyes *et al,* 2004). Not only was the programme found to have a placebo effect but the researchers said it was "voraciously marketed". There is a serious need to follow up the long-term outcomes of special provision for the gifted, whether in or out-of-school hours, in a properly scientific manner, that is with a recognisable methodology which includes carefully matched comparisons from the start. To date I know of no other such work, although the number of long-term studies is growing (Horowitz, F., Subotnik, R. & Matthews, D., Eds., 2008)

A major finding from my long study of gifted and non-gifted children, is that through the lives of the 210 individuals, their families and teachers the only real difference between the gifted and everyone else is - their gifts (Freeman, 2000a: Freeman, 2001). But how other people react to their specialness could make a big difference to the difference to the way the children developed into adults. Being gifted and hence statistically abnormal means facing special challenges. One challenge, for example, is grade skipping or accelerated learning of some kind. Only one of the 17 who were grade-skipped in school (by as much as three years), were happy with that move in their forties. Their main problems, they found, were learning among more mature classmates, missing foundation learning and

losing friends of their own maturity. Another challenge came later to those from modest home backgrounds who gained scholarships to élite universities and faced a daunting, and for a few, a devastating socio-economic divide.

But whatever obstacles the sample had to overcome as gifted children, these were small compared with what they had to accomplish to be seen as highly achieving adults in the world. For every one of these gifted children, turning their childhood prodigiousness into adult excellence was always the most difficult challenge. Life can be cruel. Gifts sometimes had to be pushed aside for the tiresome work of earning a living, and fate turned some lives upside down. How each person reacted to events outside their control could be seen as only partly related to their intellectual ability to cope, but often more closely related to their personalities and views of life. Across the decades, I have seen many times how two people of the same high potential have reacted to a similar obstacle in life. This could be, for example, getting a place at a prestigious university. Where one would see it as exciting and could not wait to get to grips with the challenge, another would take fright and give up. For such reasons, a life outcome may be nothing to do with the individual's gifts and talents

Most who had been identified as gifted, took pride in it and welcomed the status, though of itself the label did not open doors for them. Unfortunately, a few of the gifted were exploited for adult benefit, whether parents or teachers, while for others, their feelings of personal worth were squashed for being 'too clever'. A child's self-confidence could be severely wounded by just one humiliating act by a teacher, as when a boy had his precious poem torn up in front of the class because he had veered from the set subject. Others found continuing distress from the everyday unremitting pressure to achieve brilliantly at all times. Because even for the most gifted this was an impossible task, it brought parental disappointment – some of it still there even as the sample enters middle age. Some individuals feel they were living out others' dreams and weren't appreciated for themselves, and some resentment remains. Again, personality was important. Although some did their best to conform to the image of a clever child, others rebelled against it and refused to fulfil their potential. An unfortunate few were incorrectly labelled as gifted and still suffer because of their inevitable 'failure'.

The reactions to these forces have threaded through the teenage years into adult lives, affecting their success and happiness. The label of gifted was sometimes used as a presentation of the self, providing reasons for their behaviour, as in "I can only talk to the tutors in my college because my fellow students aren't up to my level". Parents used it as an explanation for difficult behaviour, as in "He can't make friends because he is gifted", said in front of a young child. For some subjects the label was like a constantly irritating thorn in their sides as they grew up. They could either learn to live with the discomfort or attempt to remove it by changing their life-styles. One girl, who'd had a bad time with the role of gifted child, said poignantly that she only escaped from it when she had her own children: they did not know about it, she explained, and loved her for herself. One 43 year-old man who has been largely unemployed and unemployable for all his adult life still lets everyone know about his childhood labelled of 'gifted', not least as it once got him on to a TV programme. As a single parent, he says it enables him to recognise the same signs of giftedness in his son as he had, notably poor concentration and inability to make friends!

Gifts and Talents

Here, I've used the word 'gifted' to mean outstandingly high mental ability, and 'talented' to mean outstandingly high artistic ability, though the two overlap, and many in this study enjoyed both. Formal definitions of gifts and talents vary immensely, especially in different cultures; so that no individual could fit them all (Freeman, 2005). Most people see 'gifted' children as being far in advance of their age-group at school, and the 'talented' as little virtuosi acknowledging the applause.

Descriptions of giftedness usually depend on what is being looked for, whether test scores, school marks, solving paper-and-pencil puzzles for an IQ club such as Mensa, or creative work recognised by an expert. Unfortunately, gifts which are vital to the smooth running of society such as entrepreneurship, economics or people-management were rarely considered by the 63 schools in the study. Some of the gifted children could do almost anything brilliantly, whether sport, music or philosophy, while others focussed on a single area, typically mathematics or music. Some were gifted in terms of their sky-high intelligence test results, but even in childhood and with appropriate

education did not show what they were capable of because of family and emotional problems. My concern is with the psychology of giftedness and talent in its many manifestations and with unrecognised high-level potential.

Longitudinal Studies of the Gifted

The major benefit of longitudinal studies is in tracking behaviour as it develops so that early indicators may be recognised, successful developmental procedures promoted for the benefit of others and inappropriate ones discarded. But unless one compares the gifted with other growing children within the context of child development, it is difficult to know what effects can be attributed to giftedness and what to other matters in a child's life. General population statistics do not provide satisfactory comparisons for longitudinal studies in gifted development because they are not focussed on the subject matter (Freeman, 1998). The major debit is that such studies inevitably started a long time ago when things were different, bringing into question the relevance of findings to current circumstances.

Giftedness is a social construct, seen in the selection of children as gifted. Children who fit the current description of gifts and talents are culturally permitted to be recognised as gifted and talented, whereas others because of e.g. minority, disablement, socially awkwardness or gender, may not be (Freeman, 2003; Freeman, 2005). Virtually all follow-up studies of gifted children select those chosen by extremely high scores on IQ or other attainment tests, thus demonstrating recognisable giftedness acceptable within the society at that time. Yet Arnold & Subotnik (1994) have found that giftedness may take many different forms; it may appear in quite unexpected situations and at different points during a lifetime. This means that theories and educational programmes designed for children who are precocious in conventional areas may well miss those whose gifts do not fit either now or in the future. Most gifted adults, even geniuses, never had any special attention for their gifts as children.

Nor are the long-term benefits of special provision for the gifted certain. In spite of an initially higher measured achievement and student feelings of satisfaction, the advantage of gifted education tends to disappear over a few years (White, 1992). Without the long-term perspective, programmes for the gifted may not be justified (Freeman, 2002). For example, a UK review of international research on Accelerated Learning found evidence of its effectiveness to be scientifically poor, "voraciously marketed" and with a strong placebo effect (Comford Boyes, Reid, Brain & Wilson, 2004). Yet for many schools around the world it is the programme of choice for the gifted and talented. The question to be asked of all special programmes for the gifted is how much of the initial boost to achievement is due to the Hawthorne effect, that is to sheer attention and change, and whether the effects last over years.

There are many concerns about the emotional effects and expectations of the label 'gifted'. When parents anticipate emotional disturbance in their gifted children, following a stereotyped view of the gifted and talented, they are far more likely to find such problems. Cornell & Grossberg (1989) found that parents who use the term gifted were more achievement-oriented and diminish their children's emotional expression, typically producing less well adjusted children than the parents who did not use this term.

The Freeman Follow-Up Study

In 1974 when I started this study in Britain, the widespread image of gifted and talented children was of rare creatures with emotional problems. Some people still think of them in that way, especially if their education is described as inadequate (Gross, 2004). But in this long involvement with truly gifted individuals in their daily lives I've seen a very different and much more complex picture which can never be picked up by written questionnaires or telephone interviews. I believe that my long work along with that of others has influenced the perception of children with gifts and talents as being normal but with something special to offer the world.

A major research question was whether there is any difference between children who are labelled as 'gifted' and identically able children who are not so labelled. For comparison, each labelled gifted child was matched with two others in the same school class, making a triad. Each of the three children in the triad was matched for sex, age, education and socio-economic level. Additionally, for each labelled child, the first matched control child was measured as being of identical ability but not seen as

gifted, whereas the second child control child was of random ability (n=210, ages 5-14 yrs, 70 triads). The study across the UK, used a battery of tests, along with decades of long in-depth interviewing with the children, interviews with the parents, class- and head-teachers, and socio-environmental assessments. This is how the whole sample looked in 1974.

THE EXPERIMENTAL GROUPS
INTELLIGENCE MEASURES

Raven raw score

Groups	Mean	SD
Labelled Gifted (T)	34.53	12.85
Matched for Ability (C1)	34.60	11.45
Random Classmates (C2)	28.75	11.58

IQ (Stanford-Binet)

Groups	Mean	SD
Labelled Gifted (T)	147.10	17.41
Matched for Ability (C1)	134.34	17.13
Random Classmates (C2)	119.20	16.09

Groups matched for gender, age and SES

Of the two gifted groups, it was the labelled gifted who were found to have statistically a far higher (1%) level of emotional problems than the non-labelled equally gifted group. The emotional problems were most outstandingly hostility and poor peer relationships. More than three decades on, those childhood problems have largely (but not entirely) disappeared.

This study has remained unique in the world in two ways:

1. *In-depth personal interviewing*. Over the decades this has reached depths of understanding that no other study of the gifted and talented has achieved.

2. *Setting up matched comparisons from the start*. The grave lack of controlled comparisons in research on gifted children has often resulted in the presentation of a false picture, notably that the gifted are easily emotionally disturbed. This is the only longitudinal study ever to have compared emotional development in labelled gifted and non-labelled equally gifted children, and between the gifted and the non-gifted.

This deep approach, bridged by statistical and interpretive analysis, has made it possible to discover the dynamics of the individuals, their families and schools. It has shown how the gifted children emerged into adulthood. It has shown that differences in life outcomes are not only influenced by opportunity, but also by the development of personal factors measured from the start, notably personality, intelligence, economic circumstances and schooling. The effects of these early influences can still be seen in the sample's adulthood, whether they became dedicated scholars, creative mavericks, or plodders.

All the face-to-face interviews were audio recorded and then transcribed. Unexpectedly, they demonstrated the unreliability of memory, such as when the same incident was described by children and parents separately or when as adults the subjects remembered their youth, such as the student I interviewed at Oxford University in the late 1980s. She had been grade-skipped by three years at school, which had not been a happy experience, and on reaching university at 16, found herself young, lonely and often in tears. Twenty years later, though, she remembered her student days as blissful. I

did not remind her how it had really been – in her own words of the time. The police are familiar with memory distortion, but researchers and biographical writers seem strangely unaware of it when they use adult memories as though they were fact.

The primary difficulty in this research, in common with all other long researches, has been in keeping the sample together. To be a valid longitudinal sample, one cannot add fresh subjects to replace the drop-outs; although some well known studies (e.g. Terman's in Holahan & Sears, 1995) have done this from the start. Some of my subjects dropped out because they did not want to be part of the study any more, while others have been lost in spite of great efforts to find them. However, members of the sample keep turning up, even years after I have given up looking for them. Fortunately, the original groupings have retained the same proportions and are currently being further analysed in this on-going work.

Of the original 70 matched triads (the labelled gifted, the non-labelled gifted and their random class-mates), just five complete ones remain. In 1974, those boys and girls had been clearly distinguishable in terms of their experimental groupings, but this is no longer so. The example below of a triad of men aged 37 in 2005 shows how difficult it is to untangle the long-term life forces associated with gifts and talents.

The labelled gifted man was one of the first in the UK to contract Aids at the age of 18 and has struggled to continue his work as an IT consultant because his severe illness stops him from time to time. His non-labelled gifted control became an architect, and his random control child of average ability is an airport income clerk, charging airlines for landing. The first man has always had a wide span of remarkable gifts and talents. He married his male partner in Amsterdam. The architect, a non-labelled gifted child, is married to a woman and they have a child, and more design work than he can handle. The income clerk lives at home with his mum, cares for her, has almost never missed a match of his local football team all his life and has a drink with his male pals most evenings. All three assure me they are content with their lives, though they have obvious problems, respectively – Aids and the constant shadow of death, making one's way in a tough world of architecture, and for the third – hoping one day that a girl-friend will materialise.

Some Conclusions from this Study

- *The long view.* It is vital to take a long view of life in the study of gifts and talents because the development of adult achievement from childhood roots is not smooth; snapshots taken at different times of life may present quite different pictures. A few gifted children in my sample overcame poor prospects to become hugely successful adults, while others did not fully develop their childhood gifts and talents. But in the long term, the gifted whether labelled or not, did much better in terms of achievement than the non-gifted.
- *Individual differences*. The way circumstances affected the children was strongly influenced by their personalities and sense of self. And these lasted well. Whether as children the subjects were modest, conventional or aiming to change the world, their adult personal style was often very similar. An empathetic child might become a social worker, for example, though there could be great changes of direction such as when a gifted mathematician became a literary editor. I did not measure whether the gifted became more or less happy than the non-gifted, but to me they seem very similar in their personal relationships with similar numbers of children, divorces, and loneliness.
- *Opportunity.* Self-concept affects the take-up of opportunity. The social pressures which can diminish a growing child's feelings of worth were often not helped by the schools and universities they attended, resulting in unnecessarily wasted energies and lost potential on courses which were not suitable for them. An élite university, for example, is not the only goal for a gifted scholar and some might have been better off either at a smaller and less socially challenging local university, or going into a non-academic field.
- *Expectations.* Strong pressure to conform to expectations, particularly to the label of 'gifted', affected the sample's life paths over decades. But when a child scored very high grades in school he or she was less likely to stand out in terms of excellence into adulthood because this appeared to detract from creativity. Some (especially boys), appeared to subdue their personalities in their striving for high grades, so their healthy emotional development, including

the freedom to play and be creative, had been severely curtailed. Unfortunately too, teachers sometimes seem to feel a need to put the liveliest and more creative youngsters in their "place".

- *Gender*. Clever girls sometimes took lower-level but emotionally satisfying work and could therefore be seen as less successful in monetary terms than high-earning men. It is a subjective judgement as to which life may be more worthwhile, but in statistical analysis where ratings are given to particular occupations, such women are seen as having a lower success rate.
- *School effects*. Symbolic learning was often very swift for the gifted so that they were functioning intellectually at a much older level. Some gifts were more encouraged in schools than others, particularly science and mathematics, possibly because easily recognisable outstanding results could be more easily achieved in those subjects. But too many youngsters wasted time and energies following wrong channels because of poor educational guidance.
- *IQ*. In general (but not always), those with an exceptionally high IQs, say within the top 1%, did much better in life than those with merely a very high score, say at about the top 10%. The least successful of the whole sample had remained with less mature and less effective, shorter-term learning techniques, like rote-memorising their lesson-notes at school, and rarely looking things up or using other resources, habits which continued in early middle age.
- *Ideas of giftedness*. The idea that the recognised gifted should be more advanced in school achievements than their age-peers was current among teachers. Being labelled gifted was frequently associated with expected emotional complications. Some young people rose to the challenge of the label and thrived on it, while others felt they could never live up to the image, so in order to shine, had chosen a career below their capabilities – a negative outcome. Others simply ignored their potential, fitting in with the local culture which did not have a place for school giftedness.
- *Pressure*. Pressure sometimes had the opposite effect from what was intended; the worst affected being the accelerated boys specialising in science. They could miss out on the healthy development of social skills and relationships, and their self-images were poor. Today, many regret that their childhood was spent in heavy study.
- *Attitudes of others*. The respect of others, especially teachers, was important to the developing young person: when the gifted received it, allowing them enough responsibility to make many of their own discoveries and decisions, they were able to lead more satisfying lives.
- *Creativity*. High-level creativity as seen in adult careers demanded a particular type of personality, noticeable in childhood, which enabled the individual to act independently of other's opinions.
- *Emotional poverty*. Poor emotional home circumstances, such as a constant change of 'uncles' did nothing but harm to the possibility of adult excellence.
- *Researchers beware*. The adults' memories were not always reliable, and many had retained very different impressions of their younger lives from what had been audio-recorded and transcribed at the time.

Freeman's Sports Approach

It was clear from this research that the children of high ability who were successful in school and in later life had not only had access to enough opportunity, but had received enough emotional support to take advantage of it. There is a need to help the gifted who are not able to help themselves or their potential for self-fulfilment. Freeman's Sports Approach grew out of this research. It is a way of not only helping children who are demonstrating their abilities, but for those of high potential who may not be showing their gifts and talents. It is based on the model of how sport is provided in schools - a form of identification by provision - in the same way that sport is normally provided for all who want it. The Sports Approach provides a "smart context for learning". It advocates that given the opportunity and with guidance highly able and motivated individuals (features recognised as essential for building excellence) should be able to select themselves to work at any subject at a more advanced and broader level (Freeman, 2000b).

This does not mean grade-skipping, but in the same way as those who are talented and motivated in sport can select themselves for extra teaching/coaching and practice, they could opt for e.g. extra foreign languages or physics. Of course, such facilities must be available to all - as sport is - rather

than only to those pre-selected by tests, teachers or money. It is an inclusive formula. This is neither an expensive route, nor does it risk emotional distress to the children by removing them from the company of their friends and age-peers and making them feel separate. It makes use of research-based understanding of gifts and talents, notably the long-term benefit of focusing on a defined area of the pupil's interest as well as providing each youngster with what they need to learn with.

To practice the Sports Approach, teachers need training in differentiated teaching methods, in addition to a variety of specific techniques for bringing out high-level potential, such as helping pupils to collect information for a portfolio. Most importantly, education authorities should coordinate and share the approach and facilities. Recognition of gifts and talent in this way would also include recognition of the provision to which the students had access. This could be done by a rating scale so that children who were excelling within their context would be seen to be doing so and not penalised because they had poorer provision than others to teaching and material to learn with. An overview of the Approach is presented below.

Freeman's Sports Approach

- Identification should be process-based and continuous;
- Identification should be by multiple criteria, including provision for learning and outcome;
- Indicators should be validated for each course of action and provision;
- The pupil's abilities should be presented as a profile rather than a single figure;
- Increasingly sharper criteria should be employed at subsequent learning stages;
- Recognition should be given to attitudes possibly affected by outside influences such as culture and gender; and
- The pupils must be involved in educational decision making, notably in areas of their own interest.

Postscript

After innumerable hours of interaction and investigation with the individuals in this sample as they grew to adulthood, I had to conclude that so many influences on happiness and success are like love – it is possible to say how it feels and what happens because of it, but there is no sure recipe to apply to others. For the rest we do have very clear information about what the gifted and talented need by way of support towards self-fulfilment– an education to suit their potential, opportunities to flourish and people who believe in them.

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References

Arnold, K. D. & Subotnik, R.F. (1994), 'Lessons from contemporary longitudinal studies', in R.F. Subotnik, & K.D. Arnold, (Eds.) *Beyond Terman: Contemporary longitudinal studies of giftedness and talent(437-451)*. New Jersey: Ablex Publishing.

Comford Boyes, L., Reid, I, Brain, K. & Wilson, J. (March 2004) *Accelerated Learning: a Literature Survey*. Unpublished report; Department for Education and Skills, UK.

Cornell, D. G. & Grossberg, I.N. (1989), 'Parent use of the term 'gifted': Correlates with family environment and child adjustment', *Journal for the Education of the Gifted, 123,* 218-230.

Freeman, J. (1998) *Educating the Very Able: Current International Research.* London: The Stationery Office. (www.JoanFreeman.com)

Freeman, J. (2000a) 'Families, the essential context for gifts and talents', in K.A. Heller, F.J. Monks, R. Sternberg & R. Subotnik, *International Handbook of Research and Development of Giftedness and Talent*. Oxford: Pergamon Press. (669-683)

Freeman, J. (2000b) 'Teaching for talent: lessons from the research', in Lieshout, C.F.M. & Heymans, P.G. (Eds.) *Developing Talent across the Lifespan*. (pp. 231-248) London: Psychology Press.
Freeman, J. (2001) *Gifted Children Grown Up*. London: David Fulton Publishers.
Freeman, J. (2002) *Out of School Educational Provision for the Gifted and Talented around the World*, Report for the Department for Education and Skills (UK Government). (www.joanfreeman.com)
Freeman, J. (2003), 'Gender differences in gifted achievement in Britain and the USA', *Gifted Child Quarterly*, *47,* 202-211.
Freeman, J. (2005) 'Permission to be gifted: how conceptions of giftedness can change lives', in R. Sternberg and J. Davidson (Eds.), *Conceptions of Giftedness*, Cambridge: Cambridge University Press. Pp 80-97.
Gross, M.U.M. (2004). Exceptionally Gifted Children. *London: RoutledgeFalmer*
Holahan, C.K. & Sears, R.R. (1995). *The Gifted Group in Later Maturity*. Stanford, CA: Stanford University Press.
Horowitz, F., Subotnik, R. & Matthews, D. (Eds.) (due 2008) *the Development of Giftedness and Talent across the Lifespan.* Washington: American Psychological Association.
Terman, L.M. (1925-1929). *Genetic Studies of Genius* Vols I-V, Stanford: Stanford University Press.
White, K.R. (1992), 'The relation between socio-economic status and academic achievement'. *Psychological Bulletin, 91,* 461-481.

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Future Possibilities for Education and Learning by the Year 2030

Jerome Clayton Glenn

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World Federation of United Nations Associations (WFUNA)

Abstract

2030 is 23 years from now. Looking back over the past 23 years can give a sense of the rapidity and magnitude of the changes we experience today and that are likely to accelerate in the future. How many would have believed that the Republic of Korea by 2007 would successfully compete with the United States in some areas of the transportation, information, and communications industries? Or that its economy would be larger than Russia's? The factors that made those changes are accelerating. As a result the changes over the next 23 years will be even greater. Twenty-three years ago what Ministry of Education had the objective of connecting their school children to the Internet? What Ministry of Education had the objective of preparing students to participate in the global knowledge economy?

Imagine two countries back in 1984. Both were about the same in all things except that one declared a national objective of cooperating with international computer networks to connect their educational systems into an international knowledge system in order to improve education for all in their country. Now, 23 years later – today – which country would be in a better position for the emerging global knowledge economy? And which country would have produced more students ready for today's complexities and opportunities? Today educational policymakers face the same kind of choices: to look far ahead seeking emerging educational opportunities or just make moderate innovations that appear creative.

What might surprise us today about 2030? If we don't know that something is possible, then we will not try to make it happen. What are some of the educational and learning possibilities by the year 2030? What might we do today to take advantage of these emerging possibilities? Since the implementation of new ideas can turn out differently than expected, it is also wise to ask what could make them turn negatively as well as positively.

To answer these questions, the Millennium Project reviewed futurist thought to design a Real Time Delphi which collected the judgments of 213 experts around the world, selected by the Nodes of the Millennium Project 2.

This study assessed 19 possibilities: **1.** National programs for improving collective intelligence; **2.** Just-in-time knowledge and learning; **3.** Individualized education; **4.** Use of simulations; **5.** Continuous evaluation of individual learning processes designed to prevent people from growing unstable and/or becoming mentally ill; **6.** Improved individual nutrition; **7.** Genetically increased intelligence; **8.** Use of global on-line simulations as a primary social science research tool; **9.** Use of public communications to reinforce pursuit of knowledge; **10.** Portable artificial intelligence devices; **11.** Complete mapping of human synapses to discover how learning occurs and thereby develop strategies for improvement of learning; **12.** Means for keeping adult brains healthier for longer periods; **13.** Chemistry for brain enhancement; **14.** Web 17.0; **15.** Integrated life-long learning systems; **16.** Programs aimed at eliminating prejudice and hate; **17.** E-Teaching; **18.** Smarter than human computers; **19.** Artificial microbes enhancing intelligence.

These possibilities present a broad array of policy choices and options which can inform the policy-making process. Each possibility was rated by an international panel in terms of its likelihood. What steps should policymakers consider today? To answer this, the respondents were encouraged to provide judgments about factors that could help or hinder the possibilities, and assuming they occurred, to conjecture about consequences that might follow. The panel's estimates of the educational situation in 2030, and a distillation of the pattern of both positive and negative features of these possibilities will be presented.

Introduction

The year 2030 is 23 years away. Looking back over the past 23 years provides a sense of the rapidity and magnitude of the changes we experienced in that time. Twenty-three years ago it was 1984. In that year how many people would have believed that the Republic of Korea by 2007 would successfully compete with the United States in some areas of the transportation, information, and communications industries? Or that millions people would be able to search billions of computer references is less than a second, and then do it again for no extra cost? Twenty-three years ago what Ministry of Education had the objective of connecting their schoolchildren to the Internet? The rate of change over the past 23 years seems very fast for many people today, yet the factors that made those changes possible are accelerating. As a result, the changes over the next 23 years will be even greater. What might those changes be for education and learning?

With support from the Presidential Commission on Education of the Republic of Korea, the Millennium Project reviewed futurist thought to design a Real Time Delphi that collected the judgments of 213 experts around the world, selected by the Project's Nodes. The 19 possibilities they considered present a broad array of policy choices and options that can inform the policy-making process. The international panel was asked to rate each for how likely it was to occur by 2030. Only 5 of the 19 were given less than a 50% chance of occurring. Figure 1 presents the possibilities in rank order by average likelihood.

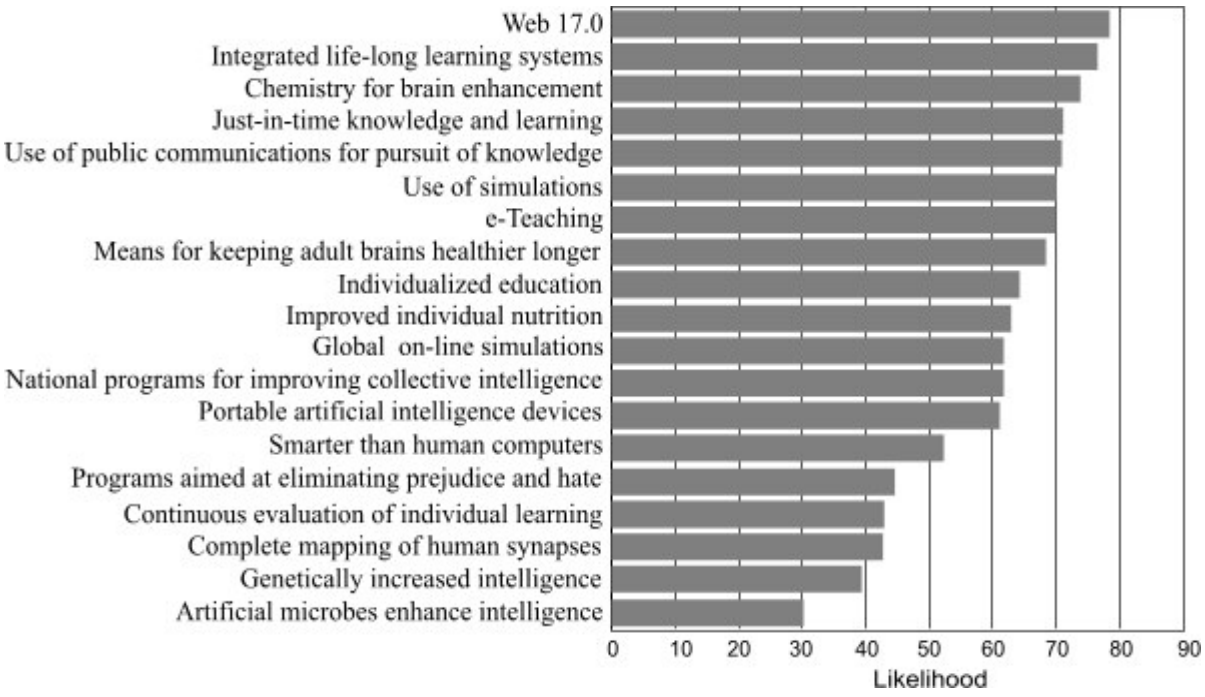

Figure 1: Likelihood of Education Possibilities, 2030.

The interrelation of these possibilities presents a dramatically different view of education than dominates today. As Moore's Law continues to be valid over the new 23 years, portable intelligent devices could have the processing power of the human brain by 2030. Individuals would gain access to the world's knowledge that has been integrated by Web 17.0 for "just-in-time knowledge and learning," using simulations with virtual reality interfaces adapted to their unique needs throughout their lives. Continuous evaluation of individual learning processes designed to prevent people from growing unstable or becoming mentally ill, along with programs aimed at eliminating prejudice and hate, could bring about a more beautiful, loving world.

In parallel, brain function should also be dramatically increased by improved personal nutrition and brain enhancement pharmaceuticals. Insights from partial mapping of the human brain and other methods could dramatically increase personal intelligence and longevity by 2030. More remotely in the future, brains may be genetically enhanced and designer bacteria could make brain cells work more efficiently. With the use of public communications to reinforce the pursuit of knowledge and the use of these learning innovations and educational concepts, individual and collective intelligence could be improved.

Advances throughout history have created gaps between early adapters who can afford the initially higher costs and those who cannot. Many participants in this study warned that serious efforts will have to be made to prevent dangerous knowledge and intelligence gaps leading to unstable conditions. Policymakers should develop ways to encourage broad democratic usage of these new powers without letting their abuse by the few disadvantage the many. Over the last several years, the digital gap has begun to narrow, giving hope that greater decentralization, access, transparency, and proliferation of feedback mechanisms can address these concerns. Although many comments from the international panel could be grouped into advances for individual learning or group learning, the

overall picture of the future is so extraordinarily rich and complex that both approaches can be accommodated.

If educational policymakers believe these results, what steps should they consider today? To answer this, the respondents were encouraged to provide judgments about factors that could help or hinder the possibilities and, assuming they occurred, to consider the consequences that might follow. This chapter lists the possibilities in the order in which they were presented in the questionnaire (together with the references provided to the participants in the questionnaire), with a distillation of the pattern of both positive and negative features of these possibilities. The full text of the responses is presented in CD Section -----.

1. National programs for improving collective intelligence

By 2030 some richer as well as lower-income countries have made improving collective intelligence a national goal; this includes improving individual capabilities as well as intelligence for their nations as a whole.[1]

1.1 What might make this happen?

The widespread realization that collective intelligence (CI) provides a political and economic advantage in an increasingly knowledge- and creativity-oriented globalized economy will lead to the adoption of this national objective. In addition, it should also improve the general functioning of society and social well-being and should reduce the fear of falling behind. Some respondents saw this as inevitable due to the continuing advances of ICT, the continuation of Moore's Law, and the general public's increasingly easy use of the Internet. CI will become a new buzzword, with major academic institutions using it as a strategic research focus and demonstrating that it is the next logical step in social-technological evolution. Downloadable open source prototypes for collective intelligence by MIT or similar institutions and the promotion of successful experiences such as Wikipedia and Google will also help.

Countries with leaders who respect and encourage free thought and the rights of the individual might announce this goal first, especially Asian countries that want increased respect and economic power. But it might also take complex and urgent national and international problems and disasters to get CI accepted as a national goal. Increasing and intense international competition among countries might also tend to develop the concept of competitive human capital within national education programs. Another way to foster CI is the pursuit of nationally important projects like landing on the moon, especially if the process is equitable in mobilizing many people to ensure collective solidarity. Finally, the increasing volume and complexity of knowledge will continue to drive the world toward collective intelligence approaches.

1.2 What are some positive consequences?

More people will work together to solve problems. It should make large-scale intelligence-improving programs possible, which will improve national economies and reduce the rich-poor gap. It should stimulate more meaningful participation of civil society in national intelligence and reduce repetition, overlap, and confusion with information pollution and overload. Virtual learning and decisionmaking communities could gradually supplant nation-states in effective decisionmaking, increasing social stability. Human life would be more civilized and Earth's resources might be more treasured, with better protection of the environment.

A smarter society will reduce some of the costs of low-cognition individuals (in terms of crime, wasted education effort, failed social projects), increase the number of people able to handle more complex work, and might attract more creative people. It might vigorously promote the reformation of the educational system and the development of education. Research is continuing to show that learning is fundamentally a social process. Open-source, knowledge creation communities and mass

[1] RT Delphi references: October 13, 2006 MIT opened a new Center for Collective Intelligence; "Examples of Collective Intelligence," in *Handbook of Collective Intelligence* (Wiki), hosted by MIT Center for Collective Intelligence; "Are Dramatic Increases in Collective Human-Machine Intelligence Plausible within 25 Years? Yes – 70%," Millennium Project Delphi, ACUNU, 2003.

collaborations have resulted in very widely used information, social sharing, and learning resources such as Wikipedia, YouTube, MySpace, FaceBook, and SecondLife. Learning will be primarily accomplished on the Web, as continuation of new structured knowledge is developed on the Web by Wikipedia-like collectives that will allow people to do a self-assessment of prior knowledge and then be placed into the particular knowledge continuum just where they need to be in order to progress in a guided learning experience at their own pace of learning.

1.3 What prevents this from happening?

Some ideologies make intervention into cognition politically controversial. These include issues involving group cognitive differences, gender differences, the heritability of cognitive abilities, the use of biomedicine for enhancement and the relationship between individual and state. The lack of a single decision point for a curriculum tends to increase the number of people involved in the decision who could defeat the idea, such as politicians fighting globalization, religious groups with conservative views, and others who do not want a change in the status quo.

Some other perceptions that might prevent this possibility are escalating costs with benefits too far in the future to be seen as "real," romantic anti-science backlash focusing on feelings, the inability to make major changes in beliefs about how learning and value creation really happens, the lack of interest in long-term projects, and "conspiracy theories" about methods of increasing intelligence. War, famine, pandemics, economic depression, social convulsion, disease, poverty, ignorance, religious prejudices, and other disruptions could hamper efforts to improve collective intelligence, potentially resulting in a vicious cycle and self-destruction.

1.4 What are some negative consequences?

Countries that do not pursue increasing intelligence as a national goal are likely to have slower economic growth, leading to "intelligence divides," growing gaps between the rich and poor, and massive inferiority complexes and depression about "falling behind." If techniques were manipulated, it could lead to vicious competition, ignoring basic education, controlling choices, invading privacy, and regimenting thoughts. Psychological effects of diminishing individuality and authorship could cause a student revolt against being part of a "collective." If improved cognition reduced acceptance of traditional values it might be politically disruptive, while other forms of cognition enhancement might be supplied with subtle or not-so-subtle attempts at manipulation toward ideological ends.

2. Just-in-time knowledge and learning

Rote learning has diminished in importance by 2030. With ubiquitous computing and education for life-long learning, "just-in-time knowledge" has become the norm.[2]

2.1 What might make this happen?

This might happen due to a failure of rote learning to achieve educational objectives, the desire for personalized learning, continued advances in artificial intelligence, and the realization that this it the only way to keep up with rapidly changing knowledge in all fields. Life is too complex to know what a person needs to know and when you need to know it, so this will occur by necessity. Infrastructures will be built for teachers and students to use 24 hours a day, 7 days a week, worldwide.

The confluence of advances in nanotechnology, neuroscience, artificial intelligence, and avatar-based synthetic online worlds will make education more experiential and engaging by 2030. Rote learning will continue because it "trains" the brain, but "just-in-time knowledge" works, because it gets us what we want. The need to be constantly updated on new knowledge and developments will require transferring the teaching from specific subjects to the subjects needed for specific purposes, with fast, practical learning procedures and new methods of teaching. We will need to learn more

[2] RT Delphi references: Monica Sambataro, "Just-in-Time Learning," *Computerworld*, 3 April 2000; Just-in-Time Education: Learning in the Global Information Age, 2000; "Just-in-time Learning: The Acquisition of Knowledge or Skills as They Are Needed," at *Word Spy*, posted 1 June 1998.

about how to learn and how to use information, and we will spend less time on learning specific information or subjects.

2.2 What are some positive consequences?

Anyone anywhere will have access to the education they want where this is implemented. People will become more self-confident and empowered, businesses will be more efficient, countries will improve their economic development, and societies will be more practical, efficient, and harmonious. Education and training costs will lower. It will be easier to change jobs, taking greater advantage of human resources. Rote learning will continue to diminish, leaving room for reflective thinking, which is the cornerstone of significant learning.

Just-in-time knowledge and learning might greatly improve human competence and intelligence, enhance democracy by creating a more educated public, increase the number of responsible global citizens, accelerate the creation of advanced knowledge and learning networks, reduce the "power" of academic arrogance, and initiate another Renaissance. Much of traditional education will be replaced by Web-based, managed learning provided by open source collaboratives or vendors who compete in delivering measurable knowledge acquisition and retention, with speed and effectiveness as the basis of their payment. Teachers and students must be part of a team where the teacher is a coordinator of information collection.

2.3 What prevents this from happening?

The technological collapse of the Internet could stop this from happening; too much computer hacking, information manipulation, and other forms of information warfare would make people uncertain of what to trust. The costs might be prohibitive. Ignorant, backward, stubborn prejudices within traditional education systems, where the teacher is the only active subject and the student a passive element, along with conservative religious leaders could discourage this possibility. Worries about bias and shallowness, as well as problems in teaching robust information gathering skills, might also slow its adaptation.

In a world where everybody can look like a specialist, there will be more risk of decisions being made on shaky grounds and less respect for true expertise, and there would be fewer good ways of validating actual competence. Slow and old educational validation systems may slow the adaptation of this possibility.

2.4 What are some negative consequences?

Just-in-time knowledge and learning could produce a very practical but a very superficial world of knowledge. Innovation could suffer. This could create poor learning habits; self-centered lazy thinking; a public less engaged in the political process, leading to more government control; the inability to see the "big picture" for the good of the planet; and a reduction in problem-solving reasoning, much like many people's current inability to concentrate or focus on a topic in-depth without intermission or a commercial break. Some rote learning will be necessary to reduce these negative consequences.

While this development could certainly lead to advances in science and technology, fields like history and civics might suffer. It would increase the rich-poor gaps, since it might be impossible for lower-income countries to implement. Those with the advanced technologies for "just-in-time learning" will evolve differently from those in the least-advanced societies caught in the divide and left behind.

3. Individualized education

Through tests of various sorts, including simulations, the needs of individual students are being assessed, and curricula and instructional methods are being tailored to individual students. It is

recognized by 2030 that all students have special needs, and these needs are being largely met in many places in the world.[3]

3.1 What might make this happen?

The convergence of advances in the Internet, cognitive sciences, medicine, artificial intelligence, continuation of Moore's Law, just-in-time learning, and the success of the $100 laptop will make this more available. Young people who want to function more intelligently and teachers with advanced technology skills are already driving this process.

If facilitated by mentors, it could be the core of the new educational paradigm. The proper use of IT and "coaching on-line" to address individual learning not only in elementary, secondary, and tertiary education but also of adults for "life-long learning" should be included. This can also be made more likely by assuming that everyone is potentially a genius and that each genius is different from the others, by teachers who awaken the curiosity and creativity in each student, by improved low-cost individualized educational software, by the proliferation of reusable learning modules at all levels of society, and by standards and single-sourcing for learning modules at all levels, so that there is no confusion or overlap in what has been learned.

3.2 What are some positive consequences?

This should lead to more satisfied students, greater respect for individual uniqueness and innovative achievements, changes in ideas about equal schooling rights, better use of genetic information to customize learning, and more special "geniuses" nurtured to their potential. The academic arrogance about who should be taught could also be reduced.

Increasing numbers of people will be leaders in different aspects of life. Leaders will need people among themselves to be coaches and referees to help teams work effectively and competition to be fair and to help different teams to be able to live together.

3.3 What prevents this from happening?

This can be blocked from happening by new ideological or religious movements that sweep the world into mono-thematic curricula, lower student-teacher ratios that could raise costs too high for poorer educational systems to afford, teacher shortages, standardized examinations, teacher unions that abhor the prospect of rewarding their superior colleagues, difficulties in reliable diagnoses and evaluation of results, and the desire to preserve standard courses based on a lower than average student capability, giving priority to teaching material rather than learning. Until teachers have tools to read students' minds, there cannot be fully "individualized" education. Since learning is a social activity, there will continue to be needs for common goals for learning.

3.4 What are some negative consequences?

Widespread use of very individualized learning could reduce social cohesion; individualized learning could lead to more individualized versus team or group actions within society. Such individuals could create new ways of learning that might divide society over how best to conduct education.

The results of individualized education depend upon the intellect, objectivity, empathy, and intent of the people involved and the artificial intelligence systems used. This could be a great way to "brainwash" people into adopting a particular ideology or way of acting.

[3] RT Delphi references: Individualized Education Plans, 2003; "Special Education Resources on the Internet," at seriweb.com, 2001.

4. Use of simulations

In 2030, virtual reality simulations with programmed learning are available and used internationally, accounting for nearly a third of the tele-educational experience in elementary and secondary schools. These simulations allow people to progress at their own pace, alone or in groups. They are designed on the basis of insights derived from cognitive science. They diagnose and adapt to the individual's or the group's learning style and need for hints and other forms of prompts. This is a means of providing artificial experience and social experimentation in a safe environment.[4]

4.1 What might make this happen?

This could be made possible by the interplay of the VR game industry and educational systems; leadership willing to commit the funds over enough time to demonstrate the benefits; the continued advance of Moore's Law, nano processes, increased bandwidth, popularization of high-tech VR; the spread of video games and easy-to-use software creation tools (will X Bot become a teaching tool?); growing acceptance and participation in simulated societies like Second Life; the use of wiki-like approaches to creating simulations for specific learning environments; the application of new insights from cognitive science; and the needs of the knowledge economy. Simulations of all kinds are a widespread and vital part of military training today.

As scientific collaboratories force standardization of data and simulation formats, educational simulations can be a lowered-cost by-product. Costs could also be lowered by global cooperation and subsidized wiki-like development of simulations, with common modules used worldwide. Future generations of Second Life–type simulations could also lower educational subsidies as these applications become commercialized. Open source standards should be considered for educational simulation software to become more accessible. Computer-smart students will be best reached through the uses of social networks such as Facebook and MySpace, which will morph into avatar-based VR worlds. VR design and implementation costs are going to improve, and once the interface becomes more natural, the numbers of people using many new applications will accelerate around the world.

4.2 What are some positive consequences?

This immersive experiential learning will have a continually growing impact, increasing the number of truly educated people, opening eyes to new experiences, stimulating creativity, improving tacit knowledge of the behavior of complex systems, providing space for individual personality development, and furthering the evolution of humanity. It will challenge people to believe that if a problem can be solved in virtual reality, then in can be solved in the "real world."

Simulations can satisfy both individual needs and collective learning experiences. Continuous real-time science, governance, and learning simulations will connect real-time public intelligence and information to government budgets, making simulations a basis for dialog and decision. Simulations will become a more normal mode of interaction, lowering costs of high performance hardware. This will evolve into new forms of individualized educational platforms.

See Holopticism at: www.thetransitioner.org/wiki/tiki-index.php?page=Holopticism.

4.3 What prevents this from happening?

Concerns about video game violence, limited home access or understanding by parents, lack of leadership, high costs, difficulties of implementation, and disagreements about what values and content to include could inhibit acceptance of simulations. Serious VR educational applications are more difficult to create than that experienced today in Second Life.

4.4 What are some negative consequences?

This could lead to cyber "addiction," loss of touch with reality and face-to-face human contact, and disconnections between learning in simulations and actual activities in reality. Cults of brilliant

[4] RT Delphi references: Jong-Heon Kim et al., "Virtual Reality Simulations in Physics Education," *IMEJ (Interactive Multimedia Electronic Journal)*, undated; "Virtual Reality: History," Science for the Millennium, National Center for Supercomputing Applications, University of Illinois, 1995; "Virtual Reality," at Wikipedia.

but socially backward individuals with little sense of team spirit and sharing could grow. It could also limit thinking about possibilities in the "real world" to those options offered in the "virtual reality" systems. It might encourage selfish and unrealistic perceptions as people achieve status in cyberspace that they cannot achieve in reality. It could limit the face-to-face communications needed especially by younger people, even though simulations will be come very vivid. To make educational simulations universally acceptable, they could become shallow, conveying little sensibility and moral character, and could be poorly used by teachers who do not add the complexity and interactivity of real experiments that can be lacking in "edutainment."

The gap between the nations, regions, and cultures that use simulations and those that do not will widen through time. There could be a backlash to this trend. Some groups will assert the value of "real" interaction and deny the benefits of virtual simulations. Whether this backlash becomes violent will partly depend on the proportion of the population with access to this technology. Cyber crimes and purposeful design of immersive VR technologies to negatively influence human behaviors are also possible. See Edward Castronova's excellent book *Synthetic Worlds*.

5. Continuous evaluation of individual learning processes designed to prevent people from growing unstable or becoming mentally ill

The objective of these programs, which have appeared in several countries, is to identify persons who seem likely in later life to exhibit antisocial behavior, including terrorist activities and violent criminality. Special nurturing programs are provided to people identified in this way to help keep them from becoming unstable or mentally ill in later life.[5]

5.1 What might make this happen?

The increasing awareness that single individuals can become massively destructive (SIMAD) could bring this about, but great care should be taken to ensure that these activities are in the public interest and that they do not drift into totalitarian applications. Perfecting the theory and methods of psychological evaluation and the use of Maslow's hierarchy of needs should guide the development of such programs. The evaluation systems would have to be validated by many individuals, and the samples would have to be significant. The programs will have to be self-evidently beneficial and very creative and engaging to encourage widespread adoption.

If developed in a humane environment, this activity could identify young people at risk. Alice Walker's work showed that those who led troubled lives but still did well had one thing in common: they all had found someone who loved them. A program like this could identify and match such young people with appropriate mentors.

5.2 What are some positive consequences?

This could help make for more harmonious and stable societies; reduce social problems like suicide, drug abuse, and terrorism; provide deeper knowledge of human nature; and increase investments into preventive mental health and medicines. It could also be a relatively inexpensive way to deal with certain mental health issues—especially as people live longer.

5.3 What prevents this from happening?

Perceptions that this could be a one-time classification system used by governments to control or eliminate deviant behavior or that it could be implemented by more dictatorial paranoid societies to reduce creativity and innovation could prevent this from happening. All geniuses are always a little crazy! Although proposed with good intentions, it is full of too many negatives such as "profiling" to find universal acceptance. Antisocial behavior, including terrorist activities and violent criminality, is

[5] RT Delphi references: Jean-Pierre Voyer, "The Pre-conditions for a Constructive Social Inclusion Research Agenda," presented 27 March 2003.

not just a problem of individual nurture; it also has social causations. No one knows how to do this, especially to make it work in very large populations. The increasing evidence that most mental illness has a genetic or physiological cause indicates that these programs might have limited effectiveness compared to genomic analysis.

5.4 What are some negative consequences?

This program might result in group speak, less privacy, reduced freedom of speech and thought, and the strengthening of intelligence-gathering/police organizations in nation-states with the worst histories of human rights violations. This could lead to neo-socialist realism, preventing more new forms of art.

Some of the world's brightest thinkers would have been classified in a negative fashion by such programs. What would have happened to them and their breakthroughs? In the future, if we begin to "cure" or isolate individuals with deviant personalities, are we going to destroy something that could have been of benefit to the world? Who decides what is "deviant"?

6. Improved individual nutrition

Self-administered diagnostic tests identify individualized nutrition requirements for improved cognitive development. These tests are used in the more affluent areas and are beginning to be used in lower-income areas with government and insurance company support.[6]

6.1 What might make this happen?

Alliances among health insurance companies, education programs, and businesses could promote self-administered tests and help educate the consumer about new nutritional foods. Insurance companies could lower premiums to those who use the tests and new foods. Scientific breakthroughs in nutrition, DNA testing, improved understanding of the "nature and nurture" factors in health, individualized medicine, and "nutrigenomics" would also increase the chances of this possibility. NGOs and UN agencies would be necessary to help in poor countries.

6.2 What are some positive consequences?

This could greatly improve a nation's health and cognitive development, reduce the cost of health care, and increase longevity and physical strength and performance.

6.3 What prevents this from happening?

Improved individual nutrition could be blocked by poverty, cultures with bad nutrition habits, lack of political will, the costs of converting food production to more individualized and nutritious foods, and the fear that the diagnostics could be faulty. (Yet the overall beneficial effects of full and diverse nutrition may overshadow the high cost-benefit of individual effects.) It may not be financially possible for poorer areas. The sensual pleasure of inherited eating habits could override such prescriptions. If DNA tests were required, then some people will oppose it.

6.4 What are some negative consequences?

This could further the separation between rich people who can afford special diets and the poor people who can't.

7. Genetically increased intelligence

Genes that contribute to increasing intelligence and learning have been identified and used by many parents in the upper and middle classes of the world to change the potential intelligence of their future children. Treatments have been subsidized for many people in poorer regions.[7]

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[6] RT Delphi references: "Foods for Thought: Foods that Build and Foods that Drain the Brain," at AskDrSears.com, 2000; "Foods and Vitamins that Help Brain Development and Repair Damage," at Yourfamilyclinic.com, undated; U.N. Food and Agriculture Organization, "Fish is Food for the Brain as well as Good Protein," *Focus: Fisheries and Food Security*, undated.

7.1 What might make this happen?

Future synergies among neurosciences and genetics, parents who want a better life for their children, and initial successes of cognitive enhancements through pharmaceuticals could make this happen. The main form of near-future genetic intelligence enhancement would be Preimplantation Genetic Diagnosis, selecting away genes involved in pathologically lower intelligence. This would lead to a reduced number of the lowest performing, in turn increasing the average. But PGD would have to become more common, which requires improvements in technology, automation of the process to bring down the price, creation of standards that make different treatments comparable, and, most important, attitudinal shifts that make genetic selection more acceptable.

Genetic enhancement of intelligence should be combined into a single procedure that would also affect genes associated with criminal behavior. Just as we "correct" our eyesight with glasses, we should also correct our low intelligence. Once a safe procedure is available for increasing intelligence, parents will take their child to the country that first offers it. Genetically increased intelligence should be accompanied with or preceded by the development of social ethics, acceptance of differences, and respect for others.

7.2 What are some positive consequences?

This could cure mentally retarded children. As with most advances, richer people would have this for their children, but eventually the price will come down to make future generations more intelligent.

7.3 What prevents this from happening?

Insufficient progress in genetics, high costs, the fear of genetic mutations caused by incorrect use of genetic technology, and the belief that life is an unalterable gift from God will discourage this path.

7.4 What are some negative consequences?

Naive selection criteria may lead to favoring a few detectable "intelligence genes" although they do not represent the full range of human capacity (on the other hand, even assuming broad approval and use of the technology, this limitation is unlikely to affect a very large number of people by 2030).

It could increase the rich-poor gap, possibly leading to a divided society of intelligent managers and less intelligent consumers, or it could be used by future dictatorships wishing to manipulate people or develop a "super race" or to provide "world leaders." Children might no longer have "time" to be children.

8. Use of global on-line simulations as a primary social science research tool

Virtual realities like Second Life—which opened in 2003 and by mid-2007 had nearly 7 million inhabitants—are used by leading cognitive scientists, curriculum experts, and behavioral scientists to evolve the equivalent of natural laws for social behavior and new tele-virtual educational simulations. In these e-universes, people act as societies, form laws, build new cultures, and provide a way to experiment with the glue of society without the concerns that might accompany human experimentation.[8]

8.1 What might make this happen?

Initial use may be for business market research and political forecasting, and then when the cost comes down it could be used in teaching social science. This will evolve naturally from phenomena such as Second Life.

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[7] RT Delphi references: Wesley Smith, "Biohazards," *San Francisco Chronicle*, 6 November 2005; João Pedro de Magalhães, "Defining Our Children's Traits," 2006; Everett Mendelsohn, "The Eugenic Temptation," *Harvard Magazine*, March-April 2000.

[8] RT Delphi references: Home Page, at secondlife.com; Annalee Newitz, "Your Second Life is Ready," *Popular Science*, September 2006; "Artificial Worlds Used to Unlock Secrets of Real Human Interaction," *Cornell News*, 14 February 2003.

8.2 What are some positive consequences?

It could reduce research costs, provide superb "strawmen" for comparative analysis, and stimulate the imagination to promote development of creative cultures. Anyone anywhere will have access to advanced social science research education.

8.3 What prevents this from happening?

It is almost impossible to reproduce real social situations in cyberspace. People may not provide enough accurate information for the simulations, hence reducing their value. Acceptable controls using such tools may be a bit of challenge. Abuse of people in cyberspace is possible, the same way experimenters have abused humans in research in the past. If results show that political directions are headed in the "wrong" directions, then future applications could be suppressed.

8.4 What are some negative consequences?

Virtual realities could result in a kind of split personality—one focused in the cyber world and the other in the conventional world—that could work against the evolution of human society. "Second Life" could have conflicts with real life in culture, ethics, morality, and other aspects.

9. Use of public communications to reinforce pursuit of knowledge

In 2030, social marketing of learning concepts or memes is widespread. Some of the themes have been: Intelligence is Sexy, Knowledge is Cool, Knowledge Matters, and Ignorance Equals Poverty. Public media leaders often meet with educational leaders, cognitive scientists, and entertainers to discuss promoting the message that learning is a central pursuit of life.[9]

9.1 What might make this happen?

With the coming knowledge-based economies, the importance of knowledge and intelligence would be highlighted, and the media and entertainment industries could be enlisted to play a role in the pursuit of knowledge, such as Project Red for AIDS with Bono of the rock group U2. Informal meetings like this already happen in the United States with the Ad Council, so it seems likely that in 25 years public communications will be even more widespread.

9.2 What are some positive consequences?

It should promote the development of people's imagination, creativity, and innovation; produce a better-educated population and improve the knowledge economy; enhance democratic governments and promote the general well-being of societies; and be an essential part of reducing poverty, increasing social justice, and accelerating progress.

9.3 What prevents this from happening?

This approach could be prevented by too many diverging viewpoints within the media, public conformism, and lack of a professional ethic within the public media. Societies would have to become more pro-education first. With the success of individualized learning there might not be as much need for public media, and it could be seen as a new form of social engineering by less enlightened governments and therefore would be opposed by free societies.

9.4 What are some negative consequences?

The messages might become dull and overused, negatively reinforcing education.

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[9] RT Delphi references: "Social Marketing," Social Marketing Institute, at social-marketing.org; "Social Marketing," at Wikipedia; "Practice Areas: Social Marketing," *Communications at CDC*, Centers for Disease Control and Prevention, 23 July 2003.

10. Portable artificial intelligence devices

In 2030, most people carry tiny computers that contain extensive personal memories and interact with their owners in human fashion. Meet a person on the street and the earbuds whisper, on the basis of facial pattern recognition, "that's Billy Johnson whom you met at a party three years ago. He is a pilot and his wife's name is Angie".

More seriously, the machine also participates in personal decisionmaking and in the on-the-spot need for information. Some individuals have been technologically augmented with nanobots, brain chips, and nanotech transceivers in clothing.10

10.1 What might make this happen?

Maturity of recognition technology (voice, face, and retina, etc.), nanobots, brain chips, and other forms of nanotech transceivers used by early adopters among very rich individuals will make this happen.

10.2 What are some positive consequences?

These devices will improve memory, analysis, and decisionmaking and will make human competence advance rapidly. Naturally, the richer nations will get this first, but just like the hand calculator, as the price comes down the usage will spread worldwide.

People's lives and experiences will be recorded, allowing them to better manage their lives, learn from their experiences, and re-live their happier experiences as they grow older. Personal AI should also reduce crime significantly. Imagine a very advanced Google in your pocket to which you ask it to identify someone walking down the street, or point out others in the area with similar interests. The AI devices may also tell with whom to interact and help you to interact with them.

10.3 What prevents this from happening?

Complexity of facial pattern recognition and privacy issues involved in face recognition and other information requirements for decisionmaking could restrict this. Certain uses of the devices might be restricted because of defense and military intelligence considerations.

10.4 What are some negative consequences?

Potential loss of privacy, continually arising ethical issues, a widening of the rich-poor gap, potential uses by criminals, a race to build portable "anti-artificial intelligence devices" to protect privacy, and reduced intellectual and emotional capabilities of people who have become dependent on these devices are among the potential negative consequences.

11. Complete mapping of human synapses to discover how learning occurs and thereby develop strategies for improvement of learning

Just as the gene was decoded, so was the connection pattern of the synapses in the human brain. From this complex map came information about cognitive development, intelligence, emotion, about how to design artificially intelligent machines, and ultimately about how to improve the speed and depth of learning.[11]

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[10] RT Delphi references: Artificial Intelligence Center, SRI International, at www.ai.sri.com; MIT Computer Science and Artificial Intelligence Laboratory, at www.csail.mit.edu/index.php; Journal of Artificial Intelligence Research, at www.jair.org.

[11] RT Delphi references: T. H. Murphy, J. M. Baraban, and W. G. Wier, "Mapping Miniature Synaptic Currents to Single Synapses Using Calcium Imaging Reveals Heterogeneity in Postsynaptic Output," *Neuron* 15 (1995), pp. 159–68; Society for Neuroscience, "Scientists Map Maturation of the Human Brain; Make Advances in Understanding the Lasting Effects of Stress, Nicotine and Alcohol," press release, 8 November 2003; Allen Institute for Brain Science, at www.alleninstitute/content/about_the_institute.htm.

11.1 What might make this happen?

The realization that increased intelligence is the key competitive advantage in the knowledge economy will stimulate massive brain research by several countries that fund the research over sufficient time to make breakthroughs. The Allen Brain Atlas project (an interactive, genome-wide image database of gene expression in the mouse brain) is an example of what is quickly happening in neuroscience. Complete understanding of mental functioning requires improvements in dynamic scanning methods (like extending the scope and resolution of such techniques beyond what we now have in functional MRI), database management, image processing, computational neuroscience, and automated research that may not be enough to finish the job by 2030. Nevertheless, even partial results are likely to produce important neuroscience insights about learning. Advances in complexity theory, acceptance that it will take incremental advances to achieve this, and the need to make great advances would also help to bring this about.

11.2 What are some positive consequences?

A more complete understanding of neuroscience could result in extraordinary progress in robotics and could empower most fields of cognition, from AI to learning enhancement drugs. It would be a great advance in life sciences, provide a qualitative leap in learning theory and human and machine intelligence, and establish a significant benchmark in human history.

11.3 What prevents this from happening?

This is a very complex task, which could be blocked by the belief that it is far too complex and expensive to complete in 25 years. Other inhibiting factors include the belief that intelligence and emotions go far beyond patterns of synapses or that insights from this research might not be very helpful in understanding how learning occurs on a personal level for an individual. The dominant educational establishment and ethical issues over human testing could also prevent this.

11.4 What are some negative consequences?

If this were to occur, it could result in the abuse of power and prestige by the scientists and doctors at its forefront and a series of problems with human and animal testing. It might also trivialize human emotion and being—is love only a set of chemical reactions?

12. Means for keeping adult brains healthier for longer periods

In 2030 there are techniques for keeping adult brains healthier during the aging process. For example, adult neural stem cells have been cloned and injected into adult brains to keep them far healthier for longer times then formerly believed possible, making old age learning and an older knowledge-based workforce possible.[12]

12.1 What might make this happen?

Rising standards of living, aging populations with increasing political power, and falling fertility rates will speed medical science to make this possible. People used to think that adults could not grow new nerve cells. Research has now shown that new brain cells are created every day. Many of the new cells born each day die off, but exercise and a more stimulating environment reduce the death rate of brain cells. Some research indicates that continued adult learning may be associated with the growth of new brain cells. Research in neurogenesis (adult growth of new brain cells) should keep brains healthy longer, certainly by 2030, and this is only one line of research. Adult brains will stay healthier longer, as a result of training, biofeedback, behavior modifications, medications, and other stimulants. These processes may make people "better than well."

[12] RT Delphi references: Monika Guttman, "The Aging Brain," *USC Health*, spring 2001; *Brain Aging International Journal*, at www.brainaging.ro/Pub-BAJ.htm; "With Few Factors, Adult Cells Take on Characteristics of Embryonic Stem Cells," *Medical News Today*, 14 August 2006.

12.2 What are some positive consequences?

This has the potential for elimination of brain diseases, including mental illness and Alzheimer's and Parkinson's diseases, hence avoiding large numbers of elderly with dementia while adding the elderly to the workforce, which would reduce the economic impact of falling fertility rates.

12.3 What prevents this from happening?

Some developments in cognitive sciences could be delayed by people believing it is not possible and hence not investing in the necessary research, ethical issues, ageist assumptions that decline is inevitable, and the fear of tampering with "order of nature" and the brain – the most complex structure in the known universe.

The potential costs could limit the widespread use of the relevant techniques to extend brain functioning. Techniques like functional magnetic resonance imaging (fMRI) may take longer than expected to produce results.

12.4 What are some negative consequences?

This development could leave a group of non-treatable elderly behind, while vital elderly might feel locked out of a youth-directed society, possibly becoming discontented, forming isolated subcultures, or enduring other imbalances in the quality of life.

13. Chemistry for brain enhancement

Brain chemistry research has led to safe drugs that enhance intelligence, improve memory, increase attention span, and improve visual acuity and hand/eye coordination.[13]

13.1 What might make this happen?

Changes in the perception of enhancement are needed for this to happen, and development of an "enhancement culture" among people will be needed to set the social norms of when the drugs are proper or not proper to use. Positive evaluation of the ethical consequences, current research by DARPA, spreading to civilian uses, and increased awareness of sources such as *Brain Drug Targeting: The Future of Brain Drug Development*, by William M. Pardridge, will increase the likelihood of this possibility. Ritilin, Valium, and Prozac are examples of new psychoactive drugs that do not "enhance" human intelligence but allow a person to function normally, despite mental problems. Adrenalin has been used to erase traumatic memories.

13.2 What are some positive consequences?

This could result in enhanced human intelligence and physical functioning, plus the positive consequences described for keeping adult brains healthier longer.

13.3 What prevents this from happening?

Medical regulations on testing and marketing, ethics of usage, suspicion of drugs, the high value placed on "the natural," medical monopolies, and the fear of the unknown effects of "wonder drugs" would discourage the possibility.

13.4 What are some negative consequences?

Thinking that "miracle drugs" will solve all human problems will yield dangerous consequences, such as luring people into a competitive drug race, overdosing, and ignoring the complexity of the human psyche.

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[13] RT Delphi references: "Psychoactive Drug," at Wikipedia; "Psychotropic Drugs," World Health Organization, at www.who.int/topics/psychotropic_drugs/en; "Psychotropic Drugs and Children: Use, Trends, and Implications for Schools," Center for Health and Health Care in Schools, George Washington University, Washington, DC, December 2004.

14. Web 17.0

By 2030 the trend toward data integration on the Web that started around the turn of the century (Google Earth, Wikipedia, the MIT course material) has progressed to the point that a large part of the world's knowledge—data, analyses, discussions—has been integrated into Semantic Web 17.0. That structure is organized according to a logical framework of concepts (both precise and fuzzy ones), has a natural language interface, is dynamically maintained, and contains an intelligent subsystem that "understands" the logical rules that govern the interactions of entities. The interface makes heavy use of virtual reality–type graphic techniques for presenting knowledge and processes.[14]

14.1 What might make this happen?

The progression from teaching children to teaching adults, and then to self-directed learning, together with progress in semantic analysis and the realization that knowledge must be worked on cooperatively, will make Web 17.0 the place where people go to learn whenever and however they choose.

14.2 What are some positive consequences?

Web 17.0 should make the networks intelligent, make query and analysis more exact, break down barriers to knowledge cooperation, stimulate co-creation for massive co-development, and reduce complexity, confusion, chaos, and error. It could change the economic paradigm of payment for access to intellectual property to the paradigm of income from the "act of knowledge working" with some shared property. Douglas Englebart's Open Hypertextdocument System and Pierre Levy's Information Economy Meta Language could combine with XML Geo and other open innovations to allow people to immerse themselves in the diversity of information, inclusive of historical information, multi-cultural and alternative perspectives, real-time serious games/games for change, and practical rigorous dialog and consensus building. Human collective consciousness will greatly advance, as networked intelligence is always on and instantly accessible and ways of knowing are no longer a struggle.

14.3 What prevents this from happening?

The current illegal and unethical uses of the Internet are likely to increase if more ethical means are not implemented. Some bottlenecks would be the ability for improved semantic analysis, "individualistic vs. group solutions," and industries that fight open source software initiatives.

14.4 What are some negative consequences?

New kinds of viruses and methods of manipulating information delivery could be used to distort knowledge on the Semantic Web by those who don't like the new knowledge. In the past, cigarette companies distorted cancer research, today an oil company is distorting global warming research, and in the future some groups might want to distort research that counters their ideologies. As ideological wars were fought by industrial means in Korea and Vietnam, future ideological wars could be fought by information warfare means yet to be invented, making the Semantic Web a battle zone and hence less trusted. Major geopolitical problems, terrorism, ideological conflicts, and even open source arguments could become foci for, or versions of, information warfare.

15. Integrated life-long learning systems

In 2030 education ranges across all age groups—from prenatal programs to programs for the elderly that provide knowledge, work, and leisure enjoyment.[15]

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[14] RT Delphi references: William E. Halal, "The Intelligent Internet," *Government Computer News*, 23 June 2004; Bill Gates, "Now for an Intelligent Internet," reprinted from the Economist Group, Microsoft, November 2000; Artificial Intelligence Foundation, at alice.pandorabots.com.

[15] RT Delphi references: "Elderhostel: Adventures in Lifelong Learning," at www.elderhostel.org; *Senior Strategies: The STEP (Students, Teachers, Elderly, Parents, Student Achievement) Program*, Home and School

15.1 What might make this happen?

Life Long Learning is already a trend reinforced by longevity as well as by the further development of knowledge and learning society; Elderhostel is a contemporary example. To some degree the Internet is providing life-long learning now, although few see it that way yet. More people are devoted to education (teaching and learning) for more years than ever before in history.

Improved classification of competences required by different occupations for all ages groups, a better understanding of how we learn from elementary school on up, and increased attention to the spiritual needs of people via more humanistic educational approaches would promote the emergence of such a possibility.

15.2 What are some positive consequences?

The positive impacts include reformation of education, increased curiosity, and self-improvement and learning becoming more a part of life, helping the evolution of society. Greater attention will be paid to prenatal care as a necessary condition for better overall physical and mental performance.

15.3 What prevents this from happening?

Economic and cultural retrogression, growing generation gaps, and the widening divides between rich and poor could increase conflicts that would interrupt the evolution of education.

15.4 What are some negative consequences?

Too much dependence on computers and learning systems that might suffocate people if they are too conservative and the educational managers are too complacent. It could also create a gap between those who use the systems and those who opt out.

16. Programs aimed at eliminating prejudice and hate

Psychologists in 2030 believe that many wars and extremist activities are fueled by overt or subtle teachings of parents, peers, and teachers. Significant efforts have been made to reduce these influences in the education of young people.[16]

16.1 What might make this happen?

Universal curricula created by some internationally accepted body like UNESCO or Wikipedia 8.0 is more likely to be universally accepted and used by parties to an educational treaty. It has to be developed with the sense that it will be taught in Chicago as well as Jeddah. Curricula should include emotional as well as intellectual development and acknowledgement of the individual's potential to contribute to society, as well as a respect for cultural diversity, the value of "soft" knowledge, and more accurate history.

In addition, better integration of insights from psychology would contribute to understanding the need for unlearning, re-cognition, and commitments to new beliefs and emotional change.

Special attention should be given to the learning that occurs during adolescence, when students form their personal philosophies and world views. Reduction of violence in media and entertainment would help the curricula be more effective.

Institute, Washington, DC, 1983; "Life in the USA: New Careers an Education," at www.lifeintheusa.com/aging.careers.htm.

[16] RT Delphi references: U.S. Department of Education, *Preventing Youth Hate Crimes: A Manual for Schools and Communities*, Washington, DC, undated; Kathleen Cotton, *Fostering Intercultural Harmony in Schools: Research Finding*, Northwest Regional Educational Laboratory, Portland, OR, November 1993; Department of Canadian Heritage, *Canada's Fourth Report under the International Covenant on Civil and Political Rights*, Gatineau, PQ, Canada, November 2003.

16.2 What are some positive consequences?

Society becomes more auspicious, respectful, democratic, free, equitable, harmonious, and stable. Such programs are essential for the survival of humanity as increasingly destructive capabilities become more available to small groups and individuals.

16.3 What prevents this from happening?

If it is created within an atmosphere of "I will tell you how to teach your children," it will fail. As long as there are significant gaps between rich and poor, and limited resources, prejudice and hate will continue to be inflamed by extremists. Some governments will want to intervene and control people's behavior. It may take at least a generation beyond the Westphalian "state-above-all"; thereafter, there may be "space" to begin significant efforts to design and offer educational means with less emphasis on extremes in society.

16.4 What are some negative consequences?

If it is possible to reduce or eliminate hatred and prejudice, then it means that others can control human minds for ill as well. For example, cult leaders, totalitarian states, or new forms of ideological political correctness might use these methods or technologies to control the public. Education alone would not be enough to eliminate prejudice and hate; programs must include specific means to achieve social justice.

17. e-Teaching

Most of the poorer areas in 2030 as well as the more affluent ones use global outsourcing for e-teachers on-demand. These e-teachers are increasingly artificial constructs using artificial intelligence rather than live humans.[17]

17.1 What might make this happen?

e-teaching can be encouraged by the increasing realization that it is good for both affluent and poorer regions of the world, that it can make the best teachers available to many people regardless of location, and that it can be cost-effective. It can address both the diversity in knowledge levels and the unevenness of access to knowledge in education systems. Outsourcing to the best e-teachers will increase their income to the point that they can hire computer programmers, cognitive scientists, and others to make really brilliant programs to reach even more people around the world. Continued improvements and cost reductions in virtual reality, bots, and tele-education collaboration among educational institutions, governments, business, and NGOs will also help. Today, Homework Help from India charges US$18 an hour for tutoring on any subject. Knowledge can be shared and built upon at no cost. It is inevitable that the cost of communications will go to near zero and the cost of e-teaching will be within the reach of all, especially if the government subsidizes e-learning. Special interests will have to be defeated by firm and wise government policies.

17.2 What are some positive consequences?

e-teaching will help education to become more democratic, increase access to more people around the world, reduce financial and environmental costs per student and thus help reduce poverty, popularize science and culture, increase the joy of learning, facilitate the exchange of information among educational institutions, and open new methods of education. It will also lead to customized one-on-one instruction and make knowledge acquisition easier, faster, more individualized, virtual, and more globalized. With continuing development of advanced interfaces, it is likely that educational opportunities in virtual or synthetic worlds will be perfected as tools for teaching. Avatars or 3D holographic recordings will allow top teachers to send their lessons to all, including the underprivileged. Appropriate levels of funding and an R&D emphasis on education (and not just

[17] RT Delphi references: John M. Harris, Jr., "Why We Need Better E-Teaching, Not More E-Learning," MELD (MedBiquitous E-Learning Discourse), 6 May 2005; "e- learning," at Wikipedia; "Advanced Distributed Learning," at Wikipedia.

"gaming") could advance this. It's possible that by 2030 accelerating technologies could lead to a point at which the elite will be educated in part through direct brain downloads or novel nanotechnology applications and the people in poorer areas will have to "settle" for 3D VR teachers and learn the "old-fashioned" way, by listening and trying to remember. The live teacher is one of the least efficient and perhaps least effective ways of teaching; artificial constructs will become more and more the norm.

17.3 What prevents this from happening?

e-teaching could be delayed by entrenched monopolies, educational system inertia, lack of access to computers with high speed Internet, governments and other institutions that do not value education enough, and the lack of cooperation in exchanging information.

17.4 What are some negative consequences?

Although it is a useful tool for distant publics, it may not be a substitute for face-to-face education that provides the human dimension. The personality of teachers and experience of interpersonal communication is an important part of the educational process; e-teaching might not be able to take personal differences into account. Education is more than exchange of information. The poorest areas might not be able to afford e-teachers, perpetuating the knowledge gap.

18. Smarter than human computers

Machines in 2030 are clearly smarter than humans in any way that "smartness" can be measured. With this threshold having been passed, the roles and methods of education and learning are being reassessed everywhere.[18]

18.1 What might make this happen?

Moore's Law seems like a good indicator that artificial intelligence will overtake human intelligence by 2029, as forecasted by Ray Kurzweil. In effect, the Internet is already a 'smarter' than human computer; this depends of course on how one defines 'smartness.' If 'smarter' means memory or specific functions, then the Net has already surpassed the individual human brain.

Advances in the fields of artificial life and nanotechnology will continue and it is likely that machines will pass the Turing test and extend into ways of machine 'understanding' beyond simple information processing.

The fulfillment of this and other scenarios in this vision of 2030 could eliminate the need for conventional schools and human teachers. If superhuman AI emerges, these entities are also going to require some form of education, which most likely would be extremely different from human learning in terms of learning facts, social interactions, relations with the physical world, and growing up from childhood to maturity.

18.2 What are some positive consequences?

This development could dramatically increase human development and be regarded as the best tool or co-agent ever created by humanity. The integration of AI and the human intellect in micro-devices would dramatically enhance the efficiency of learning and the nature of work and would fundamentally change the methods of education and learning. This processing power may yield very different kinds of "thinking" from that of humans and provide an interesting cross-reference to understanding reality.

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[18] RT Delphi references: The Singularity Institute for Artificial Intelligence, at www.singinst.org/overview/whatisthesingularity; Nick Bostrom, "When Machines Outsmart Humans," *Futures* 35(7) (2000), pp. 759–64; Raymond Kurzweil, "Will My PC Be Smarter Than I Am?" *Time*, 19 June 2000.

18.3 What prevents this from happening?

Computers may surpass "intelligence" as we define it today, but they will never be able to compete with the other learning areas of individuals, such as emotional and social, where the interests of individuals reside. There could be a backlash from people who feel threatened by robots and computers that might grow beyond our ability to control or who believe that such computers would be used by powerful evil forces. Frustration at not being able to achieve this goal could lose support for further development, as some believe that it is impossible to make machines that are clearly smarter than humans in any way. The knowledge and intelligence of the physical, psychological, social, and emotional domains could be mimicked but not the thinking intelligence. And if it could be, who would trust it?

18.4 What are some negative consequences?

It might increase unemployment, and lead to the division of humanity between the "technologically enhanced" and the "naturals," a constant worry in the development of artificial intelligence and its direct application to human beings. As the future will continue to be "unevenly distributed"—a select few will benefit before everyone else—the outcome will depend on the benevolence of the people in control of the technology. We might not recognize superhuman intelligence for what it is, especially since it may be distributed and not embodied in a single perceptible being per se, which could lead eventually to the science fiction image of intelligent machines controlling humanity before humans realize it.

19. Artificial microbes enhance intelligence

Genetic codes have been written for new microbes that improve neural performance when co-habiting the brain.[19]

19.1 What might make this happen?

Craig Venter's work on writing genetic code to create unique lifeforms might develop some lifeforms by 2010, then it might take another 10 years to create the microbes able to live in and assist the brain, then yet another 10 to test this on other mammals. Hence by 2030 it could be possible to have safe microbes assisting the brain in keeping neurons healthy. It would be wise to dedicate some of the research money to public education, as was done for the Genome Project, so that public understanding evolves with research developments. Gates-type foundations funded by the nouveau-super-riche in countries like India, Russia, and China could accelerate the research.

Symbiotic organisms have many advantages over gene therapy, but they require ways of circumventing the immune system. Symbiotic gut bacteria producing drugs seem very plausible and could probably be used for enhancement. Anti-cavity mouth bacteria have already been demonstrated. Psychopharmacology, nanobots, and computer brain interfaces may also increase human intelligence.

19.2 What are some positive consequences?

This development would revolutionize life sciences. Healthy brains will last much longer, reducing medical costs, and could make for a wiser civilization.

19.3 What prevents this from happening?

There is a normal "human" fear about the unknown; many people will be afraid of artificial microbes, new bacteria, and nanobots. Those behind the anti GMO-regulations might also oppose this,

[19] RT Delphi references: Antonio Regalado, "Biologist Venter Aims to Create Life from Scratch," *Wall Street Journal*, 29 June 2005; David A. Relman, "The Human Body as Microbial Observatory," *Nature Genetics* 30 (2002), pp. 131–33; Michael Purdy, "Gut Microbes' Partnership Helps Body Extract Energy from Food, Store It as Fat," press release, School of Medicine, Washington University at St. Louis, 12 June 2006.

as would those who consider altering human biology unethical. (A global human review board might be created to help prevent this.)

19.4 What are some negative consequences?

Microbes might mutate and cause mental disease or other unknown side effects; thus a series of research trials over years would have to be conducted.

pp. 131–33; Michael Purdy, "Gut Microbes' Partnership Helps Body Extract Energy from Food, Store It as Fat," press release, School of Medicine, Washington University at St. Louis, 12 June 2006.

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Teaching for Creativity

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What is Creativity?

Creativity is a habit (Sternberg, 2006; Tharp, 2005). The problem is that schools sometimes treat it as a bad habit. And the world of conventional standardized tests we have invented does just that (Sternberg, 1997b). If students try being creative on standardized tests, they will get slapped down just as soon as they get their score. That will teach them not to do it again.

Oddly enough, a distinguished psychometric tester, J. P. Guilford, was one of the first to try to incorporate creativity into the school curriculum, but his efforts show little fruit today (Guilford, 1950). Disciples of Guilford such as McKinnon (1962) and Torrance (1962) had little more success.

It may sound paradoxical that creativity—a novel response—is a habit—a routine response. But creative people are creative largely not as a result of any particular inborn trait, but rather, through an attitude toward life (Maslow, 1967; Schank, 1988): They habitually respond to problems in fresh and novel ways, rather than allowing themselves to respond mindlessly and automatically (Sternberg & Lubart, 1995a, 1995b, 1995c).

Like any habit, creativity can either be encouraged or discouraged. The main things that promote the habit are (a) opportunities to engage in it, (b) encouragement when people avail themselves of these opportunities, and (c) rewards when people respond to such encouragement and think and behave creatively. You need all three. Take away the opportunities, encouragement, or rewards, and you will take away the creativity. In this respect, creativity is no different from any other habit, good or bad.

Suppose, for example, you want to encourage good eating habits. You can do so by (a) providing opportunities for students to eat well in school and at home, (b) encouraging students to avail themselves of these opportunities, and then (c) praising young people who do in fact use the opportunities to eat well. Or suppose you want to discourage smoking. You can do so by (a) taking away opportunities for engaging in it (e.g., by prohibiting it in various places or by making prices of cigarettes so high one can scarcely afford to buy them), (b) discouraging smoking (e.g., advertisements showing how smoking kills), and (c) rewarding people who do not smoke (e.g., with praise or even preferred rates for health- and life-insurance policies).

This may sound too simple. It's not. Creative people routinely approach problems in novel ways (Albert & Runco, 1999; Baer & Kaufman, 1999). Creative people habitually (a) look for ways to see problems that other people don't look for, (b) take risks that other people are afraid to take, (c) have the courage to defy the crowd and to stand up for their own beliefs, and (d) seek to overcome obstacles and challenges to their views that other people give in to, among other things (Sternberg & Lubart, 1995b, 1995c; see also Sternberg, 1999; Sternberg & Grigorenko, 2007).

Educational practices that seem to promote learning may inadvertently suppress creativity, for the same reasons that environmental circumstances can suppress any habit (Sternberg & Williams, 1996). These practices often take away the opportunities for, encouragement of, and rewards for creativity. The increasingly massive and far-reaching use of conventional standardized tests is one of the most effective, if unintentional, vehicles this country has created for suppressing creativity. I say "conventional" because the problem is not with standardized tests, per se, but rather, with the kinds of tests we use. And teacher-made tests can be just as much of a problem

Conventional standardized tests encourage a certain kind of learning and thinking—in particular, the kind of learning and thinking for which there is a right answer and many wrong answers (Gardner, 1983, 1991, 1993, 2006; Sternberg, 1997b, 2003). To create a multiple-choice or short-answer test, you need a right answer and many wrong ones. Problems that do not fit into the right answer – wrong answer format do not well lend themselves to multiple-choice and short-answer testing. Put another way, problems that require divergent thinking are inadvertently devalued by the use of standardized tests. This is not to say knowledge is unimportant. On the contrary, one cannot think creatively with knowledge unless one has the knowledge with which to think creatively. Creativity represents a balance between knowledge and freeing oneself of that knowledge (Johnson-Laird, 1988). Knowledge is a necessary, but in now way sufficient condition for creativity (Sternberg & Lubart, 1995a). The problem is that schooling often stops short of encouraging, being content if students have the knowledge.

Examples are legion (see Sternberg & Grigorenko, 2007; Sternberg, Kaufman, & Grigorenko, 2008). If one is studying history, one might take the opportunity to think creatively about how we can learn from the mistakes of the past to do better in the future. Or one might think creatively about what would have happened had a certain historical event not come to pass (e.g., the winning of the Allies against the Nazis in World War II). But there is no one "right" answer to such questions, so they are not likely to appear on conventional standardized test. In science, one can design an experiment, but again, designing an experiment does not neatly fit into a multiple-choice format. In literature, one can imagine alternative endings to stories, or what the stories would be like if they took place in a different era. In mathematics, students can invent and think with novel number systems. In foreign language, students can invent dialogues with people from other cultures. But the emphasis in most tests is on the display of knowledge, and often, inert knowledge that may sit in students' heads but may at the same time be inaccessible for actual use.

Essay tests might seem to provide a solution to such problems, and they might, but as they are typically used, they don't. Increasingly, essay tests can be and are scored by machine. Often, human raters of essays provide ratings that correlate more highly with machine-grading than with the grading of other humans. Why? Because they are scored against one or more implicit prototypes, or models of what a "correct" answer should be. The more the essay conforms to one or more prototypes, the higher the grade. Machines can detect conformity to prototypes better than humans, so essay graders of the kind being used today succeed in a limited form of essay evaluation. Thus, the essays that students are being given often do not encourage creativity—rather they discourage creativity in favor of model answers that conform to one or more prototypes. In the end, essay tests can end up rewarding uncreative students who spit back facts as well as creative ones (Sternberg, 1994).

Oddly enough, then, "accountability" movements that are being promoted as fostering solid education are, in at least one crucial respect, doing the opposite (Sternberg, 2004): It is discouraging creativity at the expense of conformity. The problem is the very narrow notion of accountability involved. But proponents of this notion of accountability often make it sound as though those who oppose them oppose any accountability, whereas, in fact, they instead may oppose only the narrow form of accountability conventional tests generate. The tests are not "bad" or "wrong," per se, just limited in what they assess. But they are treated as though they assess broader ranges of skills than they actually do assess. Curiously, governments may have a stake in such narrow, but not broad, forms accountability.

Governments often wish to encourage conformity—after all, they see themselves as promoting order, usually order with respect to themselves—and so they inadvertently may prefer an educational agenda that promotes a model of an educated person that minimizes or excludes creative (i.e., nonconforming) thinking. Their goal is not necessarily to punish creativity, but rather to ensure their own stability and longevity. The punishment and extinction of creativity is merely a byproduct. Thus, they may promote education, but not a kind of education that fosters creative thinking. They may also fail to promote active critical thinking, which also potentially puts their longevity at risk. Sometimes, they will allow creative or critical thinking, so long as it is not applied to their own policies. It is easy

for a government or other powerful organization to slip into the view that critics are "traitors" who must be ridiculed or punished. Inert knowledge is much safer to stability, because it gives the appearance of education without most of the the substance.

Creativity is socialized through thousands upon thousands of acts of teachers, parents, and other authority figures. So is conformity. If people have been socialized over the years to think in conforming ways, and if they have been rewarded for conforming, no single school or governmental initiative is likely to change the way people think and act. Conformity may be so much a part of the social fabric that people give it up only reluctantly.

Whereas creativity is seen as departure from a mean, conformity is seen as adherence to that mean. Societies often speak of the "tall-poppy" phenomenon, whereby tall poppies—those that stick out—are cut down to size. If one grows up in a society that cuts down the tall poppies, or does what it can to ensure that the poppies never grow tall in the first place, it will be difficult to generate creative behavior. People in such societies will be so afraid of departure from the mean that the will be unwilling to be creative, whatever their creative abilities might be. They may also think that being creative is the province of the mentally ill. Although there are associations between creativity and mental illness (Kaufman, 2001a, 2001b), the overwhelming majority of creative people are mentally well, not ill!

Why is creativity even important? It is important because the world is changing at a far greater pace than it ever has before, and people need constantly to cope with novel kinds of tasks and situations. Learning in this era must be lifelong, and people constantly need to be thinking in new ways (Sternberg, 1997a). The problems we confront, whether in our families, communities, or nations, are novel and difficult, and we need to think creatively and divergently to solve these problems. The technologies, social customs, and tools available to us in our lives are replaced almost as quickly as they are introduced. We need to think creatively to thrive, and, at times, even to survive.

But this often is not how we are teaching students to think—quite the contrary. So we may end up with "walking encyclopedias" who show all the creativity of an encyclopedia. In a recent bestseller, a man decided to become the smartest person in the world by reading an encyclopedia cover to cover. The fact that the book sold so well is a testament to how skewed our conception has become of what it means to be smart. Someone could memorize that or any other encyclopedia, but not be able to solve even the smallest novel problem in his or her life.

If we want to encourage creativity, we need to promote the creativity habit. That means we have to stop treating it as a bad habit. We have to resist efforts to promote a conception of accountability that encourages students to accumulate inert knowledge with which they learn to think neither creatively nor critically.

The Investment Theory of Creativity

Together with Todd Lubart, I have proposed an *investment theory of creativity* as a means of understanding the nature of creativity (Sternberg & Lubart, 1991, 1995a, 1995b). According to this theory, creative people are ones who are willing and able to "buy low and sell high" in the realm of ideas. Buying low means pursuing ideas that are unknown or out of favor but that have growth potential. Often, when these ideas are first presented, they encounter resistance. The creative individual persists in the face of this resistance, and eventually sells high, moving on to the next new, or unpopular idea.

According to the investment theory, creativity requires a confluence of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. Although levels of these resources are sources of individual differences, often the decision to use the resources is the more important source of individual differences. Ultimately,

creativity is not about one thing, but about a system of things (Csikszentmilhalyi, 1988, 1990, 1996, 1999).

Intellectual abilities

Intellectual abilities are generally acknowledge to be necessary but not sufficient for creativity (Schubert, 1973; Renzulli, 1986). Three intellectual skills are particularly important: (a) the synthetic ability to see problems in new ways and to escape the bounds of conventional thinking; (b) the analytic ability to recognize which of one's ideas are worth pursuing and which are not; and (c) the practical-contextual ability to know how to persuade others of-- to sell other people on--the value of one's ideas.

The confluence of these three abilities is also important. Analytic ability used in the absence of the other two abilities results in powerful critical, but not creative thinking. Synthetic ability in the absence of the other two abilities results in new ideas that are not subjected to the scrutiny required to make them work. And practical-contextual ability in the absence of the other two may result in the transmittal of ideas not because the ideas are good, but rather, because the ideas have been well and powerfully presented. To be creative, one must first *decide* to generate new ideas, analyze these ideas, and sell the ideas to others.

Knowledge

Concerning knowledge, on the one hand, one needs to know enough about a field to move it forward. One can't move beyond where a field is if one doesn't know where it is. On the other hand, knowledge about a field can result in a closed and entrenched perspective, resulting in a person's not moving beyond the way in which he or she has seen problems in the past (Frensch & Sternberg, 1989). Thus, one needs to decide to use one's past knowledge, but also decide not to let the knowledge become a hindrance rather than a help.

Thinking styles

Thinking styles are related to creativity (Kogan, 1973). With regard to thinking styles, a legislative style is particularly important for creativity, that is, a preference for thinking and a decision to think in new ways (Sternberg, 1997c). This preference needs to be distinguished from the ability to think creatively: Someone may like to think along new lines, but not think well, or vice versa. It also helps, to become a major creative thinker, if one is able to think globally as well as locally, distinguishing the forest from the trees and thereby recognizing which questions are important and which ones are not.

Personality

Numerous research investigations have supported the importance of certain personality attributes for creative functioning (Barron, 1969, 1988). These attributes include, but are not limited to, willingness to overcome obstacles, willingness to take sensible risks, willingness to tolerate ambiguity, and self-efficacy. In particular, buying low and selling high typically means defying the crowd, so that one has to be willing to stand up to conventions if one wants to think and act in creative ways. Note that none of these attributes are fixed. One can *decide* to overcome obstacles, take sensible risks, and so forth.

Motivation

Intrinsic, task-focused motivation is also essential to creativity. The research of Teresa Amabile (1996, 1999) and others has shown the importance of such motivation for creative work, and has suggested that people rarely do truly creative work in an area unless they really love what they are doing and focus on the work rather than the potential rewards. Motivation is not something inherent in a person: One decides to be motivated by one thing or another.

Environment

Finally, one needs an environment that is supportive and rewarding of creative ideas (Sternberg & Lubart, 1995a; Sternberg & Williams, 1996). One could have all of the internal resources needed in order to think creatively, but without some environmental support (such as a forum for proposing those ideas), the creativity that a person has within him or her might never be displayed.

Confluence

Concerning the confluence of components, creativity is hypothesized to involve more than a simple sum of a person's level on each component (Sternberg & Lubart, 1991). First, there may be thresholds for some components (e.g., knowledge) below which creativity is not possible regardless of the levels on other components. Second, partial compensation may occur in which a strength on one component (e.g., motivation) counteracts a weakness on another component (e.g., environment). Third, interactions may also occur between components, such as intelligence and motivation, in which high levels on both component could multiplicatively enhance creativity.

Creative ideas are both novel and valuable. But, they are often rejected because the creative innovator stands up to vested interests and defies the crowd. The crowd does not maliciously or willfully reject creative notions. Rather, it does not realize, and often does not want to realize, that the proposed idea represents a valid and advanced way of thinking. Society generally perceives opposition to the status quo as annoying, offensive, and reason enough to ignore innovative ideas.

Evidence abounds that creative ideas are often rejected. Initial reviews of major works of literature and art are often negative. Toni Morrison's *Tar Baby* received negative reviews when it was first published, as did Sylvia Plath's *The Bell Jar*. The first exhibition in Munich of the work of Norwegian painter Edvard Munch opened and closed the same day because of the strong negative response from the critics. Some of the greatest scientific papers have been rejected not just by one, but by several journals before being published. For example, John Garcia, a distinguished biopsychologist, was immediately denounced (see Garcia, 1981) when he first proposed that a form of learning called classical conditioning could be produced in a single trial of learning (Garcia & Koelling, 1986).

From the investment view, then, the creative person buys low by presenting a unique idea and then attempting to convince other people of its value. After convincing others that the idea is valuable, which increases the perceived value of the investment, the creative person sells high by leaving the idea to others and moving on to another idea. People typically want others to love their ideas, but immediate universal applause for an idea usually indicates that it is not particularly creative.

Research Supporting the Investment Theory

Research within the investment framework has yielded support for this model (Lubart & Sternberg, 1995). This research has used tasks such as:

(a) Writing short-stories using unusual titles (e.g., the octopus' sneakers);
(b) Drawing pictures with unusual themes (e.g., the earth from an insect's point of view);
(c) Devising creative advertisements for boring products (e.g., cufflinks); and
(d) solving unusual scientific problems (e.g., how we could tell if someone had been on the moon within the past month?).

This research showed creative performance to be moderately domain-specific, and to be predicted by the combination of resources specified by the theory.

In another study, creativity was measured using open-ended measures (Sternberg & the Rainbow Project Collaborators, 2005, 2006). These performance tasks were expected to tap an important aspect of creativity that might not be measured using multiple-choice items alone, because open-ended measures require more spontaneous and free-form responses.

For each of the tasks, participants were given a choice of topic or stimuli on which to base their creative stories or cartoon captions. Each of the creativity performance tasks were rated on criteria that were determined *a priori* as indicators of creativity.

Participants were given five cartoons, minus their captions, purchased from the archives of the *New Yorker*. The participants' task was to choose three cartoons, and to provide a caption for each cartoon. Two trained judges rated all the cartoons for cleverness, humor, originality, and task appropriateness on 5-point scales. A combined creativity score was formed by summing the individual ratings on each dimension except task appropriateness, which, theoretically, is not a pure measure of creativity per se.

Participants were further asked to write two stories, spending about 15 minutes on each, choosing from the following titles: "A Fifth Chance," "2983," "Beyond the Edge," "The Octopus's Sneakers," "It's Moving Backwards," and "Not Enough Time" (Lubart & Sternberg, 1995; Sternberg & Lubart, 1995a). A team of six judges was trained to rate the stories. Each judge rated the stories for originality, complexity, emotional evocativeness, and descriptiveness on 5-point scales.

Participants also were presented with five sheets of paper, each containing a set of 11 to 13 images linked by a common theme (keys, money, travel, animals playing music, and humans playing music). There were no restrictions on the minimum or maximum number of images that needed to be incorporated into the stories. After choosing one of the pages, the participant was given 15 minutes to formulate a short story and dictate it into a cassette recorder.

Six judges were trained to rate the stories. As with the written stories, each judge rated the stories for originality, complexity, emotional evocativeness, and descriptiveness on 5-point scales.

Rasch reliability indices for the composite person ability estimates for the Written and Oral Stories were very good (.79 and .80, respectively). The judges for both the Written and Oral Stories varied greatly in terms of their severity of ratings for the stories. For the Written Stories, the judges also ranged in their fit to the model, although the reliability was still sound (rater reliability = .94). For the Oral Stories, all the judges fit the model very well, so their differences could be reliably modeled (rater reliability = .97).

Creativity-based performance tests formed a unique factor in a factor analysis. Furthermore, the creativity tests significantly and substantially increased prediction of first-year college grade-point averages for over 700 highly diverse students from 13 colleges and universities across the United States that varied widely in quality and geographic location. The tests also substantially decreased ethnic-group differences. The reason is that different groups are socialized to be intelligent in different ways. For example, American Indians performed relatively poorly in comparison with other ethnic groups on the analytical measure of the battery but had the highest scores on oral-story telling.

In a more recent project, Kaleidoscope (Sternberg, 2007a, 2007b, 2007c), over the last two years, we have presented to all of the roughly 15,500 undergraduate applicants to Tufts University, application essays designed to assess creative thinking. For example, they might be invited to say what the world would be like today if the Nazis had won World War II, or to create a short story with a title such as "The End of MTV" or "Confessions of a Middle-School Bully," or to draw a design for a new product or to draw an advertisement. We found that we did not obtain the ethnic-group differences that are typical of university-admissions assessments when we used our tests, and that students who were accepted with excellent creativity scores on Kaleidoscope did just as well as students accepted as outstanding in other ways.

In another project, Aurora, for children roughly 8-12 years of age, we are currently standardizing around the world an assessment that includes creativity items in the verbal, numerical, and figural domains (Chart, Grigorenko, & Sternberg, 2008; see Sternberg, 2007a). In this way, it will be possible to extend our work downward to a younger level.

How Can We Develop Creativity in Students?

Teaching creatively means encouraging students to (a) create, (b) invent, (c) discover, (d) imagine if…, (e) suppose that…, (f) predict. Teaching for creativity requires teachers not only to support and encourage creativity, but also to role-model it and to reward it when it is displayed (Sternberg & Grigorenko, 2007; Sternberg & Lubart, 1995; Sternberg & Williams, 1996). In other words, teachers need not only to talk the talk, but also to walk the walk.

Consider some examples of instructional or assessment activities that encourage students to think creatively.

(a) Create *an alternative ending to the short story you just read that represents a different way things might have gone for the main characters in the story. [Literature]*

(b) Invent *a dialogue between an American tourist in Paris and a French man he encounters on the street from whom he is asking directions on how to get to the Rue Pigalle. [French]*

(c) Discover *the fundamental physical principle that underlies all of the following problems, each of which differs from the others in the "surface structure" of the problem but not in its "deep structure…." [Physics]*

(d) Imagine if *the government of China keeps evolving over the course of the next 20 years in much the same way it has been evolving. What do you believe the government of China will be like in 20 years? [Government/Political Science]*

(e) Suppose that *you were to design one additional instrument to be played in a symphony orchestra for future compositions. What might that instrument be like, and why? [Music]*

(f) Predict *changes that are likely to occur in the vocabulary or grammar of spoken Spanish in the border areas of the Rio Grande over the next 100 years as a result of continuous interactions between Spanish and English speakers. [Linguistics]*

Consider 12 keys for developing the creativity habit in students (see also Sternberg & Grigorenko, 2007; Sternberg & Williams, 1996).

Redefine Problems

Redefining a problem means taking a problem and turning it on its head. Many times in life individuals have a problem and they just don't see how to solve it. They are stuck in a box. Redefining a problem essentially means extricating oneself from the box. This process is the synthetic part of creative thinking.

There are many ways teachers and parents can encourage students to define and redefine problems for themselves, rather than--as is so often the case--doing it for them. Teachers and parents can promote creative performance by encouraging their students to define and redefine *their own* problems and projects. Adults can encourage creative thinking by having students choose their own topics for papers or presentations, choose their own ways of solving problems, and sometimes having them choose again if they discover that their selection was a mistake. Teachers and parents should also allow their students to pick their own topics, subject to the adults' approval, on projects the students do. Approval ensures that the topic is relevant to the lesson and has a chance of leading to a successful project.

Adults cannot always offer students choices, but giving choices is the only way for students to learn how to choose. Giving students latitude in making choices helps them to develop taste and good judgment, both of which are essential elements of creativity.

At some point everyone makes a mistake in choosing a project or in the method they select to complete it. Teachers and parents should remember that an important part of creativity is the analytic

part--learning to recognize a mistake—and give students the chance and the opportunity to redefine their choices.

Question and Analyze Assumptions

Everyone has assumptions. Often one does not know he or she has these assumptions because they are widely shared. Creative people question assumptions and eventually lead others to do the same. Questioning assumptions is part of the analytical thinking involved in creativity. When Copernicus suggested that Earth revolves around the sun, the suggestion was viewed as preposterous because everyone could see that the sun revolves around Earth. Galileo's ideas, including the relative rates of falling objects, caused him to be banned as a heretic.

Sometimes it is not until many years later that society realizes the limitations or errors of their assumptions and the value of the creative person's thoughts. The impetus of those who question assumptions allows for cultural, technological, and other forms of advancement.

Teachers can be role models for questioning assumptions by showing students that what they assume they know, they really do not know. Of course, students shouldn't question every assumption. There are times to question and try to reshape the environment, and there are times to adapt to it. Some creative people question so many things so often that others stop taking them seriously. Everyone must learn which assumptions are worth questioning and which battles are worth fighting. Sometimes it's better for individuals to leave the inconsequential assumptions alone so that they have an audience when they find something worth the effort.

Teachers and parents can help students develop this talent by making questioning a part of the daily exchange. It is more important for students to learn what questions to ask—and how to ask them—than to learn the answers. Adults can help students evaluate their questions by discouraging the idea that the adults ask questions and the students simply answer them. Adults need to avoid perpetuating the belief that their role is to teach students the facts, and instead help students understand that what matters is the students' ability to use facts. This can help students learn how to formulate good questions and how to answer questions.

Society tends to make a pedagogical mistake by emphasizing the answering and not the asking of questions. The good student is perceived as the one who rapidly furnishes the right answers. The expert in a field thus becomes the extension of the expert student—the one who knows and can recite a lot of information. As John Dewey recognized, how one thinks is often more important than what one thinks. Schools need to teach students how to ask the right questions (questions that are good, thought-provoking, and interesting) and lessen the emphasis on rote learning.

Do Not Assume That Creative Ideas Sell Themselves: Sell Them

Everyone would like to assume that their wonderful, creative ideas will sell themselves. But as Galileo, Edvard Munch, Toni Morrison, Sylvia Plath, and millions of others have discovered, they do not. On the contrary, creative ideas are usually viewed with suspicion and distrust. Moreover, those who propose such ideas may be viewed with suspicion and distrust as well. Because people are comfortable with the ways they already think, and because they probably have a vested interest in their existing way of thinking, it can be extremely difficult to dislodge them from their current way of thinking. Thus, students need to learn how to persuade other people of the value of their ideas. This selling is part of the practical aspect of creative thinking. If students do a science project, it is a good idea for them present it and demonstrate why it makes an important contribution. If they create a piece of artwork, they should be prepared to describe why they think it has value. If they develop a plan for a new form of government, they should explain why it is better than the existing form of government. At times, teachers may find themselves having to justify their ideas about teaching to their principal. They should prepare their students for the same kind of experience.

Encourage Idea Generation

As mentioned earlier, creative people demonstrate a "legislative" style of thinking: They like to generate ideas. The environment for generating ideas can be constructively critical, but it must not be harshly or destructively critical. Students need to acknowledge that some ideas are better than others. Adults and students should collaborate to identify and encourage any creative aspects of ideas that are presented. When suggested ideas don't seem to have much value, teachers should not just criticize. Rather, they should suggest new approaches, preferably ones that incorporate at least some aspects of the previous ideas that seemed in themselves not to have much value. Students should be praised for generating ideas, regardless of whether some are silly or unrelated, while being encouraged to identify and develop their best ideas into high-quality projects.

Recognize That Knowledge Is a Double-Edged Sword and Act Accordingly

On the one hand, one cannot be creative without knowledge. Quite simply, one cannot go beyond the existing state of knowledge if one does not know what that state is. Many students have ideas that are creative with respect to themselves, but not with respect to the field because others have had the same ideas before. Those with a greater knowledge base can be creative in ways that those who are still learning about the basics of the field cannot be.

At the same time, those who have an expert level of knowledge can experience tunnel vision, narrow thinking, and entrenchment (Adelson, 1984; Frensch & Sternberg, 1989). Experts can become so stuck in a way of thinking that they become unable to extricate themselves from it. When a person believes that he or she knows everything there is to know, he or she is unlikely to ever show truly meaningful creativity again.

The upshot of this is that I tell my students and my own students that the teaching-learning process is a two-way process. I have as much to learn from my students and my students as they have to learn from me. I have knowledge they do not have, but they have flexibility I do not have—precisely because they do not know as much as I do. By learning from, as well as teaching to, one's students, one opens up channels for creativity that otherwise would remain closed.

Encourage Students to Identify and Surmount Obstacles

Buying low and selling high means defying the crowd. And people who defy the crowd—people who think creatively—almost inevitably encounter resistance. The question is not whether one will encounter obstacles; that obstacles will be encountered is a fact. The question is whether the creative thinker has the fortitude to persevere and to go against the crowd (Simonton, 1976, 1984, 1988, 1994). I have often wondered why so many people start off their careers doing creative work and then vanish from the radar screen. I think I know at least one reason why: Sooner or later, they decide that being creative is not worth the resistance and punishment. The truly creative thinkers pay the short-term price because they recognize that they can make a difference in the long term. But often it is a long while before the value of creative ideas is recognized and appreciated.

Teachers can prepare students for these types of experiences by describing obstacles that they, their friends, and well-known figures in society have faced while trying to be creative; otherwise, students may think that they are the only ones confronted by obstacles. Teachers should include stories about people who weren't supportive, about bad grades for unwelcome ideas, and about frosty receptions to what they may have thought were their best ideas. To help students deal with obstacles, teachers can remind them of the many creative people whose ideas were initially shunned and help them to develop an inner sense of awe of the creative act. Suggesting that students reduce their concern over what others think is also valuable. However, it is often difficult for students to lessen their dependence on the opinions of their peers.

When students attempt to surmount an obstacle, they should be praised for the effort, whether or not they were entirely successful. Teachers and parents alike can point out aspects of the students' attack that were successful and why, and suggest other ways to confront similar obstacles. Having the

class brainstorm about ways to confront a given obstacle can get them thinking about the many strategies people can use to confront problems. Some obstacles are within oneself, such as performance anxiety. Other obstacles are external, such as others' bad opinions of one's actions. Whether internal or external, obstacles must be overcome.

Encourage Sensible Risk-Taking

When creative people defy the crowd by buying low and selling high, they take risks in much the same way as do people who invest. Some such investments simply may not pan out. Moreover, defying the crowd means risking the crowd's wrath. But there are levels of sensibility to keep in mind when defying the crowd. Creative people take sensible risks and produce ideas that others ultimately admire and respect as trend-setting. In taking these risks, creative people sometimes make mistakes, fail, and fall flat on their faces.

I emphasize the importance of sensible risk-taking because I am not talking about risking life and limb for creativity. To help students learn to take sensible risks, adults can encourage them to take some intellectual risks with courses, with activities, and with what they say to adults—to develop a sense of how to assess risks.

Nearly every major discovery or invention entailed some risk. When a movie theater was the only place to see a movie, someone created the idea of the home video machine. Skeptics questioned if anyone would want to see videos on a small screen. Another initially risky idea was the home computer. Many wondered if anyone would have enough use for a home computer to justify the cost. These ideas were once risks that are now ingrained in our society.

Few students are willing to take many risks in school, because they learn that taking risks can be costly. Perfect test scores and papers receive praise and open up future possibilities. Failure to attain a certain academic standard is perceived as deriving from a lack of ability and motivation and may lead to scorn and lessened opportunities. Why risk taking hard courses or saying things that teachers may not like when that may lead to low grades or even failure? Teachers may inadvertently advocate students to only learn to "play it safe" when they give assignments without choices and allow only particular answers to questions. Thus, teachers need not only to encourage sensible risk-taking, but also to reward it.

Encourage Tolerance of Ambiguity

People often like things to be in black and white. People like to think that a country is good or bad (ally or enemy) or that a given idea in education works or does not work. The problem is that there are a lot of grays in creative work. Artists working on new paintings and writers working on new books often report feeling scattered and unsure in their thoughts. They often need to figure out whether they are even on the right track. Scientists often are not sure whether the theory they have developed is exactly correct. These creative thinkers need to tolerate the ambiguity and uncertainty until they get the idea just right.

A creative idea tends to come in bits and pieces and develops over time. However, the period in which the idea is developing tends to be uncomfortable. Without time or the ability to tolerate ambiguity, many may jump to a less than optimal solution. When a student has almost the right topic for a paper or almost the right science project, it's tempting for teachers to accept the near miss. To help students become creative, teachers need to encourage them to accept and extend the period in which their ideas do not quite converge. Students need to be taught that uncertainty and discomfort are a part of living a creative life. Ultimately, they will benefit from their tolerance of ambiguity by coming up with better ideas.

Help Students Build Self-Efficacy

Many people often reach a point where they feel as if no one believes in them. I reach this point frequently, feeling that no one values or even appreciates what I am doing. Because creative work

often doesn't get a warm reception, it is extremely important that the creative people believe in the value of what they are doing. This is not to say that individuals should believe that every idea they have is a good idea. Rather, individuals need to believe that, ultimately, they have the ability to make a difference.

The main limitation on what students can do is what they think they can do. All students have the capacity to be creators and to experience the joy associated with making something new, but first they must be given a strong base for creativity. Sometimes teachers and parents unintentionally limit what students can do by sending messages that express or imply limits on students' potential accomplishments. Instead, these adults need to help students believe in their own ability to be creative.

I have found that probably the best predictor of success among my students is not their ability, but their belief in their ability to succeed. If students are encouraged to succeed and to believe in their own ability to succeed, they very likely will find the success that otherwise would elude them.

Help Students Find What They Love to Do

Teachers must help students find what excites them to unleash their students' best creative performances. Teachers need to remember that this may not be what really excites them. People who truly excel creatively in a pursuit, whether vocational or avocational, almost always genuinely love what they do.

Helping students find what they really love to do is often hard and frustrating work. Yet, sharing the frustration with them now is better than leaving them to face it alone later. To help students uncover their true interests, teachers can ask them to demonstrate a special talent or ability for the class, and explain that it doesn't matter what they do (within reason), only that they love the activity.

In working with my students and my students, I try to help them find what interests *them,* whether or not it particularly interests me. Often, their enthusiasm is infectious, and I find myself drawn into new areas of pursuit simply because I allow myself to follow my students rather than always expecting them to follow me.

I often meet students who are pursuing a certain career interest not because it is what they want to do, but because it is what their parents or other authority figures expect them to do. I always feel sorry for such students, because I know that although they may do good work in that field, they almost certainly will not do great work. It is hard for people to do great work in a field that simply does not interest them.

Teach Students the Importance of Delaying Gratification

Part of being creative means being able to work on a project or task for a long time without immediate or interim rewards. Students must learn that rewards are not always immediate and that there are benefits to delaying gratification (Mischel, Shoda, & Rodriguez, 1989). The fact of the matter is that, in the short term, people are often ignored when they do creative work or even punished for doing it.

Many people believe that they should reward students immediately for good performance, and that students should expect rewards. This style of teaching and parenting emphasizes the here and now and often comes at the expense of what is best in the long term.

An important lesson in life—and one that is intimately related to developing the discipline to do creative work—is to learn to wait for rewards (Mischel, Shoda, & Rodriguez, 1989). The greatest rewards are often those that are delayed. Teachers can give their students examples of delayed gratification in their lives and in the lives of creative individuals and help them apply these examples to their own lives.

Hard work often does not bring immediate rewards. Students do not immediately become expert baseball players, dancers, musicians, or sculptors. And the reward of becoming an expert can seem very far away. Students often succumb to the temptations of the moment, such as watching television or playing video games. The people who make the most of their abilities are those who wait for a reward and recognize that few serious challenges can be met in a moment. Students may not see the benefits of hard work, but the advantages of a solid academic performance will be obvious when they apply to college.

The short-term focus of most school assignments does little to teach students the value of delaying gratification. Projects are clearly superior in meeting this goal, but it is difficult for teachers to assign home projects if they are not confident of parental involvement and support. By working on a task for many weeks or months, students learn the value of making incremental efforts for long-term gains.

Provide an Environment That Fosters Creativity

There are many ways teachers can provide an environment that fosters creativity. The most powerful way for teachers to develop creativity in students is to *role model creativity.* Students develop creativity not when they are told to, but when they are shown how (Amabile, 1996).

The teachers most people probably remember from their school days are not those who crammed the most content into their lectures. The teachers most people remember are those teachers whose thoughts and actions served as a role model. Most likely they balanced teaching content with teaching students how to think with and about that content.

Occasionally, I will teach a workshop on developing creativity and someone will ask exactly what he or she should do to develop creativity. Bad start. A person cannot be a role model for creativity unless he or she thinks and teaches creatively him- or herself. Teachers need to think carefully about their values, goals, and ideas about creativity and show them in their actions.

Teachers also can stimulate creativity by helping students *to cross-fertilize in their thinking* to think across subjects and disciplines. The traditional school environment often has separate classrooms and classmates for different subjects and seems to influence students into thinking that learning occurs in discrete boxes—the math box, the social studies box, and the science box. However, creative ideas and insights often result from integrating material across subject areas, not from memorizing and reciting material.

Teaching students to cross-fertilize draws on their skills, interests, and abilities, regardless of the subject. If students are having trouble understanding math, teachers might ask them to draft test questions related to their special interests. For example, teachers might ask the baseball fan to devise geometry problems based on a game. The context may spur creative ideas because the student finds the topic (baseball) enjoyable and it may counteract some of the anxiety caused by geometry. Cross-fertilization motivates students who aren't interested in subjects taught in the abstract.

One way teachers can enact cross-fertilization in the classroom is to ask students to identify their best and worst academic areas. Students can then be asked to come up with project ideas in their weak area based on ideas borrowed from one of their strongest areas. For example, teachers can explain to students that they can apply their interest in science to social studies by analyzing the scientific aspects of trends in national politics.

Teachers also need to *allow students the time to think creatively.* This society is a society in a hurry. People eat fast food, rush from one place to another, and value quickness. Indeed, one way to say someone is smart is to say that the person is *quick*, a clear indication of our emphasis on time. This is also indicated by the format of the standardized tests used--lots of multiple-choice problems squeezed into a brief time slot.

Most creative insights do not happen in a rush. People need time to understand a problem and to toss it around. If students are asked to think creatively, they need time to do it well. If teachers stuff questions into their tests or give their students more homework than they can complete, they are not allowing them time to think creatively.

Teachers also should *instruct and assess for creativity.* If teachers give only multiple-choice tests, students quickly learn the type of thinking that teachers value, no matter what they say. If teachers want to encourage creativity, they need to include at least some opportunities for creative thought in assignments and tests. Questions that require factual recall, analytic thinking, and creative thinking should be asked. For example, students might be asked to learn about a law, analyze the law, and then think about how the law might be improved.

Teachers also need *to reward creativity.* It is not enough to talk about the value of creativity. Students are used to authority figures who say one thing and do another. They are exquisitely sensitive to what teachers value when it comes to the bottom line--namely, the grade or evaluation.

Creative efforts also should be rewarded. For example, teachers can assign a project and remind students that they are looking for them to demonstrate their knowledge, analytical and writing skills, and creativity. Teachers should let students know that creativity does not depend on the teacher's agreement with what students write, but rather with ideas they express that represent a synthesis between existing ideas and their own thoughts. Teachers need to care only that the ideas are creative from the student's perspective, not necessarily creative with regard to the state-of-the-art findings in the field. Students may generate an idea that someone else has already had, but if the idea is an original to the student, the student has been creative.

Teachers also need *to allow mistakes.* Buying low and selling high carries a risk. Many ideas are unpopular simply because they are not good. People often think a certain way because that way works better than other ways. But once in a while, a great thinker comes along—a Freud, a Piaget, a Chomsky, or an Einstein—and shows us a new way to think. These thinkers made contributions because they allowed themselves and their collaborators to take risks and make mistakes.

Although being successful often involves making mistakes along the way, schools are often unforgiving of mistakes. Errors on schoolwork are often marked with a large and pronounced X. When a student responds to a question with an incorrect answer, some teachers pounce on the student for not having read or understood the material, which results in classmates snickering. In hundreds of ways and in thousands of instances over the course of a school career, students learn that it is not all right to make mistakes. The result is that they become afraid to risk the independent and the sometimes-flawed thinking that leads to creativity.

When students make mistakes, teachers should ask them to analyze and discuss these mistakes. Often, mistakes or weak ideas contain the germ of correct answers or good ideas. In Japan, teachers spend entire class periods asking students to analyze the mistakes in their mathematical thinking. For the teacher who wants to make a difference, exploring mistakes can be an opportunity for learning and growing. Another aspect of teaching students to be creative is teaching them *to take responsibility for both successes and failures.* Teaching students how to take responsibility means teaching students to (1) understand their creative process, (2) criticize themselves, and (3) take pride in their best creative work. Unfortunately, many teachers and parents look for—or allow students to look for—an outside enemy responsible for failures. It sounds trite to say that teachers should teach students to take responsibility for themselves, but sometimes there is a gap between what people know and how they translate thought into action. In practice, people differ widely in the extent to which they take responsibility for the causes and consequences of their actions. Creative people need to take responsibility for themselves and for their ideas.

Teachers also can work *to encourage creative collaboration*. Creative performance often is viewed as a solitary occupation. We may picture the writer writing alone in a studio, the artist painting in a solitary loft, or the musician practicing endlessly in a small music room. In reality, people often work in groups. Collaboration can spur creativity. Teachers can encourage students to learn by example by collaborating with creative people.

Students also need to learn how *to imagine things from other viewpoints.* An essential aspect of working with other people and getting the most out of collaborative creative activity is to imagine oneself in other people's shoes. Individuals can broaden their perspective by learning to see the world from different points of view. Teachers and parents should encourage their students to see the importance of understanding, respecting, and responding to other people's points of view. This is important, as many bright and potentially creative students never achieve success because they do not develop practical intelligence. They may do well in school and on tests, but they may never learn how to get along with others or to see things and themselves as others see them. Teachers also need to help students recognize person-environment fit. What is judged as creative is an interaction between a person and the environment. The very same product that is rewarded as creative in one time or place may be scorned in another.

By building a constant appreciation of the importance of person-environment fit, teachers prepare their students for choosing environments that are conducive to their creative success. Encourage students to examine environments to help them learn to select and match environments with their skills.

Creativity, then, is in large part a habit that adults can encourage in students or in themselves. It remains only for teachers to help foster this habit.

Conclusion

Creativity is as much a habit in and an attitude toward life as it is a matter of ability. Creativity is often obvious in young students, but it may be harder to find in older students and adults because their creative potential has been suppressed by a society that encourages intellectual conformity. Yet, anyone can decide to adopt the creativity habit. Start right now!

References

Adelson, B. (1984). When novices surpass experts: The difficulty of a task may increase with expertise. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *10*(3) 483-495.

Albert, R. S. , & Runco, M. A. (1999). A history of research on creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 16-31). New York: Cambridge University Press.

Amabile, T.M. (1996). *Creativity in context*. Boulder, CO: Westview.

Amabile, T. M. (1999). *How to kill creativity.* In *Harvard Business Review on breakthrough thinking* (pp. 1-28). Massachusetts: Harvard.

Baer, J., & Kaufman, J. C. (2006). Creativity research in English-speaking countries. In J. C. Kaufman, & R. J. Sternberg (Eds.) *The international handbook of creativity* (pp. 10-38). New York: Cambridge University Press.

Barron, F. (1969). *Creative person and creative process*. New York: Holt, Rinehart & Winston.

Barron, F. (1988). Putting creativity to work. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 76-98). New York: Cambridge University Press.

Chart, H., Grigorenko, E. L., & Sternberg, R. J. (2008). Identification: The Aurora Battery. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education* (pp. 281-301). Waco, TX: Prufrock.

Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 325-339). New York: Cambridge University Press.

Csikszentmihalyi, M. (1990). The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity*(pp. 190-212). Newbury Park, CA: Sage.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: HarperCollins.

Csikszentmihalyi, M. (1999). Implications of a systems perspective for the study of creativity. In R.J. Sternberg (Ed.), *Handbook of creativity* (pp. 313–335). New York: Cambridge University Press.
Frensch, P. A., & Sternberg, R. J. (1989). Expertise and intelligent thinking: When is it worse to know better? In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence* (Vol. 5, pp. 157–188). Hillsdale, NJ: Lawrence Erlbaum Associates.
Garcia**,** J. (1981). Tilting at the paper mills of academe. *American Psychologist. Vol 36(2),* 149-158.
Garcia, J., & Koelling, R. A. (1966). The relation of cue to consequence in avoidance learning. *Psychonomic Science, 4*, 123–124.Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic.
Gardner, H. (1991). *The unschooled mind*. New York: Basic Books.
Gardner, H. (1993). *Creating minds*. New York: Basic Books.
Gardner, H. (2006). *Multiple intelligences: New horizons.* New York: Perseus.
Guilford, J. P. (1950). Creativity. *American Psychologist, 5*, 444-454.
Johnson-Laird, P.N. (1988). Freedom and constraint in creativity. In R.J. Sternberg (Ed.), *The nature of creativity* (pp. 202-219). New York: Cambridge University Press.
Kaufman, J. C. (2001a). Genius, lunatics, and poets: Mental illness in prize-winning authors. *Imagination, Cognition, and Personality*, *20* (4), 305-314.
Kaufman, J. C. (2001b). The Sylvia Plath effect: Mental illness in eminent creative writers. *Journal of Creative Behavior, 35* (1), 37-50.
Kogan, N. (1973). Creativity and cognitive style: A life-span perspective. In P. B. Baltes, & K. W. Schaie (Eds.), *Life-span developmental psychology: Personality and socialization* (pp. 145-178). New York: Academic Press.
Lubart, T. I., & Sternberg, R. J. (1995). An investment approach to creativity: Theory and data. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 269–302). Cambridge, MA: MIT Press.
Maslow, A. (1967). The creative attitude. In R. L. Mooney & T. A. Rasik (Eds.), *Explorations in creativity* (pp. 43-57). New York: Harper & Row.
Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989). Delay of gratification in children. *Science, 244*, 933-938.
Renzulli, J. S. (1986). The three-ring conception of giftedness: a developmental model for creative productivity. In R.J. Sternberg & J.E. Davidson (Eds.), *Conceptions of giftedness* (pp. 53-92). New York: Cambridge University Press.
Schank, R. C. (1988). *The creative attitude*. New York: Macmillan.
Simonton, D. K. (1976). Biographical determinants of achieved eminence: A multivariate approach to the Cox data. *Journal of Personality and Social Psychology, 33*, 218-226.
Simonton, D. K. (1984). *Genius, creativity, and leadership*. Cambridge, MA: Harvard University Press.
Simonton, D. K. (1988). Age and outstanding achievement: What do we know after a century of research? *Psychological Bulletin*, *104*, 251-267.
Simonton, D. K. (1988). *Scientific genius*. New York: Cambridge University Press.
Simonton, D.K. (1994). *Greatness: Who makes history and why?* New York: Guilford.
Sternberg, R. J. (1994). Allowing for thinking styles. *Educational Leadership*, *52*(3), 36–40.
Sternberg, R. J. (2006). Creativity is a habit. *Education Week*, *25* (24), 47-64.
Sternberg, R. J. (1997a). The concept of intelligence and its role in lifelong learning and success. *American Psychologist, 52,* 1030–1037.
Sternberg, R. J. (1997b). *Successful intelligence*. New York: Plume.
Sternberg, R. J. (1997c). *Thinking styles.* New York: Cambridge University Press.
Sternberg, R. J. (Ed.). (1999) *Handbook of creativity*. New York: Cambridge University Press.
Sternberg, R. J. (2003). Teaching for successful intelligence: Principles, practices, and outcomes. *Educational and Child Psychology, 20*(2), 6–18.
Sternberg, R. J. (2004). Good intentions, bad results: A dozen reasons why the No Child Left Behind (NCLB) Act is failing our nation's schools. *Education Week, 24*(9), 42, 56.
Sternberg, R. J. (2007a). Finding students who are wise, practical, and creative. *The Chronicle of Higher Education, 53* (44), B11.
Sternberg, R. J. (2007b). The Kaleidoscope Project. *SPIM Newsletter*, *Summer Issue*.

Sternberg, R. J. (2007c). Finding students who are wise, practical, and creative. *The Chronicle of Higher Education, 53* (44), B11.
Sternberg, R. J., & Grigorenko, E. L. (2004). Successful intelligence in the classroom. *Theory into practice, 43*(4), 274–280.
Sternberg, R. J., & Grigorenko, E. L. (2007). *Teaching for successful intelligence* (2nd ed.). Thousand Oaks, CA: Corwin.
Sternberg, R. J., Kaufman, J. C., & Grigorenko, E. L. (2008). *Applied intelligence*. New York: Cambridge University Press.
Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development*, *34*(1), 1–31.
Sternberg, R. J., & Lubart, T. I. (1995a). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
Sternberg, R. J., & Lubart, T. I. (1995b). Ten keys to creative innovation. *R & D Innovator*, *4*(3), 8–11.
Sternberg, R. J., & Lubart, T. I. (1995c). Ten tips toward creativity in the workplace. In C. M. Ford & D. A. Gioia (Eds.), *Creative action in organizations: Ivory tower visions and real world voices* (pp. 173–180). Newbury Park, CA: Sage Publications.
Sternberg, R. J., & the Rainbow Project Collaborators (2005). Augmenting the SAT through assessments of analytical, practical, and creative skills. In W. Camara & E. Kimmel (Eds.). *Choosing students: Higher education admission tools for the 21st century* (pp. 159–176). Mahwah, NJ: Lawrence Erlbaum Associates.
Sternberg, R. J., & The Rainbow Project Collaborators (2006). The Rainbow Project: Enhancing the SAT through assessments of analytical, practical and creative skills. *Intelligence*, *34* (4), 321-350.
Tharp, T. (2005). *The creative habit: Learn it and use it for life.* New York: Simon & Schuster.
Torrance, E. P. (1962). *Guiding creative talent*. Englewood Cliffs, NJ: Prentice-Hall.

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A Technology Based Program that Matches Enrichment Resources with Student Strengths

One hesitates using the word revolutionary in this day of technological advancements by the hour, but the word did occur to me as I reviewed the Renzulli Learning System. It provides a new level of differentiation and engagement.

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Abstract

Remarkable advances in instructional communication technology (ICT) have now made is possible to provide high levels of enrichment and the kinds of curricular differentiation that facilitate advanced learning services to students who have access to a computer and the Internet. But in order to maximize the potential if ICT it is necessary to construct programs that are based on learning theory that goes beyond the didactic and prescriptive models that have resulted in too much worksheets-on-line and electronic encyclopedias. The Renzulli Learning System (RLS) uses a strength-based learning theory called the Enrichment Triad Model that is purposefully designed to promote advanced level learning, creative productivity, and high levels of student engagement by focusing on the *application* of knowledge rather than the mere acquisition and storage of information.

The Renzulli Learning System is a comprehensive program that begins by providing a computer-generated profile of each student's academic strengths, interests, learning styles, and preferred modes of expression. A search engine then *matches* Internet resources to the student's profile from fourteen carefully screened data bases that are categorized by subject area, grade level, state curricular standards, and degree of complexity. There are also hundreds of enrichment activities that can be down loaded and reproduced for individual or group learning activities. A management system called the Wizard Project Maker guides students in the *application* of knowledge to teacher or student selected assignments, independent research studies, or creative projects that individuals or small groups would like to pursue. Students and teachers can evaluate the quality of students' products using a rubric called The Student Product Assessment Form. Students can rate each site visited, conduct a self-assessment of what they have gained from the site, and place resources in their own Total talent Portfolio for future use. RLS also includes a curriculum acceleration management system for high-achieving students that is based on the many years of research and widespread use of a popular differentiation process called Curriculum Compacting.

Keywords: Strength Based Learning Theory; Individualized Resource Matching; Built In Assessment and Management Tools.

Introduction

Every teacher has had the satisfaction of seeing a child "turn on" to a topic or school experience that demonstrates the true joy and excitement of both learning and teaching. We have sometimes wondered how and why these high points in teaching occur, why they don't occur more frequently, and why more students are not engaged in highly positive learning experiences. Teachers are also painfully aware of the boredom and lack of interest that so many of our young people express about so much of the work they do in school. Highly prescriptive curriculum guides, endless lists of standards to be covered, and relentless pressure to increase achievement test scores have often prevented us from doing the kind of teaching that results in those joyous but rare times when we have seen truly remarkable engagement in learning.

One teacher we interviewed as part of a research project dealing with high engagement in learning said, "I could easily improve student enthusiasm, enjoyment, and engagement if I had about a dozen teaching assistants in my classroom!" It was comments like this plus the almost infinite resources that are now available through the Internet that inspired the development of the Renzulli Learning System (RLS) at the University of Connecticut's Neag School of Education. The

program is sponsored by the University of Connecticut Research and Development Corporation, with income from subscriptions used to support further research. An overview of the RLS is presented in Figure 1.

The use of instructional technology, and especially the Internet, has evolved rapidly over the past decade. First "generation" use of technology consisted mainly of what might be called worksheets-on-line, with the added advantage of providing students with immediate feedback about correct responses and subroutines for remediating incorrect answers. This generation was not unlike the teaching machines of the 1950s. The next generation consisted mainly of courses-on-line, and although this innovation enabled students to have access to teachers and professors with expertise beyond what might be available locally, it usually followed the same pedagogy to traditional courses (i.e., read the chapter, answer questions, take a test). The third generation was a great leap forward because of the advent of hypertext. Students could now click on highlighted items in on-line text to pursue additional, more advanced information, and the kinds of scaffolding that consumes more time that most teachers can devote to individualized learning.

The Renzulli Learning System might best be viewed as the next generation of applying instructional technology to the learning process. This program is *not* a variation of earlier generations of popular e-learning programs or web-surfing devices being offered by numerous software companies. It is a totally unique use of the Internet that combines computer based strength assessment with search engine technology, thus allowing true differentiation in the matching of thousands of carefully selected resources to individual strengths. The RLS also has what might best be called theoretical integrity. It is based on a high-end learning theory called the Enrichment Triad Model [1] and numerous research studies dealing with model implementation [2]. The Triad Model focuses on the kinds of creative productivity that develops higher-level thinking and investigative skills, and it places a premium on the application of knowledge to learning situations that approximate the *modus operandi* of the practicing professional. With minimal skills in the use of the Internet, and only a small amount of the teacher's time, all schools can easily make use of a system that will give teachers the equivalent of "a dozen assistants" in their classrooms. The Renzulli Learning System is a four-step procedure that is based on more than thirty years of research and development dealing with the diagnosis and promotion of advanced level thinking skills, motivation, creativity, and engagement in learning.

Step 1: Strength Assessment Using the Electronic Learning Profile

The first step consists of a computer-based diagnostic assessment that creates a profile of each student's academic strengths, interests, learning styles, and preferred modes of expression. The on-line assessment, which takes about thirty minutes, results in a personalized profile that highlights individual student strengths and sets the stage for step two of the RLS. The profile acts like a compass for the second step, which is a differentiation search engine that examines thousands of resources that relate specifically to each student's profile. Student profiles can also be used to form groups of students who share common interests. A project management tool guides students and teachers to use specifically selected resources for assigned curricular activities, independent or small group investigative projects, and a wide variety of challenging enrichment experiences. Another management tool enables teachers to form instructional groups and enrichment clusters based on interests and learning style preferences. Teachers have instant access to student profiles, all sites visited on the web, and the amount of time spent in each activity. Parents may also access their own child's profile and web activities. In order to promote parent involvement, we suggest that students actually work on some of their favorite activities with their parents.

Step 2: Enrichment Differentiation Databases

In step two the differentiation search engine matches student strengths and interests to an enrichment database of 10,000 enrichment activities, materials, resources, and opportunities for further study that are grouped into the following categories:
Virtual Field Trips

Real Field Trips
Creativity Training
Critical Thinking
Projects and Independent Study
Contests and Competitions
Websites
Fiction Books
Non-Fiction Books
How-To Books
Summer Programs
On-Line Classes and Activities
Research Skills
Videos and DVDs

These resources are not merely intended to inform students about new information or to occupy time surfing around the web. Rather, they are used as vehicles for helping students find and focus a problem or creative exploration of personal interest that they might like to pursue in greater depth. Many of the resources provide the methods of inquiry, advanced level thinking and creative problem solving skills, and investigative approaches that approximate the *modus operandi* of the practicing professional. Students are guided toward the *application of knowledge* to the development of original research studies, creative projects, and action-oriented undertakings that put knowledge to work in personally meaningful areas of interest. The resources also provide students with suggestions for outlets and audiences for their creative products. A set of learning maps for teachers is provided for each of the fourteen enrichment resource databases and for the many other resources available for teachers. Teachers can also download numerous curricular activities for use in their classrooms. Management tools classify and cross reference activities by subject area, thinking skill, and subject matter standards.

Our goal in this approach to learning is to promote high levels of engagement by providing a vehicle where students can engage in *thinking, feeling, and doing like the practicing professional,* even if they are operating at a more junior level than adult scientists, artists, writers, engineers, or other adults who pursue knowledge in professional ways.

Research on the role of student engagement is clear and unequivocal – high engagement results in higher achievement, improved self-concept and self-efficacy, and more favorable attitudes toward school and learning. There is a strong body of research that points out the crucial difference between time-spent and time-engaged in school achievement. In the recently published international PISA study, the single criterion that distinguished between nations with the highest and lowest levels of student achievement was the degree to which students were engaged in their studies. This finding took into account demographic factors such as ethnicity and the socioeconomic differences among the groups studied**.** In a longitudinal study comparing time-spent vs. time-engaged on the achievement of at-risk students, Greenwood [3] found that conventional instructional practices were responsible for the students' increased risk of academic delay. And a study by Ainley [4] reported that there were important differences in achievement outcomes favoring engaged over disengaged students of similar ability.

The resources available in step two also provide students with places where they can pursue advanced level training in their strength areas and areas of personal interest. On-line courses and summer programs that focus on specific academic strengths and creative talents are ways that any school or parent can direct highly able and motivated students to resources that may not be available in the regular school program.

Step 3: The Wizard Project Maker

A special feature of Renzulli Learning is a project organization and management plan for students and teachers called **The Wizard Project Maker.** This guide (attached) allows teachers to

help students use their web-based explorations for original research, investigative projects, and the development of a wide variety of creative undertakings. The sophisticated software used in this tool automatically locates potentially relevant web-based resources that can be used in connection with the student's investigative activity. This management device is designed to fulfill the requirements of a Type III Enrichment experience, which is the highest level of enrichment described below in the discussion of the Enrichment Triad Model. Specifically, the Project Maker provides students with the metacognitive skills to: Define a project and set a goal; Identify and evaluate both the resources to which they have access and the resources they needs (e.g. time, Internet sites, teacher or mentor assistance); Prioritize and refine goals; Balance the resources needed to meet multiple goals; Learn from past actions, projecting future outcomes; and Monitor progress, making necessary adjustments as a project unfolds.

The Wizard Project Maker helps students make the best use of web resources, it helps to focus their interests as they pursue advanced level work, and it is a built in safeguard against using Renzulli Learning merely to surf around the web. It also establishes a creative and viable responsibility for teachers in their role as "the guide on the side." By helping students pursue advanced levels of challenge and engagement through the use of the Wizard Project Maker, students see teachers as mentors rather than task masters or disseminators of knowledge. The Wizard Project Maker also has a meta-cognitive effect on students, i.e., they have a better understanding about what investigative learning is all about. As one teacher recently said, "The Wizard Project Maker helps my students understand 'the why' of using the Internet." A Wizard Project Maker template is attached to this article and Wizard Software is built into the System to help students acquire resources for the various sections of this planning device.

Step 4: The Total Talent Portfolio

The final step in the Renzulli Learning System is an automatic compilation and storage of all student activity from steps one, two, and three into an on-going student record called the Total Talent Portfolio. A management tool allows students to evaluate each site visited and resource used, students can complete a self-assessment of what they derived from the resource, and if they choose they can store favorite activities and resources in their portfolio. This feature allows easy- return-access to on-going work.. The portfolio can be reviewed at any time by teachers and parents through the use of an access code, which allows teachers to give feedback and guidance to individual students and provides parents with information about students' work and opportunities for parental involvement. The portfolio can also be used for:

- Providing points of reference for future teachers;
- Making decisions about possible class project extra credit options;
- Selecting subsequent enrichment preferences;
- Designing future projects and creative activities;
- Exploring on-line courses and competitions;
- Participating in extra-curricular activities;
- Deciding on electives in Middle and High School; and
- Guiding college selection and career exploration alternatives.

The Total Talent Portfolio "travels" with students throughout their educational career. It can serve as a reminder of previous activities and creative accomplishments that they might want to include in college applications and it is an ongoing record that can help students, teachers, guidance counselors, and parents make decisions about future educational and vocational plans.

The Theory and Research Underlying the Renzulli Learning System

The RLS is based on a learning theory called the Enrichment Triad Model, which was developed in 1977 and implemented in thousands of schools in the United States and several overseas nations (see Figure 1). A wide range of programs based on the Enrichment Triad Model were developed by classroom teachers and gifted education specialists in different school districts across the country that

serve diverse populations of students at all grade levels. Many examples of creative student work were completed as part of the enrichment opportunities built around the Triad Model.

Teachers using the model worked very hard to access resources to provide enrichment for students, but the many responsibilities of classroom teachers and the amount of time required to track down resources made this a daunting task. In the Renzulli Learning System, thousands of resources and enrichment materials are provided for teachers and students with the click of a mouse. And what makes this system unique is that these resources are individually tailored to students' abilities, interests, and learning styles. The resources can be accessed in school, during after-school programs, or even at home when students want to pursue enriched learning opportunities on their own.

The Enrichment Triad Model was designed to encourage advanced level learning and creative productivity by: (1) exposing students to various topics, areas of interest, and fields of study in which they have an interest or might develop an interest, (2) providing students with the skills and resources necessary to acquire advanced level content and thinking skills, and (3) creating opportunities for students to apply their skills to self-selected areas of interest and problems that they want to pursue.

Type I Enrichment is designed to expose students to a wide variety of disciplines, topics, occupations, hobbies, persons, places, and events that would not ordinarily be covered in the regular curriculum or that are extensions of regular curriculum topics. In the Renzulli Learning System, Type I Enrichment includes virtual field trips, on-line activities that challenge student thinking, exciting web sites, books, videos, and DVDs related to areas of special interest, and other exposure activities that are associated with independent projects and other components of the system. Type I experiences might be viewed as the motivational "hook" that causes individual students to become turned-on to particular topic or area of study that they will subsequently pursue in greater depth.

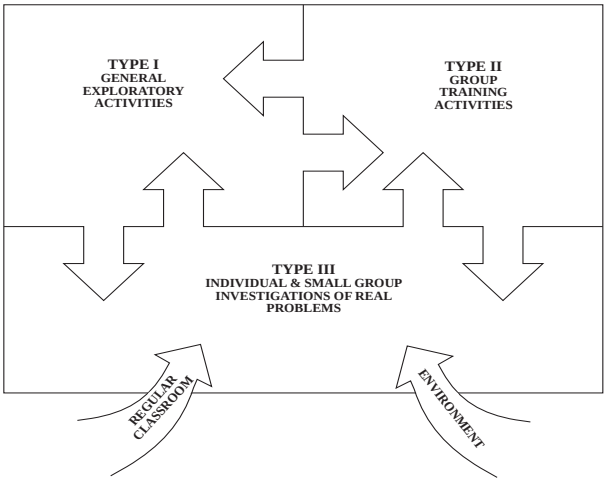

Figure 1: The Enrichment Triad Model.

Type II enrichment consists of materials and activities designed to develop a broad range of higher level thinking processes and advanced inquiry skills. Some Type II training is general, including the development of: (1) creative thinking and problem solving, critical thinking, and affective processes; (2) a wide variety of specific learning how-to-learn skills; (3) skills in the appropriate use of advanced-level research methods and reference materials; and (4) written, oral, and visual communication skills. Teachers can use general Type II Enrichment activities (e.g., a lesson in creative thinking) that are available on-line for whole group or small group instruction, or an on-line activity can be recommended for individuals or small groups to pursue on their own.

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Other forms of Type II Enrichment are specific to a particular project that a student might be pursuing. It cannot be planned in advance and usually involves advanced research skills in an interest

area selected by the student. For example, a small group of students became interested in mechanical engineering after a Virtual Field Trip that dealt with some of the world's most imaginative bridges. They located resources on the Internet that provided instruction for designing, planning, and building a model of a bridge. They also found a number of model bridge competitions to which they subsequently submitted their designs.

In the Renzulli Learning System, Type II training is embedded across many of the Enrichment Activities listed above. A quick tour of the various categories will help you become familiar with the vast array of resources that can be used for all three types of enrichment in the Triad Model. If several students are using the Renzulli Learning System it will be fun and informative to take a "tour" through their Enrichment Activities with them.

Our experience in using the Enrichment Triad Model over the years has shown that Types I and II enrichment and/or interests gained in the regular curriculum or out-of-school activities will motivate many students to pursue self-selected topics in greater depth. We call these advanced types of involvement Type III Enrichment, which is defined as individual or small group investigations of real problems. When students choose to become involved in Type III Enrichment, they usually are interested enough in a topic to pursue a self-selected area of study in great depth. They also are willing to commit the time necessary for advanced content acquisition and process training in which they assume the role of a first-hand inquirer. The goals of Type III Enrichment are:

- to provide opportunities for applying interests, knowledge, creative ideas and task commitment to a self-selected problem or area of study;
- to acquire advanced level understanding of the knowledge (content) and methodology (process) that are used within particular disciplines, artistic areas of expression and interdisciplinary studies;
- to develop authentic products that are primarily directed toward bringing about a desired impact upon a specified audience;
- to learn self-directed learning skills in the areas of planning, organization, resource utilization, time management, decision making, and self-evaluation; and
- to further develop task commitment, self-confidence, and feelings of creative accomplishment.

In the Renzulli Learning System, the Type III component can emerge from almost any of the options that students choose to pursue. They can, for example, get an idea for what they might like to learn more about by becoming involved in a virtual field trip, or a real field trip. They might find an idea from a creativity training exercise or critical thinking activity. The most logical way for students to become involved in a Type III project is by pursuing an independent study or by becoming involved in a contest or a competition. We have also found that students may become interested in doing in-depth research by using any of the other components of the RLS such as special topic websites, Fiction, Non-Fiction, and How-to books, Summer Programs, On-Line Activities and Research Skills. There are also numerous options in Renzulli Learning for students to pursue Type III studies in specialized areas (e.g., Math League, Invention Convention, National History Day Competition, to mention only a few of the hundreds of available options).

Type III Enrichment is different from the types of projects and reports that students typically do in connection with their regular schoolwork. The best way to describe this difference is to list the three things that make a problem "real" to a student. First, real problems are based on a sincere interest of the student rather than one assigned by the teacher. It is something the student *wants* to do rather than something he or she is assigned to do. You may discuss and provide guidance in helping a student find and focus a problem, and the problem might be within the general curriculum area you are covering, but the subject or theme on which a student chooses to work must represent a personalization of the topic for him or for her.

The second distinguishing feature of working on a real problem is that the student will use the methods of investigation of the practicing professional. They're going to do what the real geologist,

scenery designer, or community activist does, even if it is at a more junior level than an adult professional working in one of these fields. This focus will help to distinguish a *bona fide* Type III project from the ritualistic reports that students typically complete by merely gathering and summarizing information from reference books or Internet sites. The most powerful tools for giving students the know-how of authentic methodology, such as *How-To Books For Conducting Research and Creative Projects*, can be found in the Enrichment Database under the category How-To Books. Take a quick tour of this enrichment category to get a "feel" of the many exciting books that provide the skills for helping students become practicing professionals. And think about using some of the material in these books for whole-class and small group lessons on teaching research and investigative skills. We have found that teaching young people a practical data gathering technique such as questionnaire design, for example, will motivate them to identify a problem that allows them to use their new skill on a problem in which they have a personal interest.

The third characteristic of a real problem is that it is always geared toward an audience other than or in addition to the teacher. In the adult world, practicing professionals carry out their work because they want to have an impact on one or more relevant audiences – others who voluntarily attend a performance, read a newsletter, or go to a science fair. Presenting to classmates occasionally may qualify as a real audience, but such presentations should be viewed more as practice sessions for more real world settings such as a presentation to the local historical society, submission of one's writing to a magazine that publishes poetry or short stories, or entering an invention contest. The enrichment category entitled *Contests and Competitions* will give you and your students many ideas about opportunities for audiences in all areas of student interest. And the *Websites* category includes many organizations and professional societies that produce journals and newsletters where high quality student products might be included. These organizations are also excellent sources for resources in specialized areas of study, and some of them even provide on-line mentoring services for students.

The goal of Type III Enrichment is to transform the role of the student from a person who merely acquires information to a role in which she or he is thinking, feeling, and doing like the practicing professional by actually engaging in *authentic* activities. In reflecting on the characteristics of authentic activities described by researchers, ten broad design characteristics that relate to on-line learning have been identified by Reeves, Herrington, & Oliver [5]. These characteristics are:

- Authentic activities have real-world relevance: Activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualized or classroom-based tasks;
- Authentic activities are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity: Problems inherent in the activities are ill defined and open to multiple interpretations rather than easily solved by the application of existing algorithms. Learners must identify their own unique tasks and sub-tasks in order to complete the major task;
- Authentic activities comprise complex tasks to be investigated by students over a sustained period of time: Activities are completed in days, weeks and months rather than minutes or hours. They require significant investment of time and intellectual resources;
- Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources: The task affords learners the opportunity to examine the problem from a variety of theoretical and practical perspectives, rather than allowing a single perspective that learners must imitate to be successful The use of a variety of resources rather than a limited number of pre-selected references requires students to detect relevant from irrelevant information;
- Authentic activities provide the opportunity to collaborate: Collaboration is integral to the task, both within the course and the real world, rather than achievable by an individual learner;

- Authentic activities provide the opportunity to reflect: Activities need to enable learners to make choices and reflect on their learning both individually and socially;
- Authentic activities can be integrated and applied across different subject areas and lead beyond domain-specific outcomes: Activities encourage interdisciplinary perspectives and enable students to play diverse roles thus building robust expertise rather than knowledge limited to a single well-defined field or domain;
- Authentic activities are seamlessly integrated with assessment: Assessment of activities is seamlessly integrated with the major task in a manner that reflects real world assessment, rather than separate artificial assessment removed from the nature of the task;
- Authentic activities create polished products valuable in their own right rather than as preparation for something else: Activities culminate in the creation of a whole product rather than an exercise or sub-step in preparation for something else; and
- Authentic activities allow competing solutions and diversity of outcome: Activities allow a range and diversity of outcomes open to multiple solutions of an original nature, rather than a single correct response obtained by the application of rules and procedures (p. 565).

To help students understand the difference between an authentic Type III and the more traditional kinds of reports that they typically do in school, we have developed The Wizard Project Maker, a completed sample of which is attached. This form also highlights the specific ways in which teachers can provide guidance in helping students find and focus a problem, examine potential outlets and audiences, and obtain the necessary resources to carry out their investigative activities. Blank copies of this form can be downloaded at the RLS web site. The teacher's role in this type of enrichment becomes more like a coach and guide-on-the-side rather than a disseminator of knowledge. The teacher's role is an active one, but requires minimal time because it does not require large amounts of face-to-face instruction. You can learn more about the role that teachers play in facilitating Type III Enrichment by reviewing the short article on this topic in the Teacher Resource section of this web site.

One of the questions that teachers frequently ask is, "Where will students find the time to do Type III projects?" All students can use the Renzulli Learning System, but we have found that above average ability students – those who can master the regular curriculum at a faster pace than others – can "buy" some time for enrichment activities through a sub-component of the RLS called Curriculum Compacting. Essentially, compacting is a process through which the teacher uses formal and informal assessment at the *beginning* of a unit of study to determine which students have already mastered basic skills, and therefore do not need the same amount of practice material as others. Indeed, it is sometimes this excessive practice of skills already mastered that causes many of our more able students to become bored with school! And in subjects such as science and social studies, students may not know the material to be covered, but are eager to select an option that allows them to cover it at an accelerated pace. Many students are especially eager to select this option if they know that it will "buy" them the time to work on Type III enrichment as well as other options in the RLS. We have provided a brief article on the steps teachers use in Curriculum Compacting in the Teacher Resource section of this web site.

The Value Added Benefits of Learning with Technology

The conditions of learning have changed dramatically for young people going to school today. Don Leu and his team of New Literacies researchers at The University of Connecticut [6] have pointed out that the Internet is this generation's defining technology for literacy and learning; and that profound changes have already taken place in higher education, adult learning and the workplace, all situations for which we are preparing the young students who are in our classrooms today. There was a time when teachers and textbooks were the gatekeepers of knowledge, but today virtually all of the world's knowledge is accessible to any student who can turn on a computer and log into the Internet.

One of the dangers of a content abundant resource such as the Internet, however, is that we might be tempted to simply use it to cram more information into students' heads! But by applying a learner-centered pedagogy rather than a traditional drill-and-practice approach, we can harness the power of the Internet in a way that respects principles of high-level learning developed by the Task force on Psychology of the American Psychological Association [7]. A crucial question, therefore, is will we use this information wisely? Or will we simply turn the powerful resources available through the Internet into electronic work sheets, test-prep tutorials, and on-line courses that adhere to the same prescriptive model for learning that almost all reform initiatives have followed thus far -- a model that has indeed left so many young people bored, disengaged and behind? Or will the new technologies be the workhorse that can finally allow teachers to truly differentiate learning experiences for all students? These technologies now make it possible to apply to all students the pedagogy typically used with high achieving students. In an article entitled "A Rising Tide Lifts All Ships" [8], I pointed out how a "gifted education approach" can improve engagement and achievement for all students.

With almost unlimited access to the world's knowledge, a critical issue for educators is selecting the software and providing the training that will help young people use this access safely, efficiently, effectively, and wisely. Leu and his colleagues define the five major skill sets of the new literacies as follows:

1. Identifying Important Questions;
2. Locating Relevant Information;
3. Critically Evaluating Information;
4. Synthesizing Information; and
5. Communicating Effectively.

In addition to improved academic achievement and opportunities for creative productivity, which are the major goals of the Renzulli Learning System, there are a series of metacognitive tools that result from computer based learning environments. Metacognition is generally defined as the monitoring and control of one's own thinking processes. Metacognitive tools are skills that help students organize and self-regulate their learning so that they can make the most efficient use of time, resources, and the cognitive skills that contribute to higher levels of thinking. Metacognition involves problem-solving skills such as exploring alternative options and strategies in open-ended problem situations; and applying critical thinking skills such as examining the sources of evidence, the logic of arguments, and how to find and use reliable information. Training and experiences in metacognitive skills may be the single biggest difference between the education provided in high and low achieving schools!

Several researchers studying constructivist models of learning and metacognition have developed or modified traditional theories of learning to explain the role of computer environments in mediating the interactions between and among the cognitive, metacognitive, affective, and social processes that are involved in learning complex material [9, 10, 11, 12]. Promising results have emerged from these new developments in theory and research on the ways in which computer learning environments facilitate metacognitive skill development.

The Internet can also be a good educational tool for hard-to-reach populations. Researchers from Michigan State University examined the positive effects of home Internet access on the academic performance of low-income, mostly African American children and teenagers involved in a home Internet project. In this research, 140 children aged 10–18 years old (83% African American and 58% male) living in single-parent households (75%) with a $15,000 or less median income were followed for a two-year period to see whether home Internet use would influence academic achievement.

The children who participated in the project were online for an average of 30 minutes a day. Findings indicate that children who used the Internet more had higher standardized test scores in reading and higher grade point averages (GPAs) at one year and at 16 months after the project began compared to children who used the Internet less, said lead author Linda Jackson, PhD. Internet use had no effect on standardized test scores in math.

"Improvements in reading achievement may be attributable to the fact that spendi ng more time online typically means spending more time reading," said Dr. Jackson. "GPAs may improve because GPAs are heavily dependent on reading skills," she added.

An even more promising trend is emerging as computer use evolves from traditional e-learning (i.e., taking an on-line course or developing basic skills through computer assisted instruction) to inquiry based software that focuses on the *application* of knowledge to creative productivity and investigative research projects that promote high levels of student engagement. Students learn the basic difference between to-be-presented information that characterizes traditional instruction and just-in-time information, which is the hallmark of problem-based learning.

Skills such as: problem finding and focusing; stating research questions; task understanding and planning; identifying appropriate investigative methodologies; searching, skimming, selecting, and interpreting appropriate resource material; identifying appropriate outlets, products, and audiences; and preparing effective communication vehicles are all value added benefits when the learning theory that underlies the Enrichment Triad Model is combined with the vastness of resources available through the internet.

The Renzulli Learning System – Summing It All Up

The Renzulli Learning System is designed to be an aid to busy teachers who seek the tools for effective differentiation as they go about the process of dealing with a broad range of individual differences, diverse student needs, and increased pressures to improve student achievement. Through the use of technology and an approach to learning that is the opposite of highly prescriptive instruction, the RLS provides teachers with the "dozen teaching assistants" that every teacher would like to have in his or her classroom. The main goal of the RLS is to simultaneously increase achievement and enjoyment of learning by making available an inexpensive, easy-to-use, research-based system that promotes student engagement. Although student engagement has been defined in many ways, we view it as the infectious enthusiasm that students display when working on something that is of personal interest and that challenges them to "stretch" for the use of materials and resources that are above their current comfort level of learning. Research on the role of student engagement is clear and unequivocal – high engagement results in higher achievement, improved self-concept and self-efficacy, and more favorable attitudes toward school and learning. Numerous students involved in our field tests of the RLS summed it up with one word – "Awesome!" Interested readers can examine the RLS by going to www.renzullilearning.com and clicking on Test Drive Renzulli Learning.

References

[1] J. S. Renzulli, "The enrichment triad model: A guide for developing defensible programs for the gifted and talented: Part II," *Gifted Child Quarterly,* vol. 21, pp. 237-243, 1977.

[2] J. S. Renzulli and S. M. Reis, "Research related to the Schoolwide Enrichment Triad Model," *Gifted Child Quarterly,* vol. 38, pp. 7-20, 1994.

[3] C. R. Greenwood, "Longitudinal analysis of time, engagement, and achievement in at-risk versus non-risk students," *Exceptional Children,* vol. 57, pp. 521-536, 1991.

[4] M. D. Ainley, "Styles of engagement with learning: Multidimensional assessment of their relationship with strategy use and school achievement," *Journal of Educational Psychology,* vol. 85, pp. 395-405, 1991.

[5] T. C. Reeves, J. Herrington, and R. Oliver, R, "Authentic activities and on-line learning." in, *Quality conversations: Research and Development in Higher Education*, Vol. 25, A. Goody, J. Harrington, and M. Northcote, Eds. Jamison, ACT:HERDSA, 2002, pp. 562-567.

[6] Leu, D.J., Jr., Kinzer, C.K., Coiro, J., Cammack, D. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In R.B. Ruddell & N. Unrau (Eds.), *Theoretical Models and Processes of Reading, Fifth Edition* (1568-1611). International Reading Association: Newark, DE.

[7] APA Work Group of the Board of Educational Affairs, *Learner-centered psychological principles: A framework for school reform and redesign.* Washington, D. C.: American Psychological Association, 1997.
[8] J. S. Renzulli, "A rising tide lifts all ships: Developing the gifts and talents of all students," *Phi Delta Kappan,* vol. 80, pp. 105-111, 1998.
[9] A. Bandura, *Social foundation of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall, 1986.
[10] L. Corno and E. Mandinach, The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist,* Vol. 18, pp. 88-109, 1983.
[11] P. R. Pintrich, "The role of goal orientation is self-regulated learning," In M. Boekaerts, P. Pintrich, and M. Zeidner, Eds. *Handbook of Self-regulation* New York: Academic, 2000, pp. 452-502.
[12] D. Schunk, Social cognitive theory of self-regulated learning. In *Self-regulated Learning and Academic Achievement: Theoretical Perspectives,* B. Zimmerman and D. Schunk, Eds. Mahwah, NJ: Lawrence Erlbaum Associates, Inc., 2001, pp. 125-152.

About the Author

Prof. Dr. Joseph Renzulli is a Board of Trustees Distinguished Professor at the University of Connecticut where he also serves as director of the National Research Center on the Gifted and Talented. In June 2003 of he was awarded an Honorary Doctor of Laws Degree from McGill University in Montreal, Canada. His work has focused on the development of theories and research related to broadened conceptions of human potential, the identification and development of creativity and giftedness in young people, and on organizational models and curricular strategies for differentiated learning environments and total school improvement. A focus of his work has been on applying the pedagogy of gifted education to the improvement of learning for all students and using technology to promote high-end learning.

Renzulli learning™

The Wizard Project Maker™

for Individual and Small Group Work

Name(s): Liza

Teacher: Ms. Latino
School: Southeast School

Start Date: Completion Date:
January 15, 2006 June 15, 2006

Dates for Progress Meetings with My Teacher:
2/21/06 3/11/06 4/2/06 5/13/06

Project Description: Write a brief description of the project, problem, topic, or interest area that you want to learn about and study. What do you hope to find out or learn?

I love theater and want to try to direct and produce a play starring some of my friends and classmates. I will have to find some of the following kinds of information.

1. What is a good play for elementary students to perform?
2. What types of tasks will I have to do to successfully direct a play for kids?
3. What type of play will I select? Will I have to pay for it? What other tasks are involved in directing and producing a play?

Interest Areas for this Project
---------- Check All That Apply----------
❍ Architecture ● Arts (drawing & pointing)
❍ Athletics/ Sports/ Fitness ❍ Business/ Management
❍ Building Things (robots, models) ❍ Creative Writing
● Computers/ Technology/ Gaming ● Drama/ Performing
● Graphic Design/Animation ❍ Foreign Languages
❍ Geography ❍ Helping in the Community ● History
● Journalism ❍ Mathematics
❍ Music

Intended Project(s): What form or format will the final project take? How, when, and where will you share and communicate the results of your project with other people? In what ways will you share your work (competition, on-line magazine, art show, performance, science fair, etc.)

Direct and produce a play for my class and if it goes well, the school and even the community.
Design and build a set for the play; learn about lighting!
Design and produce a program for the play.

What Format Will Your Project Take?
----------Check All That Apply----------
● Artistic ● Audio/ video/ DVD ❍ Display
● Drama/ Performance ❍ Musical
● Photographic
● Written ❍ Service/ Leadership
● Technology/ Computer
❍ Oral/ Discussion (speech, teach, presentation)
❍ Using my hands to make/build something
❍ Other:

Getting Started: What are the first steps you should take to begin your work? What types of information do you need to find in order to do your work? Where will you get the information you need? What questions do you have that you need answered in order to start your work? What help do you need from your teacher or parents? List that information here.

Learn how to direct a play and how to produce one.
Conduct research about children's plays and drama and find specific information about which plays might be good for my class and for me
Locate information on how to create sets and produce a play.

Project Skills, Resources and Materials I Will Need: List the Renzulli Learning™ resources here along with other resources (people, organizations, businesses, etc.) you have located that will help you with your work. Include websites, contact names, addresses and phone numbers, lists of the materials you will need, etc.

Drama Map
This site helps you to organize your search for plays and other dramatic material. You can choose to organize your knowledge by character, setting, conflict, or resolution. This will help you keep information neat and organized.

http://www.readwritethink.org/materials/dramamap/

The American Century Theater
The American Century Theater
P.O. Box 6313
Arlington, VA 22206
703-553-8782
Dedicated to Great, Important & Neglected American Plays and Playwrights of the 20th Century! Ten years ago, a group of us started The American Century Theater because we felt that great Twentieth Century American plays and playwrights were getting short shrift in this area. Thanks to the indispensable assistance and support of Arlington County, we were provided with the opportunity to discover if enough other theater-lovers felt the same way.

http://americancentury.org/index.htm

At the site below, I will be able to consider directing and producing Snow White with my friends and classmates. I will need to also find out how I might earn the money to be able to buy the rights to stage this show. Maybe I can charge a minimum amount for tickets? I can also do some more searching for plays in the school library.

http://www.childrenstheatreplays.com/sw.htm

We can also look at other plays that will be available at this site. I will have to check with my teacher as some of these will require a small fee that I can make from ticket sales.

http://playsandmusicalsnewsletter.pioneerdrama.com/public/blog/100616

I can also take an online journey through Shakespeare's life to learn about his writing and access some of it online. After all, he was the greatest playwright who ever lived.

http://www.tramline.com/tours/lit/shake/_tourlaunch1.htm

Try Out These Theater Games
If you are interested in drama this is the activity for you. Practice your acting skills by playing these games in a group. Learn the art of being a mime or act out roles that you draw from a pile.

http://library.thinkquest.org/5291/games.html

How-to books:

Acting and Theatre
Author: Cheryl Evans and Lucy Smith
Copyright 1992
64 pages
ISBN: 0-7460-0699-3
Grade Level: 4-12

Introduce students to every aspect of the theatrical world! This book illustrates and explains some of the ways actors train and rehearse, as well as the practical arts of set, prop, and costume design and the technical basics of lighting and sound.

Break a Leg!: The Kid's Guide to Acting and Stagecraft by Lise Friedman and Mary Dowdle (Workman Publishing Company, 2002) ISBN: 0761122087
A complete drama course for kids in a book. BREAK A LEG! teaches budding thespians everything they need to know about stagecraft and the production of performances, in home or out. There are sections on body preparation, including warm-ups, stretches, and breathing exercises. Theater games, improv, miming, and other fun ways to develop technique. Important acting skills, such as voice projection, crying on command, learning accents, and staging falls and fights without getting hurt. The performance: analyzing scripts, building a character, what to expect from rehearsals, and overcoming stagefright. A backstage look at blocking, lighting, and other technical aspects of theater production. And for the fun of costumes and make-up, a 16-page color insert. In addition, it covers legends and lore (Why is Macbeth cursed? Why do we say "break a leg"?) and offers dozens of must-see movie recommendations. Plus, for the ambitious, talented, and just plain curious, there's advice on how to make a career of it all, with tips on agents and auditions and getting jobs in theater, film, TV, and radio.

Intended Audience(s): Who would be most interested in your work or project? Consider organized groups (clubs, organizations, societies, teams) at the local, state, regional and national levels, and list them here. Also consider contests, places where your work might be displayed or published, and web sites that include work done in your area of study. Include contact names, phone numbers, addresses and email, along with meeting times and locations.

Class project
School Play
Town Play (open to public)
If I decide to write my own play, I can submit it to the following using Renzulli Learning:

http://www.edta.org/rehearsal_hall/thespian_playworks.asp

Create a Play for Thespian Playworks
Thespian Playworks
2343 Auburn Avenue
Cincinnati, OH 45219
Activity Type: Writing a play
Bring out the writer and director inside of you by entering this contest. Write a short (thirty minutes or less) play and send it in for review. If the judges select your work for the Thespian Festival, you will join them during the workshops that bring your play to life. In order to be eligible you must be enrolled in a high school and a member of the Thespian Society.

For Completion By Teacher (Optional)
List of state standards addressed with this project:

Ontogenese Du Psychisme: Hypothese De Deux Modes De Traitement De L'Information

Ontogeny of Psychism: Proposition of Two Modes of Information Processing

Jean-Pol Tassin

Neurobiologiste, Collège de France,
Directeur de Recherches Inserm

Au cours de cette présentation, nous proposerons l'existence de deux modes de traitement de l'information dans le système nerveux central. Un mode analogique, rapide, où l'information est traitée et enregistrée sans que l'on en ait conscience, et un mode lent, cognitif, où l'information est analysée consciemment avant d'être stockée. Chez le nouveau-né, seul le mode analogique est fonctionnel, le mode cognitif se développant au fur et à mesure de la maturation. A l'âge adulte, au cours de la veille, les deux modes sont en oscillation permanente. C'est un sous-groupe de neurones, dénommés modulateurs, particulièrement sensibles aux situations affectives, qui contrôlent ces oscillations. Selon cette hypothèse, l'intelligence –et la mémorisation qui l'accompagne- correspondraient à l'aptitude d'un animal ou d'un individu à utiliser les capacités de ces deux modes de traitement. Elle dépendrait de trois critères : la vitesse et la quantité d'informations qui peuvent être traitées en mode analogique, le temps pendant lequel le mode cognitif peut se maintenir et les conditions qui contrôlent les oscillations entre les deux modes. Parmi ces trois critères, les deux premiers sont, selon toute vraisemblance, déterminés génétiquement.

In the course of this presentation, we will suggest the existence of two modes of processing information in the central nervous system. A rapid mode, called analogical, where information is processed and recorded unconsciously, and a slow cognitive mode, where information is consciously analysed before being stored. In a newborn, only the analogical mode is functional and the cognitive mode develops as the individual matures. In an awake adult, the two modes are in constant fluctuation. We suggest that it is the catecholaminergic and serotoninergic neurons, modulators that are particularly sensitive to emotive stimuli, that control these fluctuations by modifying the cortico-sub-cortical functional equilibrium. In line with this hypothesis, intelligence –and the memorizing which follows- would correspond to the capacity of each individual to take advantage of these two modes of information processing. Three criteria may be crucial: the rate and the quantity of information which can be processed in the analogical mode, the time length during which cognitive mode can be maintained and the conditions which control the oscillations between the two modes. Among these three criteria, the first two ones are probably genetically determined.

About the Author

Reclaiming "Lost Prizes": Projects to Identify and Develop the Talents of At-Risk Populations

Ken W. McCluskey
The University of Winnipeg

Abstract

This paper reviews several made-in-Manitoba initiatives designed to serve marginalized, at-risk populations. In these projects, Creative Problem Solving and mentoring have been used together to reclaim talented but troubled high-school dropouts (*Lost Prizes*), to turn around the lives of disadvantaged Aboriginal teens (*Northern Lights*), and to reduce the recidivism rate of Native Canadian inmates (*Second Chance*). More recently, through various other programs at the University of Winnipeg, pre-service teacher mentors have been recruited to identify and nurture the talents of vulnerable young people at risk for school failure, alienation, dropping out, and criminal and gang activity.

Introduction

Well over a year ago, my colleagues and I vowed never to do another piece about our past projects with "at-risk" young people. For one thing, much had already been written. In addition, I simply wanted to avoid being typecast as the "*Lost Prizes* Guy." (I really do have other professional interests.)

Of late, however, we've had cause to change our collective mind. The flood of requests for information about our work has made it clear there is profound and enduring interest from those striving to create similar service delivery programs. If our efforts can serve as a stimulus or model for anyone committed to identifying and enhancing the talents of at-risk young people, we're more than willing to share our findings, thoughts, and perspectives. It goes without saying that we don't expect others to use our exact framework – naturally, practitioners and researchers will develop variations on the original theme unique to their own settings.

Another development that has made us less reluctant to revisit earlier projects is the fact there has recently been some new "action" on the local front. Specifically, our team at the University of Winnipeg has secured a large grant to establish an Innovative Learning Centre – in effect, a base from which to reach out and reclaim Aboriginal youth mired in difficult inner-city circumstances. A director has been hired and trained, needy young people have been identified, and programming is just underway. In other words, *Lost Prizes* is in the process of being reincarnated in a larger and more permanent form. We don't have much in the way of outcomes to discuss as yet, but we will surely be engaging more students and generating substantially more data than we have in the past.

Potential Lost

Most gifted/talented programs in most school jurisdictions are created predominantly for "teacher pleasers" – the students who are academic or social "stars," if you will. Concomitantly, there is a decided dearth of services for the alienated "tough bright" who don't fit nicely into our educational moulds (Peterson, 1997). Nonconforming, troubled and troubling children and youth often march to the beat of their own drummer (Sisk, 2003) and view the school curriculum as irrelevant (Baum, Renzulli, & Hébert, 1995).

Be that as it may, recalcitrant, relationship-resistant young people are often tremendously capable. A case in point: It takes real (albeit misdirected) talent to be a successful leader or member of a youth gang (Baker, McCluskey, & McCluskey, 2003). Indeed, it's not at all uncommon for at-risk children and adolescents – many of whom are blocked from legitimate paths to recognition – to become serious social

problems. One major conclusion arising from the First World Conference on Gifted Children in London in 1975 was that high-ability individuals whose needs are not met are apt to turn their talents toward unsavoury pursuits. One seminal report, produced by Statistics Canada (1991) just as we were first considering these issues, showed clearly that very capable students are likely to become disenchanted, bored, and unproductive at school. In fact, only 8% of the dropouts sampled identified difficulty with academic work as their main reason for quitting. Some 30% had actually been maintaining averages of A or B before leaving. Incidentally, 48.18 percent of gifted dropouts in America fell in the bottom quartile in terms of socio-economic level – only 3.56 percent were in the top quartile (Renzulli & Park, 2000).

The economic implications of inaction have been documented repeatedly by governments of many countries. To illustrate, as we were about to launch our first project, it was estimated that the cost of having 11,000 disadvantaged Canadian teens drop out of school over a 20-year period was $1.4 billion in unemployment and social assistance payments, $9.9 billion in uncollected tax revenue, and $23 billion in lost income and productivity (Canadian Council on Social Development, 1991). In our home province of Manitoba, about $1,000 a minute – or $1.4 million per day – was spent on at-risk young people (Manitoba Department of Finance, 1995-96).

Further, there are the impossible-to-quantify, yet significant social ramifications of what might have been. “What is the ‘cost’ of a symphony unwritten, a cure not discovered, a breakthrough not invented? In today's complex world, and in preparing for tomorrow's certainly more complex one, we can scarcely afford to waste ‘talent capital’ of any sort” (McCluskey & Treffinger, 1998, p. 216).

Potential Regained

In any case, let’s take one last brief look back before moving forward. In the ’90s, the following three projects – each designed to address some of the foregoing needs – attracted considerable attention locally and abroad:

Lost Prizes

This three-year (1993-96) program was a shared tri-district undertaking to "recapture" talented high-school dropouts. Their talents notwithstanding, the young people in question had left or been removed from the system. The best case scenario was that they were floating aimlessly. More often than not, they had become involved in debilitating substance abuse and petty crime – many had run seriously afoul of the law. The intent of *Lost Prizes* was to reconnect with these individuals and awake dormant potential and enthusiasm. A more detailed description of the program planning has been laid out in an earlier publication (McCluskey, O’Hagan, Baker, Treffinger, & Feldhusen, 1995).

Teachers, employing Feldhusen’s (1995) Talent Identification and Development in Education (TIDE) model, identified dropouts who were deemed to possess talent in the Academic-Intellectual, Artistic, Interpersonal-Social, or Vocational-Technical domains. In the first phase of the project, a facilitator worked directly with these youth in an off-site classroom. Along with information and career awareness sessions, the “curriculum” featured Creative Problem Solving (CPS) training (Treffinger, Isaksen, & Dorval, 2006). The students, using CPS tools, gradually learned to make more reasoned educational, career, and life decisions. Part of the process involved mapping out Individual Growth Plans to help them move from their “current reality” to a “desired future state.” Participants who completed this portion of the program earned one high-school credit.

During the second phase of the *Lost Prizes* experience, students gained first-hand knowledge of the world of work (and their second credit) through on-the-job placements. Supported by philanthropic mentors within the local business community, they had the chance to come face to face with and work through some real-life problems. The entrepreneurs were not expected to offer traditional work

placements as such, but rather to motivate, support, and guide the participants. The mentors took their new-found roles extremely seriously, typically going above and beyond the call of duty by bonding with and literally "adopting" their *Prizes*.

The project outcomes have been documented elsewhere (McCluskey, Baker, & McCluskey, 2005: McCluskey, Baker, O'Hagan, & Treffinger, 1998). To summarize succinctly, during the life of the project, many formerly discouraged, disconnected dropouts turned their lives around in a dramatic manner. Once their talents were identified, validated, and nurtured, 65 percent of the students (i.e., 57 of 88) responded by returning to and performing well at high school, entering and proceeding successfully though post-secondary programs at community college or university, or finding full-time employment.

Northern Lights

A follow-up undertaking, *Northern Lights*, was developed to address the plight of Aboriginal youth (cf. McCluskey, O'Hagan, Baker, & Richard, 2000). In the U.S., Aboriginal students are far less likely to have their talents recognized or be included in gifted programs than their non-Aboriginal counterparts (Callahan & McIntire, 1994; Sisk, 1993; U.S. Department of Education, 1991).

Things are similar in Canada, where Aboriginal youngsters are also under-represented when it comes to school enrichment opportunities (Bowd, 2003). And certainly, the situation is grave in the province of Manitoba, where in excess of 70% of children in care and youth in correctional facilities are of Aboriginal ancestry (Government of Canada/Province of Manitoba, 2002). As well, 50.3% of Aboriginal youth in our capital city of Winnipeg drop out of school, compared to only 19.5% for non-Aboriginals (Social Planning Council of Winnipeg, 1999).

From 1996-99, *Northern Lights* provided assistance to Aboriginal youth who had dropped or been "pushed" out of school for attendance, behavioural, and/or academic reasons. Although similar to *Lost Prizes* in most ways, pronounced program modifications were required to reach this population, including an infusion of culturally appropriate material and the hiring of Aboriginal social workers and educational assistants to connect with the students and their families. The mentoring component was also increased from four to five weeks. Once these extra supports were put in place, some 65 percent (38/58) of the participants again returned to school, graduated, enrolled in post-secondary programs, or obtained jobs.

Second Chance

Sponsored by Human Resources Development Canada and Corrections Canada, this endeavour targeted Native Canadian inmates from Northern reservations who had ended up in provincial jails. They had been incarcerated for a variety of offences, including break and entry, robbery, assault, physical or sexual abuse, drug trafficking, and even juvenile murder – you really can't get more at risk than that. Not surprisingly in light of the high recidivism rate for Aboriginal people in Canada (Canfield & Drinnan, 1991), 18 of the 31 participants had prior convictions.

The *Second Chance* intervention again consisted of Creative Problem Solving training, mentoring, and job preparation for the offenders (Place, McCluskey, McCluskey, & Treffinger, 2000). Inmates in a matched control group received no such pre-release support: They were simply "warehoused" through the prison system in traditional "Do the crime, do the time!" fashion, and left to their own devices at sentence's end. Unfortunately, a year after release, a staggering 90 percent (28/31) of the individuals in the unsupported control group had re-offended. However, of those who had received our pre-release program, only 39% (12/31) were recidivist. Importantly, that rate has held for almost a decade: Even extremely high-risk Aboriginal inmates showed they were able to turn their lives around, and keep them turned around.

Lost Prizes: A Rebirth

We are now in the midst of establishing the Innovative Learning Centre at our institution. This facility, home of a program modelled in large part after the original *Lost Prizes*, is being created to support large numbers of disadvantaged Aboriginal teens in the city centre. To borrow a phrase from the newly appointed Director, Kevin Chief (an appropriate name for an up-and-coming young man who is Aboriginal himself), the goal is to reach out to at-risk inner-city youth who have dismissed post-secondary education (and even high school) as unrealistic, and "give them a tap on the shoulder." This encouragement – a wake up call of sorts – is intended to help them understand they may have more possibilities in their future than they have hitherto realized.

Kevin and his staff do the *Lost Prizes* thing, and more, by reaching out to far larger numbers of students than in our earlier attempts. Since there is a marked shortage of Aboriginal students in the Sciences, we are placing extra emphasis on that discipline. One great advantage we have at the University of Winnipeg is the fact that a high school – The Collegiate – is attached and fully integrated into our campus. As consequence, we can offer a secure, carefully monitored high school haven as part of the reclamation process.

Anyway, Kevin is now firmly up to speed, having completed training in CPS and the Circle of Courage (Brendtro, Brokenleg, & Van Bockern, 1990), an approach which builds upon traditional Native American teachings to create reclaiming environments and connect with at-risk youth. As well, he has completed the Response Ability Pathways (RAP) training (Brendtro & du Toit, 2006), a universal curriculum which prepares caregivers to respond to the needs of hard-to-reach young people rather than merely reacting to their problems. The goal is to guide youth toward problem ownership and responsibility. Soon to come is Life Space Crisis Intervention (LSCI) (Long, Wood, & Fecser, 2001) – a strength-based intervention which helps caregivers rethink the conflict cycle, decode the meaning of recalcitrant behaviour, and move from "crisis management" to "crisis teaching."

Although it's early days yet, a great deal has already been accomplished. Aside from making sure Kevin is as ready as possible, the first wave of participants has been selected, a mentoring component has been built in, and some preliminary programming is underway. In addition, personnel at our own Institute of Urban Studies are preparing, from the get-go, to gather information, analyze the data, and evaluate the process and outcomes.

Mentoring Projects

Various researchers in the areas of at-risk and gifted education have shared their thoughts and described various mentoring programs in a recent volume (McCluskey & Mays, 2003). Suffice to say here, then, is that – if done appropriately – mentoring offers exciting possibilities for enriching the lives of students, including those who are at-risk (Bergsgaard, Land, & Myles, 2003; Dubois, Holloway, Valentine, & Copper, 2002; DuBois & Neville, 1997; Ferguson & Snipes, 1994; Grossman & Rhodes, 2002; Grossman, & Tierney, 1998; Meyer, 1997; Renzulli, Baum, Hébert, & McCluskey, 1999; Royce, 1998). Cross-cultural mentoring with Aboriginal and other students has also shown promise (McCluskey & Torrance, 2003; Torrance, Goff, & Satterfield, 1998).

Responding to our mandate to address urban, inner-city, and Aboriginal issues, the Faculty of Education at the University of Winnipeg has launched a series of wide-ranging mentoring projects to reach out to needy young people in the city's core. Creative Problem Solving has been used both to help plan these ventures and to arm our student mentors with tangible, pragmatic skills.

To step back for a moment, the mentors – drawn from the ranks of pre-service teachers in our Faculty – are prepared through a fourth-year Issues with At-Risk Children and Youth course (which examines

topics such as anger management, bullying, gang prevention, resilience, talent development, CPS, LSCI, and mentoring per se). The point is, of course, that these individuals are not simply volunteers thrown into the trenches: They are teachers-to-be who have many university courses and some very specific training under their belts.

The follow-up pass/fail Mentoring practicum provides the experiential link between theory and practice. Selected pre-service teachers, who keep detailed reaction logs summarizing their experiences, serve as mentors for at least fifty hours through one university term. In part, they function as "talent scouts" (McCluskey & Treffinger, 1998), searching for and building upon strengths in their young charges. Meaningful connections typically develop between mentors and “mentees,” to the point where our teachers-in-training often find themselves voluntarily putting in far more time than required. In fact, of the total number of mentors placed in the community to date, in excess of 50 percent have maintained contact with their mentees after the completion of their particular project. More than 10 percent have stayed connected over an extended period of time.

MARS (Mentoring At-Risk Students), our first project of this type, focused on disadvantaged, gang-involved Aboriginal “street kids.” Through MARS, we matched 58 mentors with 58 mentees, aged 9 to 18. Fifty of those mentees came from single parent families, and all of the families involved were living in poverty. Many other mentoring programs followed: PLUTO (Please Let Us Take Off) involved a partnership with two core-area schools, VENUS (Versatility in Educating Non-attending, Underachieving Students) was another endeavour to engage sporadic attenders in another school, SATURN (Storefront Activities To Unleash Resilience and Nurturing) taught parents in a storefront operation how to build the literacy skills of their pre-schoolers, and NEPTUNE (Nurturing Enrichment Programming Through University Networking and Empowerment) used mentors prepared through an Enrichment and Talent Development course to challenge some at-risk students through higher-order projects. As we jokingly say to the funding agencies, “If they’ve got the money, we’ve got the planets!”

In all, we feel we’ve raised the bar somewhat compared to many traditional mentoring programs. To us, the entire experience seems to be a win-win scenario, in that it offers concrete support and enrichment to needy young people who might otherwise "fall through the cracks,” while at the same time providing invaluable, front-line experience for our teachers-to-be.

In a project of a different sort, *Three Stars and a Wish,* we used mentors both as tutors and emotional supporters of grade 4/5 students at Fort Rouge School in Winnipeg’s inner city. It’s a very intriguing place; at the time of the project, there were 30 first languages spoken among the school’s 180 elementary students. Talk about diversity!

Sixteen pre-service teacher mentors from our Language Arts course worked with 16 youngsters to help them write biographical sketches of significant moments in the lives of their parents. At the end of the exercise, there was a celebration (held in our university theatre) where the kids, after being introduced by their mentors, read their stories aloud to a packed audience. Parents then shared a personal wish they had for their child: There wasn’t a dry eye in the place. At the event, each child was presented with a book, designed by one of the mentors, that included their story, the wish, pictures of the three stars (the child, the parent, and the mentor), and photos of maps of their parent’s childhood communities and treasured possessions.

The project has been described in detail in another article (Katz & McCluskey, 2003). But to make things come alive, let me take directly from Katz’s introduction to *Three Stars and a Wish*:

The children wrote to learn about real people of importance to them. They gained a new understanding of themselves, their families, and their communities. One child wrote, “I am happy that my Mom told me this story because it gave me a chance to to know what my mother was like when she was a

little girl." Another child wrote, "My Mom wants me to know that sometimes life is hard and sometimes there are good times. It is important to get to know your family better." In articulating their stories, parents learned too. A parent wrote, "My parents were not perfect and now that I am a parent I know there is no such thing as 'perfect.'" A father wished for his daughter, "that you stay in Canada where you can enjoy freedom – but never forget our country, family, and culture." (Katz & King, p. iii)

To elaborate a little further, young Ernie wrote this about his mother: "Once there was a little girl named Rebekah. She went to school in the 60s on the reserve (Poplar River, Manitoba). The reserve is much different from today. There was no electricity. They had to use gas lamps for light and wood stoves for cooking. There were no phones and no television ..." (Katz & King, p. 3).

For her part, Sabrije wrote, "Imagine looking outside your window and seeing houses on fire on your street. Imagine hearing the sounds of bombs at night when you fall asleep. This was our life in our country of Kosovo. During these times ... my father would take my family ... to my uncle's house where we would be safe ..." (Katz & King, p. 5).

Final Thoughts

When all is said and done, we must confess that all this work has been more about service than research. Indeed, although we have gathered data along the way, "none of the above" was constructed with empirical rigour in mind – the aim was to help people. Still, some interesting data have emerged from following participants and monitoring their achievements, from analyzing hundreds of rich reaction logs, and from comparing pre- and post-intervention measures of dropout rates, behavioural incidents at school, run-ins with the law, and so on. The aforementioned "Comparing Current Realities with Desired Futures" exercise, a tool borrowed from the CPS literature (Treffinger, Isaksen, & Dorval, 2006), has been very helpful in terms of setting direction and tracking the performance of individual participants.

We're also gradually moving from the ethereal, mentoring-feels-good realm toward more objective data gathering. Goal attainment scaling (Kiresuk, Smith, & Cardillo, 1994), where personalized goals are set, quantified, and measured for each participant, offers some interesting possibilities.

Although imperfect, after obtaining feedback from large numbers of participants, mentors, educators, and significant others, our team is confident that our projects have made a real difference to marginalized populations. Hunt (1987) has challenged university types to put away their "little professor," and to remember that "in the beginning" there was experience, not a "blackboard."

Heeding this admonition, we try to break free from the ivory tower, to seek outside wisdom in respectful ways, to connect with schools and agencies, and to improve the situation for as many young people as possible. We hope, in some way, that our projects stand as a monument to partnership and as a roadmap illustrating how a university can contribute to its community.

References

Baker, P. A., McCluskey, K. W., & McCluskey, A. L. A. (2003). Youth gangs: Cesspool or talent pool? In D. Sutherland & L. Sokal (Eds.), *Resiliency and capacity building in inner-city learning communities* (pp. 147-168). Winnipeg, MB: Portage & Main Press.

Baum, S. M., Renzulli, J. S., & Hébert, T. (1995). *The prism metaphor: A new paradigm for reversing achievement*. Storrs, CT: The National Research Center on the Gifted and Talented, The University of Connecticut.

Bergsgaard, M., Land, R., & Myles, E. (2003). The prism project: Colors in the dark. In K. W. McCluskey & A. M. Mays (Eds), *Mentoring for talent development* (pp. 87-102). Sioux Falls, SD: Reclaiming Youth International, Augustana College.

Brendtro, L. K., Brokenleg, M., Van Bockern, S. (1990). *Reclaiming youth at risk: Our hope for the future*. Bloomington, IN: National Educational Service.

Brendtro, L. K., & DuToit, L. (2006). *Response ability pathways: Restoring bonds of respect*. Cape Town, South Africa: Pretext Publishers.

Bowd, A. D. (2003). *Identification and assessment of gifted and talented youth particularly in northern, rural and isolated communities*. Thunder Bay, ON: Centre of Excellence for Children and Adolescents with Special Needs, Lakehead University.

Callahan, C. M., & McIntire, J. (1994). *Identifying outstanding talent in American Indian and Alaska Native students*. Washington, DC: U.S. Department of Education (Javits Gifted and Talented Education Program, Office of Educational Research and Improvement).

Canadian Council on Social Development. (1991). The poverty connection. *Social Development Overview*, 1, 9-10.

Canfield, C., & Drinnan, L. (1991). *Native and non-native federal inmates: A five year history: Comparative statistics*. Ottawa, ON: Correctional Service of Canada.

Dubois, D. L., Holloway, B. E., Valentine, J. C., & Copper, H. (2002). Effectiveness of mentoring programs for youth: A meta-analytic review. *American Journal of Community Psychology*, *30*, 157-197.

DuBois, D. L., & Neville, H. A. (1997). Youth mentoring: Investigation of relationship characteristics and perceived benefits. *Journal of Community Psychology*, *25*, 227-234.

Feldhusen, J. F. (1995). *Talent identification and development in education (TIDE)* (2nd ed.). Sarasota, FL: Center for Creative Learning.

Ferguson, R. F., & Snipes, J. (1994). Outcomes of mentoring: Healthy identities for youth. *Reclaiming Children and Youth*, *3* (2), 19-22.

Government of Canada/Province of Manitoba (2002). *Aboriginal people in Manitoba*. Ottawa, ON: Author.

Grossman, J. B., & Rhodes, J. E. (2002). The test of time: Predictors and effects of duration in youth mentoring relationships. *American Journal of Community Psychology*, *30*, 199-219.

Grossman, J. B., & Tierney, J. P. (1998). Does mentoring work? An impact study of the Big Brothers/Big Sisters program. *Education Review*, *22*, 403-426.

Hunt, D. E. (1987). *Beginning with ourselves in practice, theory, and human affairs*. Cambridge, MA: Brookline Books.

Katz, H., & King, J. (2000). *Three stars and a wish: A Fort Rouge School & University of Winnipeg project*. Winnipeg, MB: The University of Winnipeg.

Katz, H., & McCluskey, K. W. (2003). Seeking strength-based approaches in Aboriginal education: The "three stars and a wish" project. *McGill Journal of Education*, *38* (1), 116-134.

Kiresuk, T. J., Smith, A., & Cardillo, J. E. (1994). *Goal attainment scaling: Applications, theory, and measurement*. Hillsdale, NJ: Hove and London.

Long, N. J., Wood, M. M., & Fecser, F. A. (2001). *Life space intervention: Talking with students in conflict* (2nd ed.). Austin, TX: pro•ed.

Manitoba Department of Finance. (1995-96). *Public accounts*. Winnipeg, MB.

McCluskey, K. W., Baker, P. A., & McCluskey, A. L. A. (2005). Creative problem solving with marginalized populations: Reclaiming lost prizes through in-the-trenches interventions. *Gifted Child Quarterly*, 49 (4), 330-341.

McCluskey, K. W., Baker, P. A., O'Hagan, S. C., & Treffinger, D. J. (1998). Recapturing at-risk, talented high-school dropouts: A summary of the three-year Lost Prizes Project. *Gifted and Talented International*, *13* (2), 73-78.

McCluskey, K. W., & Mays, A. M. (Eds.). (2003). *Mentoring for talent development*. Sioux Falls, SD: Reclaiming Youth International, Augustana College.

McCluskey, K. W., O'Hagan, S. C., Baker, P. A., & Richard, S. (2000). Nurturing the talents of Aboriginal Canadian youth. *TalentEd*, *18* (4), 1-9.

McCluskey, K. W., O'Hagan, S. C., Baker, P. A., Treffinger, D. J., & Feldhusen, J. F. (1995). Lost prizes project: Program development. In K. W. McCluskey, P. A. Baker, S. C. O'Hagan, & D. J. Treffinger (Eds.), *Lost prizes: Talent development and problem solving with at-risk students* (pp. 147-159). Sarasota, FL: Center for Creative Learning.

McCluskey, K. W., & Torrance, E. P. (2003). Mentoring: One pathway to Aboriginal talent development. In K. W. McCluskey & A. M. Mays (Eds), *Mentoring for talent development* (pp. 178-195). Sioux Falls, SD: Reclaiming Youth International, Augustana College.

McCluskey, K. W., & Treffinger, D. J. (1998). Nurturing talented but troubled children and youth. *Reclaiming Children and Youth*, *6* (4), 215-219, 226.

Meyer, W. (1997). A turn down the harbor with at-risk children. *Phi Delta Kappan*, *79* (4), 312-316.

Peterson, J. C. (1997). Bright, tough, and resilient – and not in a gifted program. *Journal for Secondary Gifted Education*, *8* (3), 121-136.

Place, D. J., McCluskey, A. L. A., McCluskey, K. W., & Treffinger, D. J. (2000). The second chance project: Creative approaches to developing the talents of at-risk native inmates. *Journal of Creative Behavior*, *34* (3), 165-174.

Renzulli, J. S., Baum, S. M., Hébert, T., & McCluskey, K. W. (1999). Reversing underachievement through enrichment. *Reclaiming Children and Youth*, *7* (4), 217-223.

Renzulli, J. S., & Park, S. (2000). Gifted dropouts: The who and the why. *Gifted Child Quarterly*, *44* (4), 261-271.

Royce, D. (1998). Mentoring high-risk minority youth: Evaluation of the Brothers Project. *Adolescence*, *33*, 145-158.

Sisk, D. (1993). *Systemic training educational programs for under-served pupils (Project Step-UP)*. Washington, DC: U.S. Department of Education.

Sisk, D. (2003). Gifted with behavior disorders: Marching to a different drummer. In D. Montgomery (Ed). *Gifted and talented children with special educational needs: Double exceptionality* (pp. 131-154). London, England: David Fulton Publishers.

Social Planning Council of Winnipeg. (1999). *Note on Aboriginal youth educational attainment levels*. Winnipeg, MB: Author.

Statistics Canada. (1991). *School leavers survey*. Ottawa, ON: Employment and Immigration Canada.

Torrance, E. P., Goff, K., & Satterfield, N. B. (1998). *Multicultural mentoring of the gifted and talented*. Waco, TX: Prufrock Press.

Treffinger, D. J., Isaksen, S. G., & Dorval, K. B. (2006). *Creative problem solving: An introduction* (4th ed.). Waco, TX: Prufrock.

U.S. Department of Education (1991). *National education longitudinal study (NELS:88) on gifted and talented education*. Unpublished study, Washington, DC: Author.

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Lost Prizes: Recognizing and nurturing talent in at-risk populations

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Abstract

Employing Creative Problem Solving (CPS), mentoring, and the Talent Identification and Development in Education (TIDE) model developed by Feldhusen, the three-year, tri-district Lost Prizes project was designed to recapture talented high-school dropouts. Their talents notwithstanding, the young people in question had been lost to the system. At best, they were floating aimlessly; at worst, they were in serious trouble with the law. The hope was to reconnect with these at-risk individuals, awake dormant creative potential, and encourage reasoned decision making. This flexible off-site program featured career exploration, growth plans, job experience, and CPS training. It worked successfully for many dropouts, whose talents were identified, appreciated, and nurtured. Specifically, 57 of the 88 participants (65 percent) responded by completing high school, entering post-secondary programs, or obtaining employment. Related projects with other at-risk populations, including Aboriginal teens, Native Canadian inmates, and inner-city youth, have had a similar positive impact.

Introduction

The Lost Prizes Project, and other follow-up ventures, have been well-documented over the years (McCluskey, Baker, Bergsgaard, & McCluskey, 2003; McCluskey, Baker, & McCluskey, 2005; McCluskey, Baker, O'Hagan, & Treffinger, 1995, 1998; McCluskey & Mays, 2003: McCluskey, O'Hagan, Baker, & Richard, 2000; Place, McCluskey, McCluskey, & Treffinger, 2000; Polyzoi, Bergsgaard, McCluskey, & Olifirovych, 2005). For the purposes here, however, I'll simply offer a brief overview of the program and its outcomes. Of course, since the "graduates" are changing direction continually, the data gathering is never complete – things shift substantially over time. There is no doubt, however, that tremendous progress has been made in working with at-risk individuals, and that the Lost Prizes approach has made a real difference in the lives of many young people.

For those unfamiliar with the initiative, Lost Prizes – a shared venture among three Manitoba school districts – was a project designed to "reclaim" at-risk, talented dropouts who had left or been "pushed out" of their high schools. Despite their talent, these youth had, for the most part, turned away and withdrawn totally from the school system. Most were producing virtually nothing: At best, they were floating aimlessly; at worst, they were involved in serious substance abuse and/or criminal activity.

In terms of program components, school teams considered the issues, focused on the Academic-Intellectual, Artistic, Vocational-Technical, and Interpersonal-Social Domains, and selected the participants using the Talent Identification and Development in Education model (Feldhusen, 1995). Then, for one month in the first phase of the project, a facilitator worked directly with the "re-connected" students. Since most of the individuals in question were hesitant to return to school, classes were held off-site. The sessions addressed topics such as nonverbal communication, learning styles, wellness, and self-fulfilling prophecy. Career awareness (e.g., interest inventories, job search, interviewing, and the like) was a major part of the in-class program. Individual Growth Plans (Feldhusen, 1995) were developed to help students identify and move toward specific goals. As well, Creative Problem Solving (Isaksen, Dorval, & Treffinger, 2000; Treffinger, Isaksen, & Stead-Dorval, 2006) figured prominently in the training. By learning and practicing CPS strategies, the students became more self-assured, more goal-directed and future-oriented, and better prepared to make positive educational, career, and life decisions.

The second phase of Lost Prizes, a one-month job placement, was designed to give the participants some experience in the world of work. Here they had an opportunity to confront and navigate their way through everyday problems. We matched student interests to the "employment" setting, and most of our workplace hosts became, in effect, philanthropic mentors to the "lost prizes."

Students received a full high-school credit for completing each portion of the program (i.e., in-class and work experience). Essentially, then, talented young people, who had hitherto been disenchanted, disengaged, and disconnected, were given the chance to acquire practical knowledge, apply it in real-world settings, and quickly earn two secondary school credits.

Overall, in the three districts combined, eight Lost Prizes sessions were conducted. By project's end, 88 students had participated. A detailed look at the outcomes has been offered elsewhere (McCluskey, Baker, O'Hagan, & Treffinger, 1995, 1998; McCluskey, Baker, & McCluskey, 2005). To summarize quickly, 57 percent (50/88) of the students were male and 43 percent (38/88) female. Six (3 male, 3 female) were Aboriginal. Slightly more than 50 percent of the participants had been referred earlier in their schooling for suspected attention-deficit/hyperactivity disorder or learning disability. Of the males, 52 percent (26/50) completed both phases of the program; 47 percent (18/38) of the females finished up both. Most of the youth were between 16 and 19 years of age when they entered Lost Prizes. To be precise, the mean entry age of those completing both phases was 17.48, while it was 17.22 for those earning only one credit (and 16.24 for those who received none). However, several individuals who never "finished" left for educational or employment opportunities.

At the time of a 1998 update of successful Lost Prizes participants, it was noted that 24 had moved directly into the workplace and obtained permanent, full-time jobs (2 were self-employed), 18 returned to school and were performing solidly, 9 graduated from high school and then moved on to employment, and 6 had entered university or community college. That is, of the 88 students initially enrolled in Lost Prizes, 57 (or 65 percent) could be considered success stories.

Keeping in mind that our target population was an extremely at-risk group of dropouts, these results are impressive. Indeed, the Lost Prizes project has shown that with training, support, and encouragement, many dropouts can turn their lives around and make a significant contribution. Other related ventures have also had singularly positive results. For example, *Northern Lights* increased the graduation rates of vulnerable Aboriginal youth (McCluskey, O'Hagan, Baker, & Richard, 2000), while *Second Chance* markedly reduced recidivism among Native Canadian inmates (Place, McCluskey, McCluskey, & Treffinger, 2000).

Hunt (1987) has described the need for post-secondary institutions to become more responsive to the outside world. In his view, university types must begin to put away their "little professor" and – remembering that in the beginning there was experience, not a blackboard (or PowerPoint) – respect community expertise and wisdom. Teachers in the public schools must also be mindful of the fact that education does not occur in isolation, but rather in an "ecosystem of learning" that "is influenced by what happens in homes; at computers; on the Internet; in community workplaces; in churches, museums, and theaters; on athletic fields; and in correctional facilities, youth homes, and health-care centers" (McCluskey & Treffinger, 1998, p. 218).

Heeding Hunt's admonition that we must emerge from the ivory tower, and responding to our institution's inner-city, urban, Aboriginal issues mandate, faculty and staff at the University of Winnipeg have launched a variety of community outreach initiatives. Creative Problem Solving is usually involved, and mentoring typically is the common element in most of the endeavours (McCluskey & Mays, 2003), particularly with Aboriginal populations (McCluskey & Torrance, 2003). From our base as a "core area" university, we have launched several made-in-Manitoba mentoring projects, wherein pre-service teacher mentors identify and nurture the talents of marginalized young people: MARS (Mentoring At-Risk Students) focused on reclaiming gang-involved Aboriginal "street kids," PLUTO (Please Let Us Take Off) supported inner-city schools, SATURN (Storefront Activities To Unleash Resilience and Nurturing) helped parents develop the literacy skills of their preschoolers, NEPTUNE (Nurturing Enrichment Programming Through University Networking and Empowerment) facilitated higher-order projects with gifted students, and EARTH (Encouraging Autonomy and Responsibility in Teen Households) offered direction to adolescents in independent living situations. These and other mentoring projects have provided support to inner-city, high-ability, and war-affected young people.

Related University of Winnipeg in-the-trenches programs are also worthy of mention, including Camp UWin (a free summer camp for inner-city children involving enrichment experiences in art and music), Service Learning (a new second year course in which well over 200 students annually serve the community through "work experience" placements, Doors Open (where pre-service teachers guide high school youth in researching heritage buildings), the Global Welcome Centre (which provides social, educational, and career awareness support to newcomers to Canada), the Wii Chiiwaakanak ("partnership" in Ojibway) Learning Centre (with its various computer, cultural, and study skills programs for children and adults alike), and the Innovative Learning Centre (which partners with schools to provide direct programmatic support for students and, through its Eco-Kids and Enviro Techs sustainability programs, to explore the relationship between culture, science, and the environment, and connect Aboriginal traditional teachings to school science programs).

The original Lost Prizes project has clearly sparked the development and growth of at-risk programs on a variety of fronts. And the piece de resistance gets underway in September of this year with the creation of the Model School at The University of Winnipeg Collegiate. Based on the Lost Prizes philosophy and approach, this grade 9-12 limited-enrollment facility will serve talented, at-risk students in very comprehensive and on-going fashion.

References

Feldhusen, J. F. (1995). Talent *identification and development in education (TIDE)* [2nd ed.]. Sarasota, FL: Center for Creative Learning.

Hunt, D. E. (1987). *Beginning with ourselves in practice, theory, and human affairs*. Cambridge, MA: Brookline Books.

Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2000). *Creative approaches to problem solving: A framework for change* (2nd ed.). Dubuque, IA: Kendall/Hunt.

McCluskey, K. W., Baker, P. A., Bergsgaard, M., & McCluskey, A. L. A. (2003). Interventions with talented at-risk populations with emotional and behavioural difficulties. In D. Montgomery (Ed.), *Gifted and talented children with special educational needs: Double exceptionality* (pp. 168-185). London, England: David Fulton Publishers.

McCluskey, K. W., Baker, P. A., & McCluskey, A. L. A. (2005). Creative problem solving with marginalized populations: Reclaiming lost prizes through in-the-trenches interventions. *Gifted Child Quarterly*, *49* (4), 330-341.

McCluskey, K. W., Baker, P. A., O'Hagan, S. C., & Treffinger, D. J. (Eds.). (1995). *Lost prizes: Talent development and problem solving with at-risk students*. Sarasota, FL: Center for Creative Learning.

McCluskey, K. W., Baker, P. A., O'Hagan, S. C., & Treffinger, D. J. (1998). Recapturing at-risk, talented high-school dropouts: A summary of the three-year lost prizes project. *Gifted and Talented International*, *13* (2), 73-78.

McCluskey, K. W., & Mays, A. M. (Eds.). (2003). *Mentoring for talent development*. Sioux Falls, SD: Reclaiming Youth International, Augustana College.

McCluskey, K. W., O'Hagan, S. C., Baker, P. A., & Richard, S. (2000). Nurturing the talents of Aboriginal Canadian youth. *TalentEd*, *18* (4), 1-9.

McCluskey, K. W., & Torrance, E. P. (2003). Mentoring: One pathway to Aboriginal talent development. In K. W. McCluskey & A. M. Mays (Eds), *Mentoring for talent development* (pp. 178-195). Sioux Falls, SD: Reclaiming Youth International, Augustana College.

McCluskey, K. W., & Treffinger, D. J. (1998). Nurturing talented but troubled children and youth. *Reclaiming Children and Youth*, *6* (4), 215-219, 226.

Place, D. J., McCluskey, A. L. A., McCluskey, K. W., & Treffinger, D. J. (2000). second chance project: Creative approaches to developing the talents of at-risk Native inmates. *Journal of Creative Behavior*, *34* (3), 165-174.

Polyzoi, E., Bergsgaard, M., McCluskey, K. W., & Olifirovych, O. (Eds.). (2005). *At-risk children and youth in Canada and Russia: A cross-cultural exchange for talent development*. Calgary, AB: University of Calgary-Gorbachev Foundation.

Treffinger, D. J., Isaksen, S. G., & Stead-Dorval, K. B. (2006). *Creative problem solving: An introduction* (4th ed.). Waco, TX: Prufrock Press.

Active Learning and Passive Students

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Compliance Demo:

A. Why did you do this? Because of social norms governing the relationship between speaker and audience, which also operates between teacher and students;

B. Social norms are valuable because they guide social behaviour in ways that make life predictable and that keep society operating smoothly;

C. This certainly happens in our schools. From the elementary school years onward, social norms shape and solidify the expectations about what should and shouldn't happen in the classroom;

D. Specifically, teachers-Though their own experience as students – tend expect to lecture and they expect their students to listen and take notes. So students come to expect to passively take in information. They have learned that education involves receiving information from their teacher and that much like a mid-air refueling operation-their main respobnsibilty is to do be in the right place to accept it.

E. As a result, many of our students think of themselves as numbers of audience, not a class, and they do not expect to have much personal involvement (or enjoyment) in the learning process.

F. So by the time students get to our psychology classrooms at the university, many of them will have come to expect to be taught mainly by being lectured to-rather than to learn on their own, to be told what to learn and what to ignore, and to believe that they need to retain what they learn long enough to pass a test on it. Further, many of them will have been discouraged, and even punished, if they attempted to actively engage in the learning process-especially if they dared to question rather than accept what their teachers told them.

G. No wonder we have passive students who just stare at us when we stop lecturing and ask questions.

H. Think back to your own university classes and you might agree that many lectures are exercises in mutual punishment, in which people who may not be the world's best speakers force themselves to make long presentations to people who may not want to be there, and are sorry they came;

I. But, do not get me wrong. I am actually a big fan of lectures. Lecturing is a perfectly good way to transmit facts, definitions, principles, descriptions of phenomena, and other types of information. Well-Organized and well-presented lectures can engage and eveninspire students. Again, think back to your university days, and you will probably remember a professor whose lectures inspired you to enter psychology;

J. It is just that lectures may not be the best way to get students to think about course material, and so teaching through lectures alone, the results can be disappointing, and the experience may not be particularly enjoyable for our students, or for us.

The Importance of Active Learning

(1) For our students' sake -and for our own- I think it is important to combine lectures with a wide veriety of other teaching methods that can promote more active learning;

(2) Indeed, there is research in cognitive psychology suggesting that adding active learning strategies to lectures helps students to learn more, retain it longer, and understand it more deeply;

(3) What do I mean by active learning? Active learning is learning by doing something other than just passively listening or reading. In other words, doing anything other than you are doing right now. The "something" can be, for example, answering questions and writing down things that are not clear, participating in demonstration or debates or collaborative learning or service learning, collecting data outside of class and then reporting on results, etc.;

(4) If you are already doing this, you know that it takes time and effort, and that it also takes some persistence; because so many of our students are not expecting to do anything other than listen

to us talk. They might not immediately appreciate it when they discover that they are going to have to do a lot more than that;

(5) But using active learning methods is too important to give up on just because students are not immedialtely enthusiastic partners in the process;

(6) Why should active learning methods help? The idea behind active learning methods is that they help students to go beyond memorizing isolated facts, encourage them to think more deeply, consider how new material relates to what they already know, and apply it in new situations. This kind of thinking also makes the material easier to remember. This is not a new idea. In 1869, Charles Eliot, then president of Harvard University, wrote that "lectures alone are too often a useless expenditure of force. The lecturer pumps laboriously into sieves. The water is good, but it goes through. A mind must work to grow";

(7) Active learning supports the idea that the deeper processing of information that comes with active learning will improve retention over the shallower processing used in pssive learning.

Promoting Active Learning

- First, be willing to take the risk of violating the social norms that typically govern behaviour in classes and in the classroom;
- Second, we must decide that it is OK to make some changes in how we teach;
- Third, we need to recognize that our students do not expect to take an active role in their learning, and may not react as positively as we had hoped the first time we violate their expectations. Do not be discouraged. Just as your class learns that when you ask a question you expect an answer, they will also learn that you expect them to participate in active learning activities, and that they are enjoyable;
- Notice that in order to incorporate active learning methods into your courses, you do not have to abandon your current methods. Note that the model can be lecturing interspersed with active learning demos and activities ranging from quick little demos to class-long group projects; and
- Choose active learning methods that match your level of interst and the amount of risk you are willing to take.

Other Classroom Demonstrations to Promote Active Learning

- Introduce active learning activity that involves everyone, gets them to experience the phenomenon to be discussed, and keeps hem from saying "I wouldn't have done that". It is also quick, poses relatively little risk for failure, does not significantly disrupt your normal class routine;
- To promote critical thinking and the use of scientific research methods, use psychic demos and other interesting phenomena (e.g., do newspaper trick, discuss use of 5-steps in class; note idea of using other C.T. targets and then scientific journal articles that can then be analyzed using 5-steps by individuals or teams and presented as written reports and/ or in-class presentations;
- To demonstrate constructive memory (memory as a combination of actual events and what we think or expect or want to have happened): Do sleep list demo, and discuss in terms of the value of eyewitness testimony;
- Mention using "name that disease" to teach about reliability of psychiatric diagnosis; and
- Take any concept you teach and ask yourself: "what can I do to get my students to do something in learning this concept in addition to reading about it or listening to me talk about it".

About the Author

Douglas A. Bernstein was born in Pittsburgh, Pennsylvania on December 27, 1942. He attended public schools there before completing his bachelor's degree in psychology at the University of Pittsburgh in 1964. He received his masters and Ph.D. in clinical psychology at Northwestern University in 1966 and 1968, respectively. From 1968 to 1998, he was on the psychology faculty at the University of Illinois at Urbana-Champaign, where he taught classes ranging from 15 to 750 students, and served both as Associate Department Head and Director of Introductory Psychology. In the early 1970s, he spent three years as a visiting faculty member in the Department of Psychology at Western Washington University in Bellingham, Washington. He is currently Professor Emeritus at the University of Illinois, Courtesy Professor of Psychology at the University of South Florida, and Visiting Professor of Psychology and Education Advisor to the School of Psychology at Southampton University. He is a fellow of the Association for Psychological Science. His research career, which initially focused on the modification of smoking behavior and later on the measurement and treatment of anxiety, was supported for several years by the National Institute of Mental Health and the National Institute of Dental Research. From 1986-1992, he was a member of the State of Illinois Clinical Psychology Licensing and Disciplinary Committee. Over the years, his interests have turned increasingly toward the teaching of psychology, and toward efforts to promote excellence in that arena. These efforts began in 1978, when he spoke at the First Annual National Institute on the Teaching of Psychology. He joined its program committee in 1979, and eventually became committee chair. In 1994, he founded the APS Preconference Institute on the Teaching of Psychology, and in 2000, he helped plan the First Annual Summer National Institute on the Teaching of Psychology. From 1989-1991, he served on the steering committee for the APA National Conference on Enhancing the Quality of Undergraduate Education and, in 2001, on the advisory panel to the APA Board of Educational Affairs Task Force on Undergraduate Psychology Major Competencies. Most recently, he served for two years as the founding chairman of the Steering Committee for the APS Fund for the Teaching and Public Understanding of Psychological Science, and he remains a member of that committee. His teaching awards include the University of Illinois Psychology Graduate Student Association Teaching Award and the University of Illinois Psi Chi award for excellence in undergraduate teaching, both in 1979, the Illinois Psychology Department's Mabel Kirkpatrick Hohenboken Teaching Award in 1993, and the APA Distinguished Teaching in Psychology Award in 2002.

The Science of Creative Cognition

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Abstract

I will be speaking about the science of creative cognition, that is, the science of the creative mind. Today is the 4th of July, a very important date for an American, because this is our Independence Day. America has often been described as an experiment, one where we hope to find the best combinations from all over the world, so I find it appropriate to be discussing the science of creativity on this day.

I plan to cover these topics in my presentation today. First, some general remarks about creativity, including some paradoxes of creativity. Then I will speak briefly on the subject of creativity and the mind, also known as "creative cognition." Then I will turn to the importance of scientific investigation in our understanding of creativity. Finally, I will describe some of my own scientific research on creative cognition.

Definition of Creativity

There are thousands of different definitions that you can easily find online or in books. In spite of the vast diversity of definitions, there are two characteristics that nearly all definitions include to describe anything that is creative: Novelty – it must be new in some way – and Practicality – it must have potentially some functional value or utility, even if that value is not immediately recognized. In addition to these two required characteristics, we can define "creativity" using a "family resemblance" type of definition. That is, just as members of a family have a set of shared characteristics, even though no member of the family must have ALL of those qualities, we can see that creative things also tend to share several features, even though no one of these features is absolutely required. These family features include Ambiguity, Meaningfulness, Emergence, Incongruity, Divergence, Originality, Flexibility, and Ambiguity.

There are many levels of creativity; what is creative at one level may not be creative at other levels. The different levels include the Historic, Societal, Paradigmatic, Institutional, Group, Individual Task, Process, and Biological levels. My own research in creative cognition includes the Group, Individual, Task, and Process levels. When one studies creativity scientifically, it is important to determine whether the different levels of analysis can be aligned: that is, are our scientific conclusions at one level of analysis relevant and meaningful for other levels. When I describe my own research on creative cognition, I will show you how I have tried to align my observations and conclusions across multiple levels of analysis.

There are several paradoxes of creativity, seemingly contradictory truths. Here are a few. Is creativity something special, seen in only a few rare individuals, or is it normal, something seen in almost everyone? As you will see, the answer to these paradoxes is almost always, "both."

Is creativity Domain-Specific, that is, different for every area of endeavor, or are there general principles, seen in every area or domain of creative work? The simple answer, of course, is, "both."

Are creative things Imaginative, or Practical? Again, "both."

To be creative, must we use prior knowledge, standing (as Newton said) on the shoulders of giants? Or must we reject prior knowledge, lest we get stuck in a rut? The phenomenon of getting stuck because of prior knowledge is called "fixation."

Finally, can we try to be creative, or are we creative only when we are not trying? These paradoxes, and others, make creativity a fertile area for scientific research.

Creativity and the human mind

The world has seen many remarkable creative personalities: Albert Einstein, Marie Curie, Ludwig von Beethoven, Josephine Baker, Yo-Yo Ma, Pablo Picasso, Gallileo, Jane Goodall, Charles Darwin, Paul Gauguin, Fancoise Truffaut, Archimedes, Leonardo da Vinci, Victor Hugo, Sigmund Freud, Janis Joplin, Thomas Edison, Toulouse Lautrec, Stephen Hawking, Louis Pasteur, Paul Cezanne, Henri Poincaire, Marcel Marceau, Auguste Kekule, Marcel Proust, and John Lennon, to name only a few. Remarkable and highly creative personalities. Now that we have celebrated these amazing people, I have a question: how did they achieve their remarkable accomplishments?

I maintain that understanding the creative process is more useful than understanding the creative personality. Why? Because a process can be learned. A personality cannot be learned. If we are to learn to be more creative, we must understand the process.

Research should find out how to *improve* or *optimize* creativity. A personality approach focuses on identifying creative people and assessing their creative talents. The more useful Process approach seeks to understand the processes and mechanisms that lead to creativity. Thus, the better we understand processes and mechanisms of creativity, the more we can improve them.

"Creative Cognition," a term created by myself and my colleagues, has two basic principles. One is that cognitive processes and cognitive structures underlie all creative thinking. The other principle is that cognition, itself, is inherently creative. I plan to focus on the first principle today, although my research has explored both principles.

The cognitive processes and structures to which I am referring include those involved in the formation and use of concepts and mental categories, visualization, memory, problem solving, and language.

With my colleagues, we have written several books and scientific articles concerning creative cognition. I will focus on only a few today.

It is important to emphasize that there is no single, unitary "creative process." Rather, the science of creative cognition deals with the complex interacting components of creative thinking. These components collaborate in countless ways to produce creative ideas.

Cognitive Components of Creative Behaviour

There are many cognitive components of creative thinking. A few are listed here, but I do not have the time to cover them all today.

Instead, I will describe a few typical aspects of creative cognition, using the example of how James Crocker, a NASA engineer, figured out a way to repair the Hubble Space Telescope after it was first launched into space. When the Hubble Space Telescope was launched into orbit in 1990, the world was thrilled at the prospect of Hubble's Ultra Deep Field images of the universe's most distant objects, of breakthroughs in astrophysics and astronomy, such as accurately determining the rate of expansion of the universe. Our hopes were immediately crushed, however, when astronomers realized that there was a big problem with the orbiting telescope.

The problem was with the telescope's primary imaging mirror, which was 2.3 micrometres out from the required shape. The typical solutions of returning the mirror to Earth, creating a new mirror, and re-launching it, were technologically and economically out of the question. NASA scientists, met many times, but could not figure out a solution to the problem; they had reached what psychologists call a state of Fixation, which is the focus of much of my creative cognition research. Fixated and frustrated after one of these meetings, engineer James Crocker returned to his hotel room to take a shower, taking a break from the fixated problem, what we call Incubation. It was during this incubation period that he had a flash of Insight. Looking at the adjustable shower head, he combined the idea with the idea of corrective eyeglasses, a Conceptual Combination. Using the Analogy that the mirror was like a human eye, he visualized that a spacewalking astronaut could install adjustable corrective lenses on the space telescope. The problem was solved!

Is it possible to study creative cognition scientifically?

The title of my talk is "The Science of Creative Thinking." Why do I emphasize science? And, is it possible to study creative cognition scientifically?

Why do people believe that some things are true, and other things are not true? We humans have many methods to establish our beliefs. First, there is the method of Authority; we believe things because people we trust tell us those things are true. A second method is Intuition; we cannot say exactly why we believe something, it just seems like it is true. A third method is Logic; something makes sense to us logically. You might also believe something because of Personal Observation; it happened to you personally. Finally, there is the method of Science; belief because of systematic observation and testing. Every one of these methods has value, yet at times, every one of these methods can be wrong. What gives science an advantage over the other methods? Only science is

"self-correcting." Only the method of science is designed to find out when it's answers are wrong, and to correct those answers.

Science is defined as "A body of knowledge." However, I want to focus on a second definition, the Scientific Method. This method usually begins with observation of phenomena in their natural contexts. Next is an explanation, known as a "theory." What does the theory predict? That prediction is a "hypothesis," a testable statement of the theory. Next, of course, is the test, an "experiment." We make observations in our experiment, usually called "results" or "data." Then we analyze and interpret the results; do they support the theory, or do they reject the theory? Finally, we ask whether we can Generalize the results; that is, do the experiment results have any meaning back in the natural contexts where we began? This is the basic idea of the scientific method. How can we use this method to study creativity?

I began with naturalistic observation. I observed that in creative thinking, people often get stuck when they are working on important problems and ideas.

There are many examples to choose from, but here are a few historic examples of cases in which creative people were fixated in their pursuit of creative ideas and solutions. As I already noted, NASA engineer James Crocker was fixated on ways of repairing the Hubble Space Telescope. Kary Mullis, a biotechnological engineer, was fixated on the problem of how to replicate strands of DNA. Henri Poincaré, while working on the mathematical theory that eventually supported the theory of relativity, was fixated on a mathematical problem for weeks before discovering the Fuchsian functions. Archimedes was fixated on a problem involving the volume of an irregularly shaped solid, a golden crown. Friedrich August Kekulé von Stradonitz was fixated on carbon chains when trying to discover the structure of the chemical benzene. Beethoven was fixated when trying to compose a new canon for the piano. What causes fixation? And how can it be overcome?

The theory that I have worked with states that fixation results from implicit assumptions that are wrong or inappropriate for a problem, when these wrong assumptions are unconsciously brought to mind. Where do these assumptions come from? Previous experience.

This theory led me to the Fixation Hypothesis, the notion that I could show people wrong or inappropriate ideas, and that these ideas would be brought to mind unconsciously when those people were given problems to solve, causing mental blocks.

Interestingly, in each of these historic cases of incubation, the great discoveries that these people made, and the fixation that they overcame, took place when they were away from their typical workplaces. Crocker was taking a shower, Kekule was dozing in front of the fireplace, Mullis was taking a drive in the country, Poincare was boarding a bus, Beethoven was riding in a carriage, and Archimedes was taking a bath when insight struck.

Historic cases of startling and important insights that happened during or after a break from the problem have been called "Incubation Effects." It was my observation that incubation always seemed to occur only when people were initially fixated. This observation led me to the Incubation Hypothesis, which states that Incubation effects are caused by relief from mental blocks, or relief from fixation.

My scientific tests of these hypotheses led me to several experiments in creative cognition. My experiments do not try to explain everything about creative thinking – no experiment could possibly do that. Rather, my experiments are a scientific approach to explain one facet of creative cognition.

How one can do research on creative thinking?

I want to give you an idea of how one can do research on creative thinking, so I will give you a brief discussion of several of my own experiments. The first question that I asked was whether cognitive blocks can be caused by implicit memory, which is a form of unconscious memory. Next, I asked whether a similar method can cause mental blocks in laboratory tasks that involve creative idea

generation. Third, I examined whether these same mental blocks affect people not in laboratory tasks, but in situations that are closer to real life creativity – specifically, engineering design. This third question is concerned with what I earlier referred to as "alignment." That is, do the results we observe with artificial laboratory tasks and non-expert subjects align with what we observe in more realistic tasks, using more expert subjects? Fourth, I asked whether breaks or interruptions from a task cause incubation effects, and if so, is incubation related to fixation?

First, I will give you a very simple diagram to explain how cognitive blocks, or fixation, can occur. If a stimulus is associated with more than one response, and is an undesirable response in stronger or more dominant than the desired target response, then the stronger more dominant response can block or supplant the intended target response.

Explicit memory is normal conscious memory, and can be distinguished from Implicit memory, an unconscious form of memory, with simple tests. Most people have both types of memory intact, but some patients with brain damage may have a type of amnesia where their conscious explicit memory no longer functions properly. An example of this type of amnesia was depicted in the movie "Memento," where the main character could not consciously remember events even a few minutes after they had occurred.

After reading a list of words, a normal non-amnesic person can recall many of the words if they are asked to do so, but an amnesic person cannot consciously recall the words from the list, because they do not have an intact explicit memory. However, if word fragments are shown that correspond to the list words, both amnesics and non-amnesics can complete those fragments, because both have intact implicit memory systems. Implicit memory unconsciously brings the recent experiences to mind automatically when we see the word fragments. Word fragments that do not correspond to the words that were recently read are difficult to complete, because there is no implicit memory to help complete those word fragments. Thus, word fragment completion is often used as a test of implicit memory.

To create implicit memory blocks, I created word fragments that were highly similar to the words that were recently read. However, these new word fragments cannot be completed by implicit memory. Therefore, when implicit memory unconsciously brings to mind the wrong word, it automatically blocks the correct solution from coming to mind. This is an implicit memory block.

Here are a few examples, in French, of words that might cause implicit memory blocks in word fragment completion.

These are words in English that I have used in my experiments to induce implicit memory blocks in word fragment completion.

Subjects in these experiments saw a list of words, called "Primes," and then were given instructions to complete a set of word fragments. The Control condition instruction merely asked subjects to try to complete the word fragments. The "Remember" instruction told subjects to try to explicitly recall the priming words to help them complete the word fragments. The "Forget" instruction told subjects to try to forget the priming words, because remembering those words would prevent subjects from thinking of the correct solutions. When no similar words had been read on the priming list, subjects were able to complete about half of all the word fragments. However, when subjects had previously read blocker words, they performed more poorly on the word fragments. This blocking effect occurred whether subjects were in the Control condition or the Forget condition, because implicit memory automatically brought the wrong solutions to mind. The Remember condition added an explicit memory block to the implicit memory block; those subjects who explicitly remembered priming words did even worse.

Form these experiments, we concluded that Blocks can be caused by implicit memory of inappropriate responses, and that these implicit memory blocks are involuntary, and cannot be avoided.

Can cognitive blocks cause fixation in creativity tasks?

We next turn to the second hypothesis: Can cognitive blocks cause fixation in creativity tasks?

Our favorite creativity task is called an Idea Generation Task. Subjects in these experiments are asked to imagine and sketch new ideas that they create. For example, they might be asked to imagine what sort of life forms might evolve on a planet that is similar to Earth. Their ideas are often quite creative.

Here are more ideas generated by our subjects in this creative idea generation task. Although these subjects are not expert artists or science fiction writers, their ideas are sometimes quite creative.

To study fixation, or blocking in this creative idea generation task, we showed some of our experimental subjects examples of ideas before they began the task. Other subjects saw no examples. We wanted to see if the examples would be implicitly remembered, and incorporated into the ideas of subjects in the experiments.

In one experiment, the task was to create, sketch, and label the parts of new toys that they had never encountered before. In other experiments, they were asked to create, sketch, and label the parts of new life forms that might evolve on a planet similar to Earth. In these experiments, half of the subjects saw examples, and half saw no examples.

In one experiment we showed subjects three example life forms. Although we did not point it out, all three examples included antennae on their heads, four legs, and a tail.

Subjects who had seen examples showed a fixation effect; they often included antennae, four legs, and a tail in their ideas. Subjects who did not see the examples, the non-fixated ones, were less likely to include these features.

In another version of this experiment, subjects were asked to invent new toys. Examples were shown to half of the subjects. Each example included electronics, a ball, and a high level of physical activity.

Those who has seen examples showed a fixation effect, often including electronics, a ball, and a high level of physical activity in their ideas.

Those who saw no examples were less likely to create new toys with these features.

The numerical results show these fixation effects for both toys and creatures tasks. In a second experiment, subjects who saw the example creatures were given either the standard instructions (invent new creatures for a planet like Earth), or they were explicitly asked to conform to the examples, or they were asked to avoid using the features of the examples in their ideas. Clearly, even when they tried to avoid the examples, they were still strongly fixated by having seen the examples.

The implicit memory blocking effect, and this fixation effect are similar; in both cases, subjects cannot avoid using their implicit memory.

These experiments show that fixation effects can be experimentally induced by the introduction of examples. Like implicit memory blocking, these fixation effects increased when blockers (the examples) were deliberately remembered, but were not decreased by efforts to avoid using the examples. These experiments also show alignment: blocking in implicit memory resembles fixation in creative idea generation.

Can fixation block creativity in real life settings?

We next turn to the third hypothesis: Can fixation block creativity in real life settings?

These more realistic creativity tasks were done with engineering students in a design course, or in one case, we used professional engineers. These more realistic design tasks included asking subjects to: 1. Design a new bicycle rack, 2. Create, sketch, and label the parts of a new measuring cup for blind people, 3. Create, sketch, and label the parts of a new inexpensive spill-proof coffee cup, and 4. Design a biomechanical device that samples & measures the inside of the intestine. In each experiment, half of the subjects saw an example design, and half saw no examples. We wanted to see if the designs would show a fixation effect.

The theory here was the same; would examples come implicitly to mind, preventing subjects from thinking of more creative designs?

The example bicycle rack used a top-mount design, rails for tires, and suction cups.

These features were seen in the Fixation group, that is, the subjects who had seen the example, than in the Control condition.

In a second experiment, designers were asked to create, sketch, and label the parts of a new measuring cup for blind people.

Half of the subjects saw this flawed example design, which used non-infinitely variable measurements, and which lacked a much-needed overflow device.

Seeing the flawed example design greatly increased the number of ideas that used non-infinitely variable measurements, and which lacked an overflow device.

In a third experiment, subjects were asked to create, sketch, and label the parts of a new inexpensive spill-proof coffee cup. These subjects were explicitly instructed that they should not use drinking straws or mouthpieces, major flaws in the designs that would cause mouth burs, and cups that would leak.

Nonetheless, subjects were again fixated on the example. Seeing the example design greatly increased the number of designs that leaked, that used a straw, and that used mouthpieces.

In a fourth experiment, professional design engineers were asked to design a biomechanical device that samples & measures the inside of the intestine. Half of the engineers saw an example with design flaws; the example used an opening in the front (rather than on all sides), a control box, and an electric cord.

Once again, we found a fixation effect. Seeing the example with design flaws increased the engineers creation of designs that, like the example, used an opening in the front, a control box, and an electric cord.

We concluded that Fixation affects the creative conceptual design process. Even explicitly identified negative features of examples could not be avoided by designers. Again, we demonstrated evidence of Alignment: Both college students and professional engineers experienced design fixation.

Do breaks or interruptions cause incubation by relieving cognitive blocks?

Finally, we turn to the fourth hypothesis: Do breaks or interruptions cause incubation by relieving cognitive blocks?

A general diagram of an incubation effect begins with a question to be answered, and an initial failure to answer the question. If we compare people who simply continue working on the problem with people who take a break from the problem, we find that those who postpone their continued work may do a better job of resolving the initial failure – an incubation effect.

In a set of experiments with puzzle problems, we gave half of our experimental subjects no clues at all, and the other half we showed misleading hints to cause initial fixation. After the first attempt, we re-tested all of the subjects on the puzzle problems. Half were re-tested immediately, and half were re-tested after a delay of several minutes.

We found that more problems were resolved if subjects were re-tested after a delay, an incubation effect. Interestingly, this incubation effect only occurred if subjects were initially fixated by showing them misleading clues.

A longer break from the problems resulted in greater incubation effects. Consistent with our theory, we also found that longer delays resulted in poorer memory for the misleading clues! As fixation diminished over time, incubation effects increased.

In conclusion, we found that an incubation effect was observed if a break or delay occurred after initial fixation. In addition, we found that forgetting the blockers (misleading clues) corresponded with bigger incubation effects.

These experiments in creative cognition supported our hypotheses. We showed that our methods aligned laboratory and naturalistic task domains, that blocks or impediments obstructed task performance at many levels of complexity, that incubation fixated problem solving, and that, indeed, creativity CAN be studied scientifically!

Finally, I would like to make the following conclusions, in general. The scientific study of creativity is possible. No single study can give us all of the answers, but this approach can help us separate true principles of creative thinking from pure speculation. Understanding the creative process is more useful than understanding the creative personality, because you can learn a process, but you cannot learn a personality.

About the Author

Steven M. Smith is a Full Professor of Psychology, and a founding Member of the Creative Cognition group at Texas A&M University. He is the author of four scholarly books on creative cognition, and more than seventy articles in cognitive psychology (see http://www.tamu.edu/faculty/stevesmith/ Dr. Smith is the Director of Research for the Institute for Applied Creativity, an interdisciplinary group at Texas A&M University. Dr. Smith has conducted many experimental studies examining aspects of creative thinking, focusing especially on the ways that mental impasses can be caused and how those impasses can be resolved. With his colleagues he defined and developed laboratory methods for examining aspects of the creative process. His interdisciplinary work, which bridges his research on creative cognition to creativity in engineering design, business, and computer science, has been supported by the National Science Foundation.

Creative Problem Solving (CPS): Powerful Tools for Managing Change and Developing Talent

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Abstract

Creative Problem Solving (CPS) offers a powerful, practical set of tools for people of all ages to learn and apply. In educational settings, CPS is empowering adults and students as individuals or in groups to think creatively and critically, deal with complex, open-ended problems, and manage change. CPS also plays a role in promoting talent recognition and development. This article describes the foundations for understanding the CPS system and the reasons for its importance in education, summarizes major influences on the development and evolution of CPS over more than five decades, summarizes current educational applications, and outlines a number of current and emerging trends and issues for research, development, and practice.

Introduction

Once upon a time, educators might have said to their students, "If you will simply pay close attention to what I am going to teach you, you will learn everything you will need to know for a successful life." Alas, stories that begin, "Once upon a time…" are fairy tales. It's doubtful that such a message was ever true, but we can be certain that it is not true today. We do not know all the knowledge, information, or content that today's students will need, or the answers to the questions they will face. Indeed, increasingly, we do not even know the questions (Treffinger, in press).

Creativity and CPS are important. They help students to prepare to deal effectively, independently, and resourcefully with a wide variety of complex opportunities and challenges. During this preparation for the increasingly complex challenges of the workplace, creativity and CPS can also have a very powerful, positive impact on students' personal lives and careers. Through knowledge of CPS tools and the ability to use them, students discover new, rich and varied opportunities for personal growth and productivity. They discover their passions, while discovering and developing ways to be at their best. When people in a group talk about the best, most powerful learning experiences they have ever had, it is common for them to describe their encounters with creative learning. When people discover and use their creativity, they find that they feel healthier, happier, and more productive in a variety of ways (Treffinger, 2001).

Engagement in creativity and CPS is not only demanding, but also rewarding. Typically, after a period of extended work on a creative project, or in a problem-solving group, people to say, for example, "I'm exhausted; I would never have believed thinking could be such hard work— but it was worth it!" Paradoxically, although "drained" from the amount of focus and effort they have invested in their work they are at the same time energized and excited by the results of that work, eager to carry out their action plans or put their new ideas to work.

Creativity contributes to our efforts to bring liveliness, excitement, and challenge to any work project— in school, or on the job. Educators and employers today are increasingly aware of the powerful benefits that accompany creative engagement in a task. They know students or employees who feel "ownership" in what they are doing pursue it more energetically and diligently over sustained periods of time. Creative learning engages people in tasks bringing a sense of commitment and renewal to one's work.

In principle, educators need to help students accept challenges that extend beyond learning, recalling, and regurgitating facts in order to do well on basic standardized tests. By means of gifted and talented programming, many students may be helped to become people able to find, learn, and apply new knowledge to complex, novel, open-ended challenges; to make the most of the opportunities they discover

or create in the future; and to proceed confidently and competently into outstanding accomplishments and productivity in the future.

It is possible to provide students today with thinker friendly tools for creative and critical thinking, problem solving, and change management. These tools are practical, proven, powerful, and portable. Let us consider each of these attributes briefly.

Practical. Perhaps the most important attribute of these tools is their practicality. They are not just theories about what someone "might" do. They work, and people can— and do! — really use them; we might say they are "user-friendly."

Proven. We make no claim to having invented (or discovered) many of these tools for productive thinking; indeed, the use of deliberate tools for generating and focusing options might be documented across centuries and civilizations. Within our CPS framework, the use of these tools builds on more than five decades of research, development, and practice (Isaksen & Treffinger, 2004). The term "brainstorming," for example— one of the most commonly known tools that has been incorporated into everyday conversation across the world— was introduced by Osborn more than 50 years ago in his book, Applied Imagination (1953).

Powerful. CPS tools can be used in many different settings or situations, and they are effective. They help individuals or groups to achieve successful results or outcomes. It is important for teachers, and for students, to recognize that the tools are not just "academic exercises," time-fillers, or clever workbook activities, but of real importance to people in their personal life as well as in the world of work.

Portable. These tools can and should be taught to students of all ages, in all grade levels, and across all disciplines. In a very real way, they can be "picked up" and carried from place to place, task to task, or from very simple challenges to very complex, demanding, long-term concerns. They can be used easily, with only a minimum of training, preparation, and materials.

Understanding and Defining Creativity

There are more than 100 definitions of creativity in the literature and many approaches to studying creativity and problem solving. (e.g., Treffinger, 2000a). We have used the illustration of a lake to organize and explain many perspectives on the nature and sources of creativity (e.g., Treffinger, Isaksen, & Firestein, 1983; Treffinger, 2000b). This example is illustrated in Figure 1.

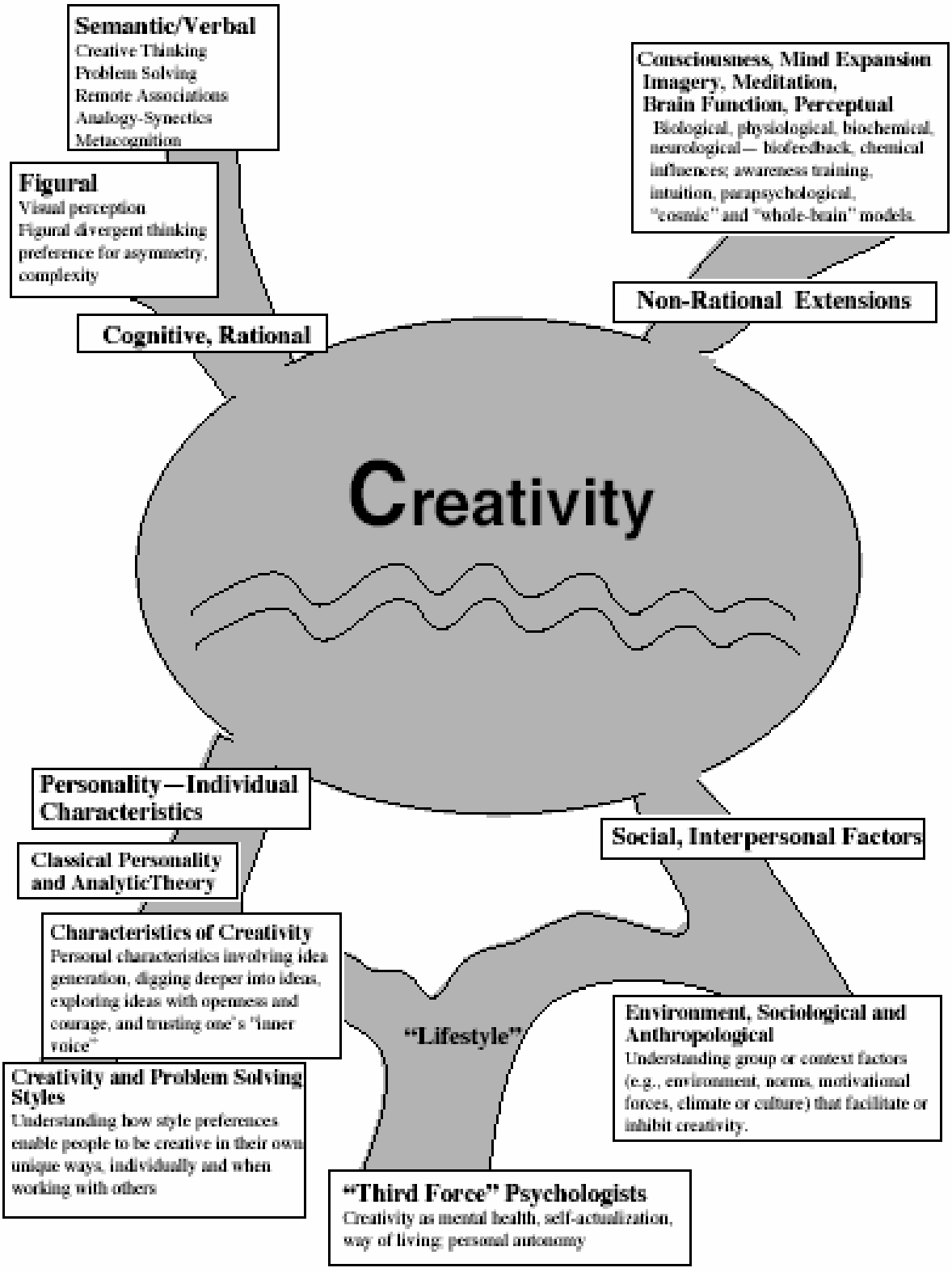

Figure 1: The "Lake" of Creativity
(Treffinger, 2000b; reproduced by permission)

The water in a lake has many sources. For example, it may come from rain, from underground springs, or from any of a number of tributaries. As water collects to form the lake, those separate sources become synthesized, to the extent that a bucket of water gathered from the lake may be described simply as "lake water." Similarly, creativity has many sources, even though we commonly use that single word, "creativity." In reality, of course, work on creativity (in research and practice) is not always taking place in the deepest waters at the lake's center, but to extend the metaphor, work may be going on in one of the tributaries, and the word creativity may still be used to describe its focus. We have made deliberate efforts to be informed about and responsive to contributions from other perspectives. Even so, our work has generally focused on the "stream" illustrated in Figure 1 and characterized as "cognitive, rational" through its long history of research, development, and practice. In this article, we will consider one such perspective: Creative Problem Solving. Let us examine very briefly the history, present status, and implications of our "stream" in the lake and its implications.

Creative and Critical Thinking

Our approach builds on a foundation incorporating both creative and critical thinking. Unfortunately, these are often seen (or stereotyped) as opposites, poles apart and incompatible, viewing the creative thinker as one who is wild and zany, eccentric or at least a little bit weird or strange, and who thrives on "off the wall" ideas that are usually impractical. The critical thinker, on the other hand is seen as serious, deep, analytical, and impersonal.

We hold a different view, arguing instead that these are two complementary, mutually important ways of thinking. Individuals and groups need to be able to use both creative and critical thinking, working together in harmony (or, as we describe it, as the "heartbeat" of the process) in order to be effective problem solvers and managers of change. Generating many ideas will not be enough by itself to help a person or group solve a problem. Similarly, if people rely only on the focusing side, they may have too few and too limited a range of possibilities from which to choose.

Treffinger, Isaksen, and Stead-Dorval (2006) defined creative and critical thinking as illustrated in the following chart.

Creative Thinking

Encountering gaps, paradoxes, opportunities, challenges, or concerns; then searching for meaningful new connections by *generating:*

- many possibilities;
- varied possibilities (from different viewpoints or perspectives);
- unusual or original possibilities; and
- details to expand or enrich possibilities.

Critical Thinking

Examining possibilities carefully, fairly, and constructively; then *focusing* your thoughts and actions by:

- organizing and analyzing possibilities;
- refining and developing promising possibilities;
- ranking or prioritizing options; and
- choosing or deciding on certain options.

Basic Guidelines and Tools for Generating and Focusing Options

Both generating (using creative thinking) and focusing (using critical thinking) also involve learning and applying specific guidelines (attitudes and habits of mind that support effective thinking) and tools. What is a tool? The term is an ordinary part of everyday conversation. We have tools in our home, in the yard or garden, or for use in hobbies, and "the tools of our trade" is a familiar phrase for most people. Simply, a tool is an object we use to help us do a task or job. There are many different kinds and categories of tools and we make a number of more specific distinctions among them with ease, based on where we use them or the functions they serve. In education, we deal with another kind of tools: tools for the mind. These include many tools that we teach to make various kinds of academic work easier, more efficient, or more productive for students (e.g., tools for research, note-taking, or organizing information). In CPS, building on our basic definitions, we identify two basic sets of tools: one for generating options and another for focusing our thinking. These are summarized in Figure 2.

Tools for Generating Options	Tools for Focusing Options
Brainstorming and its variations. Generating many, varied, or unusual options for an open-ended task or question. (Variations include Brainwriting and Brainstorming with Post-It® Notes.)	**Hits and Hot Spots.** Selecting promising or intriguing possibilities (identifying "hits") and clustering, categorizing, organizing, or compressing them in meaningful ways (finding "hot spots").
Force-Fitting. Using objects or words that seem unrelated to the task or problem, or to each other, to create new possibilities or connections.	**ALoU: Refining and Developing.** Using a deliberate, constructive approach to strengthening or improving options, by considering *Advantages, Limitations* (and ways to *overcome* them), and *Unique* features.
Attribute Listing. Using the core elements or attributes of a task or challenge as a springboard for generating novel directions or improvements.	**PCA: Paired Comparison Analysis.** Setting priorities or ranking options through a systematic analysis of all possible combinations.
SCAMPER. Applying a checklist of action words or phrases ("idea-spurring questions") to evoke or "trigger" new or varied possibilities.	**Sequencing: SML.** Organizing and focusing options by considering short, medium, or long-term actions.
Morphological Matrix. An analytical tool for identifying the key parameters of a task, generating possibilities for each parameter, and then investigating possible combinations ("mixing and matching").	**Evaluation Matrix.** Using specific criteria in a systematic manner to evaluate each of several options or possibilities to guide judgment and selection of options.

Figure 2: The Creative Problem Solver's Basic Toolbox.

Generating Tools

Individuals or groups use these tools to produce many, varied, or unusual possibilities, to develop new and interesting combinations of possibilities, or to add richness and detail to new possibilities. When

using these tools, it is important to follow four basic guidelines (Treffinger, Isaksen, & Stead-Dorval, 2006). These are:

(1) Defer Judgment. When generating options, separate generating from judging, directing effort and energy to producing possibilities that can be judged later.
(2) Seek Quantity. The more options a person or group can generate, the greater the likelihood that at least some of those possibilities will be intriguing and potentially useful.
(3) Encourage All Possibilities. Even possibilities that might seem wild or silly might serve as a springboard for original and powerful new connections.
(4) Look for Combinations. Increase the quantity and quality of options by building on the thinking of others and by seeing new combinations.

Brainstorming is an example of a generating tool and in fact, is probably the most widely known tool (but also often the most misunderstood and misused tool, too). Many people use this term as if it were a synonym for a general conversation, discussion, or exchange of views. It is more accurate, however, to view brainstorming as a specific tool, which facilitates use of four guidelines described above to search for many possible responses to an open-ended task or question. As illustrated in Figure 2, there are also several other tools for generating options (e.g., Treffinger, Nassab, Schoonover, Selby, Shepardson, Wittig, & Young, 2006).

Focusing Tools

The focusing set includes several tools for analyzing, organizing, refining, developing, prioritizing, evaluating, or selecting options. Focusing also involves four broad guidelines (Treffinger, Isaksen, & Stead-Dorval, 2006), which are:

(1) Use Affirmative Judgment. When focusing thinking, examine options carefully but constructively, placing more emphasis on screening, supporting, or selecting options than merely on criticism.
(2) *Be Deliberate.* Consider the purpose or need for focusing: to select a single solution, to rank order or prioritize several options, to examine ideas carefully with very detailed criteria, to refine or strengthen options, or to create a sequence of steps or actions. Each purpose may involve deliberately selecting and applying a specific focusing tool.
(3) Consider Novelty. When seeking a novel or original solution or response, focus deliberately on that dimension when evaluating possible solutions.
(4) Stay on Course. Keep task goals and purposes clearly in sight and ensure the options are evaluated in relation to their relevance and importance for the goal at hand.

As illustrated in Figure 2, there are also several specific focusing tools.

The basic tools for generating and focusing options can be applied independently and easily incorporated into a variety of content or curriculum areas or linked to content standards (e.g., Treffinger, Nassab, Schoonover, Selby, Shepardson, Wittig, and Young, 2004a, 2004b, 2004c).

The Creative Problem Solving Framework

There are also situations in which it is necessary to go beyond the basic tools. For opportunities and challenges that are complex, ambiguous, important, and open-ended, individuals and groups often need to employ a systematic approach to attain clarity about the problem, to generate possible solutions, or to prepare for action and successful implementation. Such complex tasks call for applications of the Creative Problem Solving (CPS Version 6.1™) framework (Isaksen, Dorval, & Treffinger, 2000;

Treffinger, Isaksen, & Stead-Dorval, 2006; Treffinger, et al., 2006). Figure 3 presents our current graphic representation of the CPS model.

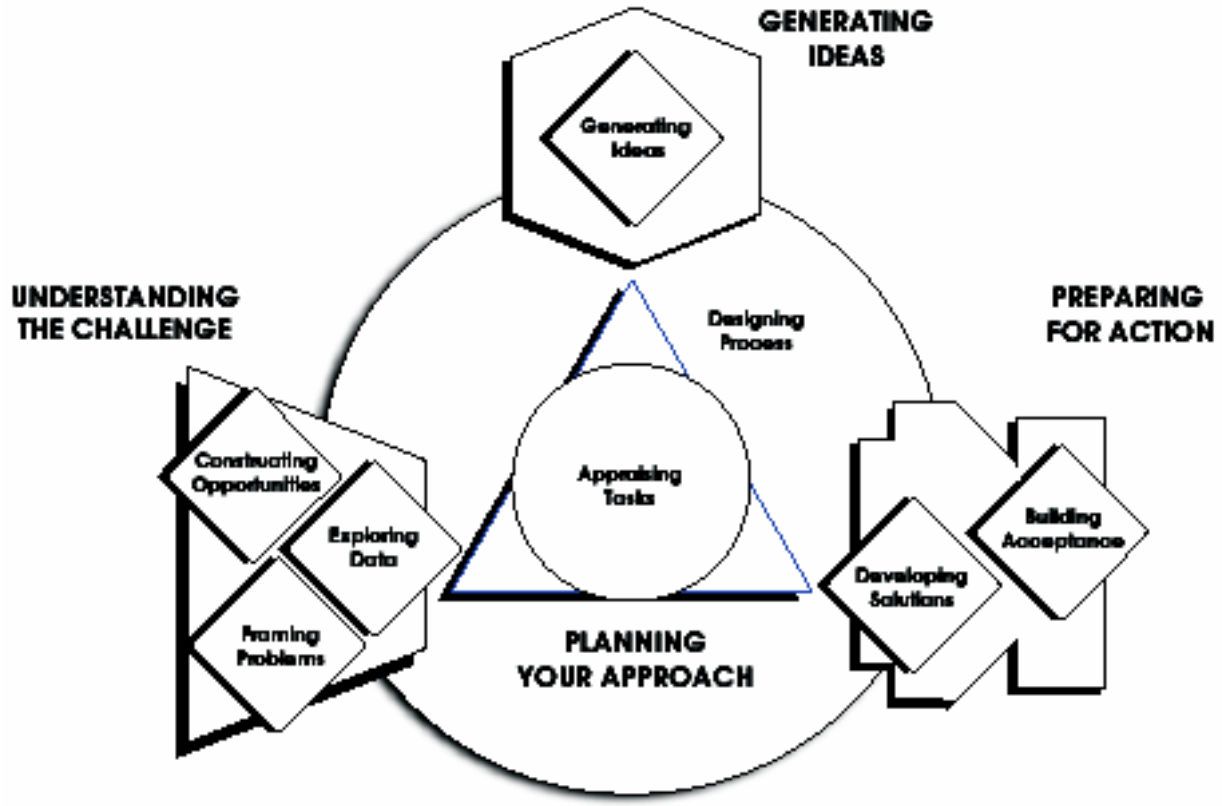

Figure 3: Creative Problem Solving Framework: CPS Version 6.1™
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CPS involves three process components, with six specific stages, and a management component with two stages. The process components and their specific stages are:

Understanding the Challenge. This component involves three stages that: a) contribute to defining a constructive goal or direction for problem solving *(*Constructing Opportunities*);* b) identify the important data involved in the task (Exploring Data); and c) define a specific problem statement to guide one's search for ideas (Framing Problems).

Generating Ideas. This component includes one stage of the same name. Generating Ideas involves searching for many, varied, original, or detailed ideas for dealing with or responding to an open-ended task.

Preparing for Action. This component consists of two stages: a) the Developing Solutions stage helps problem solvers transform ideas into promising solutions, and b) the Building Acceptance stage involves assessing factors that will support or inhibit successful implementation and the development of a specific Plan of Action.

Planning Your Approach. The management component includes two specific stages: a) Appraising Tasks guides individuals or groups in examining people, content, context, and methods in order to assess the appropriateness of CPS for use with a specific task. One important element of

Appraising Tasks involves using information about creativity characteristics (e.g., Treffinger, Young, Selby, & Shepardson, 2002) and problem-solving styles (Selby, Treffinger, Isaksen, & Lauer, 2004) to customize or personalize effective applications of CPS; and b) when CPS is an appropriate choice of methods, the Designing Process stage guides specific choices of components, stages, and tools.

Five Decades of Research and Development on CPS

Today's CPS framework reflects a gradual and incremental evolution in understanding and describing the process, which spans more than five decades. It builds on the theory, research, and rich practical experiences of many individuals and groups. Although CPS represents an approach clearly in the "cognitive, rational" stream illustrated in Figure 1, it now incorporates many contributions from other perspectives as well. A brief survey of its history will illuminate the ways in which CPS has evolved over time, and will also establish a foundation for understanding its implications for practice today as well as for framing future opportunities and directions.

Alex F. Osborn's (1953) writing on brainstorming and creativity served as the foundation for the CPS model. The model's early development was also influenced by other work in the 1950's and 1960's on creativity and creative thinking (e.g., Gowan, 1972; Guilford, 1950, 1967a; Torrance, 1962, 1963, 1965) and broadening conceptions of human intelligence (e.g., Guilford, 1959, 1967b; Taylor, 1963, 1968), clarifying the need for an explicit, well-defined process. In the 1960's, the emphasis on divergent thinking as an important and fundamental element of creativity and with it, a focus on the central role of brainstorming, influenced the early presentations of the CPS model (e.g., Parnes, 1967).

From the late 1960's and into the 1970's, work on CPS focused on elaborating the CPS model for instructional purposes (e.g., Parnes & Noller, 1972a, 1972b, 1973a, 1973b; Parnes, Noller, & Biondi, 1976; Noller, Parnes, & Biondi, 1977), while concurrent research and development on creativity in education also focused on instructional programs and packages to foster creativity (e.g., Callahan, 1978; Guilford, 1975; Stein, 1974, 1975; Torrance, Bruch, & Torrance, 1976; Torrance, 1978, 1979; Torrance & Torrance, 1978; Treffinger & Feldhusen, 1977). Efforts to refine and develop CPS for instructional purposes were also influenced by research on personal characteristics, extending work on CPS outward from the cognitive, rational strand of Figure 1 into more complex efforts to link person and process (e.g., MacKinnon, 1962, 1967, 1978).

As research, development, and practical applications of CPS continued into the 1980's, work began to focus on expanding and refining the CPS model. These efforts included clarifications of the language and structure of CPS (A sixth stage, known as "Mess-Finding", was added, clarifying the importance of problem ownership, giving explicit attention to diverging and converging in each CPS stage, broadening "Fact-Finding" to "Data-Finding", and beginning to expand our awareness of the importance of Person, Situation, and Task (Isaksen & Treffinger, 1985; Treffinger, Isaksen, & Firestien, 1982).

The CPS framework continues to evolve through ongoing research, development, and practice, currently spanning more than 25 countries worldwide, with children, adolescents, and adults. Since the 1990s, research and development on the CPS process framework itself has continued to focus on moving from linear, prescriptive views of CPS to a more natural, descriptive view, in which the CPS components and stages are dynamic and can be selected and applied independently or in concert. Efforts to link person, process, and situation have also moved forward, enhancing our ability to "personalize" or customize process applications for individuals and groups for varied tasks, settings, and circumstances (e.g., Isaksen, Dorval, & Treffinger, 1994, 2000; Isaksen, Lauer, & Ekvall, 1999; Selby, Treffinger, Isaksen, & Lauer, 2004; Treffinger, Selby, Isaksen, & Crumel, 2007).

Educational Applications of CPS

The basic tools, stages, and components of CPS can all be helpful to educators working with students of all ages and across many content areas. In addition, we have found that these same tools may be as important for teachers to apply to tasks, e.g., school improvement or curriculum development (Treffinger, 2002), as they may apply to teaching students in regular education, special education, and gifted education (Treffinger, 2004; Treffinger & Isaksen, 2005; Treffinger, Selby, & Isaksen, in press). Many published resources provide additional information about these tools and their applications for children in the primary grades (e.g., Keller-Mathers & Puccio, 2000), the middle and secondary grades (e.g., Treffinger & Nassab, 2000, 2005), or adults (e.g., Isaksen, Dorval, & Treffinger, 1998).

Instructional resources also exist for teaching students the CPS tools, stages, and components and applying them to real problems and challenges (e.g., Treffinger, Nassab, Schoonover, Selby, Shepardson, Wittig, & Young, 2006). Structured programs such as the Future Problem Solving International Program (www.fpspi.org; see, for example: Tallent-Runnels & Yarbrough, 1992), Destination ImagiNation™ (www.destinationimagination.org; see for example, Bognar, Guy, Purifico, Redmond, Schoonmaker, Schoonover, & Treffinger, 2003; Treffinger & Young, 2002), or inventing programs such as Camp Invention (www.invent.org; see, for example, Saxon, Treffinger, Young, & Wittig, 2003) also provide important opportunities to encourage students to learn and apply CPS to creative challenges and realistic problems of the present and future.

Ongoing Research and Development Initiatives

The commitment to continuous improvement in tandem with innovation in the understanding and application of CPS that characterized the first five decades of research and development continues today.

Although early versions of CPS presented the process as a linear, sequential "step/stage" model, CPS has become a more natural and flexible framework. Current views of the CPS framework led us to call into question the prescriptive, step-by-step lockstep for problem solving (or for scientific method or research and inquiry skills) that has been commonplace from elementary school to graduate school. Experienced problem solvers, like their academic research colleagues, have long questioned simplistic summaries of *the* [fixed, prescribed] steps for problem solving. A contemporary approach to CPS recognizes that an effective process framework must be flexible and dynamic. While initial instruction in CPS may be more linear and sequential in nature, we should also accept the challenge to guide students in more natural, flexible, and dynamic ways of applying CPS. Students can learn to examine a complex, open-ended problem or challenge carefully, assess the relevance and potential value of applying any of the CPS components, stages, or tools, and then proceed accordingly. They can also learn to monitor the effectiveness of their decisions and plans, and to adjust their process choices and strategies as they continue to work toward a solution.

While early research and development emphasized the organization of the process and the formulation of instructional models and materials, we continue to be concerned with the questions of people, context, desired results, and their interactions as they influence the effectiveness or impact of CPS. The question of "what works best, for whom, and under what conditions" led us to examine the nature and role of profiling for CPS (Isaksen, Puccio, & Treffinger, 1993) and to study the interactions of person and process in new ways. We have learned that problem solving style, i.e., one's personal orientation to change, one's preferred manner of processing information, and one's preferred ways of making decisions, has direct and important implications for learning and applying CPS (Selby, Treffinger, Isaksen, & Lauer, 2004; Treffinger, Selby, Isaksen, & Crumel, 2007). We have also learned that the context or climate for creativity in many kinds of groups or organizations will be influenced, positively or negatively, by specific, measurable factors (Isaksen, Dorval, & Treffinger, 2000).

Modern technology also leads to expanding horizons for research and development on the role of technology (e.g., web-based or "distance learning" applications and virtual collaboration and teamwork) in effective process instruction, and to the creation and testing of new resources that enable individuals and teams to learn and apply CPS autonomously.

Implications for Talent Development and Gifted Education

Advances in research, development, and CPS practice in educational settings also relate to several important issues and themes in contemporary gifted education and talent development (Treffinger, 2003b). The implications include:

(1) A working knowledge of CPS helps people discover, apply, and extend their natural strengths and talents. Many contemporary understandings of giftedness and talent emphasize creativity productivity and the person's ability to use knowledge rather than just to recall and reproduce it (e.g., Dunn, Dunn, & Treffinger, 1992; Renzulli, 1978). People, when they know and can use CPS, have a level of confidence and skill that enables them to approach complex tasks and challenges successfully. They are able to pursue their personal interests or passions, and to attain successful results. We have learned from experience, they are often able to exceed expectations based on arbitrary test score categorizations and labels, and to accomplish results that no one would have considered attainable. The power and impact of CPS for discovering and developing talents has also been demonstrated by the work of McCluskey and his associates with at-risk students (e.g., McCluskey, Baker, Bergsgaard, & McCluskey, 2001; McCluskey, Baker, O'Hagan, & Treffinger, 1985; see also, Treffinger, 2003a). CPS presents a powerful set of tools for affirming the uniqueness and talent potentials in all people.

(2) Process tools are "building blocks" for productivity across many talent domains. Some individuals focus their creative efforts in a single talent area or domain, while others are multi-talented, successful and productive in applying their creativity across several domains. CPS tools can be applied successfully in any content or talent area, and so provide a common language for effective communication and a set of functional skills that can serve as a foundation for productivity.

(3) Viewing problems as opportunities and challenges, seeing them as possibilities instead of obstacles, makes challenging visions attainable. CPS contributes to a sense of purpose and direction in life and work. Published resources offering exercises and activities keyed to each of the CPS processes may be useful and valuable in the early stages of instruction. However, it is important to understand such contrived instructional exercises and activities do not, in and of themselves, constitute important ends or outcomes. The more important goal of both process instruction and talent development is ultimately to enable students improve their ability to deal creatively and successfully with high-level real problems and challenges. The most powerful applications of CPS for students involves them carrying out their solutions as they deal with real life opportunities and challenges rather than hypothetical solutions to contrived exercises.

The challenge of engaging students in powerful, real-life applications of CPS is especially significant in the maturing field of gifted and talented education. Programming for talent development today involves moving beyond "pull out" programs where there may be over-reliance on divergent thinking exercises and activities, toward more powerful and sustained opportunities for students to engage in more complex and challenging investigations (e.g., Renzulli, Gentry, & Reis, 2003; Treffinger, Young, Nassab, & Wittig, 2004). Students benefit from the engagement and commitment to action that result from opportunities to carry out first-hand inquiry, and from involvement in problems and challenges for which they will actually carry out solutions. The Future Problem Solving Program's "Community Problem Solving" component illustrates one powerful example of the difference between learning about problems and actually being real-life problem-solvers.

4. CPS provides a vehicle that enables people to move easily between personal or individual creative effort and effective collaboration and teamwork. Giftedness and talents are usually viewed as inherent personal strengths and individuals can certainly apply CPS tools in their own personal creative efforts. However, given the importance of teamwork and collaboration are realities of today's world CPS tools are also powerful methods for group *productivity*.

5. *There can be linkages between CPS and today's emphasis on standards, but CPS also challenges us to look to higher levels.* Current emphasis on "standards" and "standards-based" instruction, which too often seem to focus only on lower-level thinking and testing, can actually provide an opportunity for extending applications of CPS tools to academic content areas. It is readily possible to link many generating and focusing tools with content standards (e.g., Treffinger, Nassab, Schoonover, Selby, Shepardson, Wittig, & Young, 2004a, 2004b, 2004c). While content standards in any curriculum area can be treated as topics to be "covered" through memorization and drill, they can be made more challenging and stimulating when specific thinking tools are used to address the same standards. Providing instruction in CPS tools for all students imparts a "process foundation" high-ability students can use as a springboard for more complex learning and problem solving. In addition, as all students have opportunities to learn and apply basic CPS tools, we may begin to see strengths and talents in students among whom such abilities may not previously have been evident. A contemporary approach to teaching and applying CPS in programming for talent development involves a rich tapestry of cognitive skills and tools, personal characteristics and styles, a supportive environment, attention to outcomes that extend beyond recognition and recall, and opportunities to work on real-life problems and challenges.

Conclusion

Helping students to learn and apply practical tools for generating ideas and for focusing their thinking, in addition to applying the components and stages of CPS, will enhance student learning in powerful ways that extend beyond memorization and recall. Even in times in which there is great emphasis on basic learning and doing well on standardized tests— indeed, particularly in such times— it remains important to balance the emphasis between process and content in teaching and learning. Students, competent in the basics of productive thinking and CPS as well as the basics of content areas will be lifelong learners, creators, and problem solvers able to live and work effectively in a world of constant change. They will be learners prepared for the important challenges of our world today— a world in which we have a high need for creative efforts and accomplishments. Creative problem solvers are important to our world today for many reasons. There are symphonies to compose, novels to write, works of art to complete, diseases to cure, hunger to eliminate, and justice to attain. We need new generations of people care about, and for each other and who care about, and for our planet. And most of all, instead of a world of hatred and war, we desperately need a world of respect and peace. CPS provides us with tools that will help us dare to imagine that another world is, indeed, possible.

References

Bognar, R., Guy, M., Purifico, S. B., Redmond, L., Schoonmaker, J., Schoonover, P., & Treffinger, D. (2003). Practical tools for creative and critical thinking: Applications for Destination ImagiNation®. Glassboro, NJ: Destination ImagiNation, Inc.

Callahan, C. M. (1978). Developing creativity in the gifted and talented. Reston, VA: Council for Exceptional Children.
Dunn, R., Dunn, K., & Treffinger, D. J. (1992). Bringing out the giftedness in your child. New York: John Wiley.
Gowan, J. C. (1972). The development of the creative individual. San Diego, CA: R. Knapp.
Guilford, J. P. (1950). Creativity. American Psychologist, *5,* 444-454.
Guilford, J. P. (1959). Three faces of intellect. American Psychologist, 14, 469-479.
Guilford, J. P. (1967a). Creativity: Yesterday, today, and tomorrow. Journal of Creative Behavior, 1 (1), 3-14.
Guilford, J. P. (1967b). The nature of human intelligence. New York: McGraw-Hill.
Guilford, J. P. (1975). Varieties of creative giftedness, their measurement and development. Gifted Child Quarterly, 19, 107-121.
Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (1994). Creative approaches to problem solving. Dubuque, IA: Kendall-Hunt.
Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (1998). Toolbox for creative problem solving. Williamsville, NY: Creative Problem Solving Group, Inc.
Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2000). Creative approaches to problem solving (2nd Ed.). Dubuque, IA: Kendall/Hunt.
Isaksen, S. G., Lauer, K. J., & Ekvall, G. (1999). Situational Outlook Questionnaire: A measure of the climate for creativity and change. Psychological Reports, 85, 665-674.
Isaksen, S. G., Puccio, G. J., & Treffinger, D. J. (1993). An ecological approach to creativity research: Profiling for Creative Problem Solving. Journal of Creative Behavior, 27 (3), 149-170.
Isaksen, S. G. & Treffinger, D. J. (1985). Creative problem solving: The basic course. Buffalo, NY: Bearly Limited.
Isaksen, S. G., & Treffinger, D. J. (2004). Celebrating 50 years of reflective practice: Versions of Creative Problem Solving. Journal of Creative Behavior, 38 (2), 75-101.
Keller-Mathers, S., & Puccio, K. (2000). Big tools for young thinkers. Waco, TX: Prufrock Press.
MacKinnon, D. W. (1962). The nature and nurture of creative talent. American Psychologist, 17, 484-495.
MacKinnon, D. W. (1967). Assessing creative persons. Journal of Creative Behavior, 1 (3), 291-304.
MacKinnon, D. W. (1978). In search of human effectiveness. Buffalo, NY: Bearly Limited.
McCluskey, K. W., Baker, P. A., Bergsgaard, M., & McCluskey, A. (2001). Creative problem solving in the trenches: Interventions with atrisk populations. (Research monograph #308). Orchard Park, NY: Creative Problem Solving Group, Inc.
McCluskey, K. W., Baker, P. A., O'Hagan, S. C., & Treffinger, D. J. (Eds.). (1995). *Lost prizes: Talent development and problem solving with at-risk students.* Sarasota, FL: Center for Creative Learning.
Noller, R. B., Parnes, S. J. & Biondi, A. M. (1977). Creative actionbook. New York: Charles Scribner's Sons.
Osborn, A. F. (1953). Applied imagination. New York: Scribners.
Parnes, S. J. (1967). Creative behavior guidebook. New York: Charles Scribner's Sons.
Parnes, S. J. & Noller, R. B. (1972a). Applied creativity: The creative studies project, Part I - The development. Journal of Creative Behavior, 6, 1-22.
Parnes, S. J. & Noller, R. B. (1972b). Applied creativity: The creative studies project, Part II - Results of the two-year program. Journal of Creative Behavior, 6, 164-186.
Parnes, S. J. & Noller, R. B. (1973a). Applied creativity: The creative studies project: Part IV—Personality findings and conclusions. Journal of Creative Behavior, 7, 15-36.
Parnes, S. J. & Noller, R. B. (1973b). Toward supersanity: Channeled freedom. Buffalo, NY: DOK.
Parnes, S. J., Noller, R. B. & Biondi, A. M. (Eds.). (1976). Guide to creative action. New York: Charles Scribner's Sons.
Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. Phi Delta Kappan, 60, 180-184.
Renzulli, J. S., Gentry, M., & Reis, S. (2003). Enrichment clusters. Mansfield Center, CT: Creative Learning Press.

Saxon, J. A., Treffinger, D. J., Young, G. C., & Wittig, C. V. (2003). Camp Invention®: A creative, inquiry-based summer enrichment program for elementary students. Journal of Creative Behavior. 37 (1), 64-74.
Selby, E. C., Treffinger, D. J., Isaksen, S. G., & Lauer, K. J. (2004). The conceptual foundation of VIEW: A tool for assessing problem solving style Journal of Creative Behavior, 38 (4), 221-243.
Stein, M. I. (1974). Stimulating creativity. Volume I: Individual procedures. New York: Academic Press.
Stein, M. I. (1975). Stimulating creativity. Volume II: Group procedures. New York: Academic Press.
Tallent-Runnels, M. K. & Yarbrough, D. W. (1992). Effects of the future problem solving program on children's concerns about the future. Gifted Child Quarterly, 36 (4), 190-194.
Taylor, C. W. (1963). Multiple talent approach. Instructor, 27, 142 + 144-146.
Taylor, C. W. (1968, December). Be talent developers as well as knowledge dispensers. Today's Education, pp. 67-69.
Torrance, E. P. (1962). Guiding creative talent. Englewood Cliffs, NJ: Prentice-Hall.
Torrance, E. P. (1963). Education and the creative potential. Minneapolis, MN: University of Minnesota Press.
Torrance, E. P. (1965). Rewarding creative behavior. Englewood Cliffs, NJ: Prentice-Hall.
Torrance, E. P. (1978). Giftedness in solving future problems. Journal of Creative Behavior, 12 (2), 75-86.
Torrance, E. P. (1979). The search for Satori and creativity. Buffalo, NY: Bearly Limited.
Torrance, E. P., Bruch, C. B., & Torrance, J. P. (1976). Interscholastic futuristic creative problem solving. Journal of Creative Behavior, 10 (2), 117-125.
Torrance, E. P. & Torrance, J. P. (1978). Future Problem Solving: National interscholastic competition and curriculum project. Journal of Creative Behavior, 12 (2), 87-89.
Treffinger, D. J. (2000a). Creativity, creative thinking, and critical thinking: In search of definitions. Sarasota, FL: Center for Creative Learning.
Treffinger, D. J. (2000b). Dimensions of creativity. Sarasota, FL: Center for Creative Learning.
Treffinger, D. J. (2001). The importance of creative learning and problem solving. DImagiNings (Destination ImagiNation newsletter), 2 (2), 1+10,12.
Treffinger, D. J. (2002). Using creative problem solving in school improvement. Sarasota, FL: Center for Creative Learning.
Treffinger, D. J. (2003a). CPS for positive achievement. Creative Learning Today, 12 (3), 1+8-9.
Treffinger, D. J. (2003b). Talent development and creativity. Creative Learning Today, 12 (4), 1-2.
Treffinger, D. J. (2004). Gifted education and creativity: Three decades of inquiry and development. In: D. J. Treffinger (Ed.). Creativity and giftedness. Thousand Oaks, CA: Sage/Corwin.
Treffinger, D. J. (in press). Creativity and creative problem solving: Preparing productive thinkers for tomorrow's world. Educational Leadership, February 2008.
Treffinger, D. J. & Feldhusen, J. F. (1977). Creative thinking and problem solving in gifted education. Dubuque, IA: Kendall/Hunt.
Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: History, development, and implications for gifted education and talent development. Gifted Child Quarterly, 49, 342-353.
Treffinger, D. J., Isaksen, S. G., & Firestien, R. L. (1982). Handbook of creative learning. Honeoye, NY: Center for Creative Learning.
Treffinger, D. J., Isaksen, S. G., & Firestien, R. L. (1983). Theoretical perspectives on creative learning and its facilitation: An overview. Journal of Creative Behavior, 17 (1), 9-17.
Treffinger, D. J., Isaksen, S. G. & Stead-Dorval, K. B. (2006). Creative problem solving: An introduction. [4th Ed]. Waco, TX: Prufrock Press.
Treffinger, D. J., & Nassab, C. A. (2000). Thinking tools lessons. Waco, TX: Prufrock Press.
Treffinger, D. J., & Nassab, C. A. (2005). Thinking tool guides. Sarasota, FL: Center for Creative Learning.
Treffinger, D. J., Nassab, C. A., Schoonover, P. F., Selby, E. C., Shepardson, C. A., Wittig, C. V., & Young, G. C. (2004a). Thinking with standards: Preparing for the future. (Elementary ed.). Waco, TX: Prufrock Press.

Treffinger, D. J., Nassab, C. A., Schoonover, P. F., Selby, E. C., Shepardson, C. A., Wittig, C. V., & Young, G. C. (2004b). Thinking with standards: Preparing for the future. (Middle ed.). Waco, TX: Prufrock Press.

Treffinger, D. J., Nassab, C. A., Schoonover, P. F., Selby, E. C., Shepardson, C. A., Wittig, C. V., & Young, G. C. (2004c). Thinking with standards: Preparing for the future. (Secondary ed.). Waco, TX: Prufrock Press.

Treffinger, D. J., Nassab, C. A., Schoonover, P. F., Selby, E. C., Shepardson, C. A., Wittig, C. V., & Young, G. C. (2006). The CPS Kit. Waco, TX: Prufrock Press.

Treffinger, D. J., Selby, E. C., & Isaksen, S. G. (in press). Understanding individual problem solving style: A key to learning and applying creative problem solving. Learning and Individual Differences.

Treffinger, D. J., Selby, E. C., Isaksen, S. G., & Crumel, J. H. (2007). An introduction to problem-solving style. Sarasota, FL: Center for Creative Learning.

Treffinger, D. J. & Young, G. C. (2002). Building creative excellence. Glassboro, NJ: Destination ImagiNation, Inc.

Treffinger, D. J., Young, G. C., Nassab, C. W., & Wittig, C. V. (2004). Enhancing and expanding gifted programs: The levels of service approach. Waco, TX: Prufrock Press.

Treffinger, D. J., Young, G. C., Selby, E. C., & Shepardson, C. A. (2002). Assessing creativity: A Guide for educators. Storrs, CT: National Research Center on the Gifted/Talented, University of Connecticut (RM 02170).

About the Author

Prof. Dr. Donald J. Treffinger, President of the Center for Creative Learning, Inc., in Sarasota, Florida, is an internationally known researcher, writer, teacher, and presenter in the area of creativity and Creative Problem Solving, as well as in the area of gifted and talented education. He has authored or co-authored more than 60 books and monographs, including Creative Problem Solving: An Introduction and Creative Approaches to Problem Solving, and more than 300 articles. Dr. Treffinger has served as a member of the faculty of many colleges and universities, including Purdue University, the University of Kansas, and Buffalo State College. He has been the recipient of the National Association for Gifted Children's Distinguished Service Award and the E. Paul Torrance Creativity Award. In 2005, Dr. Treffinger received the Risorgimento Award from Destination ImagiNation, Inc., and the International Creativity Award from the World Council for Gifted and Talented Children. Dr. Treffinger has served as a reviewer for many professional journals, as editor of the Gifted Child Quarterly (1980-84) and as Editor-in-Chief of Parenting for High Potential, NAGC's quarterly magazine for parents (2000-07).

New Directions in Gifted and Talented Education

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Abstract

In an era of global market and media techniques, students need to grasp international realities and communicate effectively with people of other cultures. Multicultural emphasis and foreign language learning should become an integral part of gifted education.

The motivation issue deserves particular attention. Educational professionals must become more sensitive to the variety of motivations that contribute to the development of individuals with considerable expertise. They must support the commitment needed for the long training that is necessary in every field. They should also cultivate personality characteristics that link to creative performance: tolerance to ambiguity, moderate risk taking, willingness to surmount obstacles and persevere, willingness to grow, open-mindedness, and self-esteem. More room is also needed in programming for social and emotional well-being.

A second challenge concerns establishment of some standards for viable gifts and talents development programs that will integrate current and future knowledge about brain functioning, as well as developmental processes by which abilities interact with environmental factors.

Instructional methods used might be refined for a specific gift or talent and developmental period, and more research will be needed to validate the efficacy of those instructional methods.

This paper will shed some light on new directions in gifted education. It is important to look critically at both the past as well as the present situation and to decipher the future educational trends. This field is entering a period of intense change in terminology, ability identification, programmes, teachers' education and training, classroom practices, funding, and introduction of educational technology.

This paper has encountered many of the major issues to face educators and those addressing gifted education over several decades. The aim is to offer a summary of these ideas, which can be divided into **seven** categories: gifts or talent as entities, the philosophy of gifted education, identification, programmes, educational technology and the "digital world', future research, and challenges that lie ahead.

This presentation does represent many of the major issues to face educators of gifted and talented students, and those concerned about them over several decades.

i. But, what are the questions that are should be addressed?
ii. Do we have the necessary tools to do our job well?
iii. If the tools are not there, can we create them, and can we convince public decision makers to help us create them?
iv. Is it any wonder that we have been unable to impact the major engines of change our societies?
v. What happen when gifted programmes are eliminated and gifted students are put back into the general education programme?
vi. Are we a support system for general education, or a separate entity?

Keywords: Gifted education; computerised provision; creativity; digital world; educational reform; enrichment; extracurricular; identification; intellectual process; metacognition; productive thinking; rationale; special provisions; virtual learning environment.

Introduction

The field of gifted and talented education is entering a period of intense change in ability identification, programs, teachers' education and training, classroom practices, funding, introduction of educational technology, and terminology.

In the last three decades, educational movements stressing equity have resulted in the elimination or reduction of programs and special provisions designed to meet the special needs of gifted and talented students in many countries including the USA.

If these programs and provisions are to survive attacks from many quarters, and if gifted education is to advance, it is essential to question some of our paradigms or practices and to develop new directions.

This presentation does represent many of the major issues to face educators of gifted and talented students, and those concerned about them over several decades.

But, what are the questions that are should be addressed?

- Do we have the necessary tools to do our job well?
- If the tools are not there, can we create them, and can we convince public decision makers to help us create them?
- Is it any wonder that we have been unable to impact the major engines of change our societies?
- What happen when gifted programmes are eliminated and gifted students are put back into the general education programme?
- Are we a support system for general education, or a separate entity?

These are issues of some consequence to our future as a profession, and this presentation attempts to offer a few ideas which were divided into **seven** categories, including: gifts or talent as entities, philosophy of gifted education, identification, programs, educational technology and the "digital world', future research, and challenges that lie ahead.

(1) Gifts and Talents as Entities:

Some advances were achieved and some advances can be expected in understanding of brain functioning, intellectual processes (problem solving, decision making, meta-thinking, and so forth), and their relationship to the development of gifts and talents, particularly the developmental processes by which abilities and personality interact with environmental factors to create gifted and talented individuals. Although the role of genetics has been clearly established in the development of giftedness, especially in intellectual development. More research is needed to gain a better understanding of the role of environmental settings and culture (educational practices, values, identity, attitudes, societal rules, and so forth) on gifts and talents development may further redefine what we refer to as "gifted" or "talented" individuals, and the instructional methods applied to identify, develop, or enhance their potential.

In agreement with Cohen (2003): "A unified theory of creative intelligence must address how something new is created, how the self and a field of endeavour are transformed, and the type of giftedness found in adults. I believe that our efforts should focus on creativity as the end point, and we should work backward to understand how to support its development in children, so that they can become productive, creative adults "(pp.35-36).

Cohen (2003) pointed out that: "theories of creativity should be the sources for understanding both intelligence and optimal development (giftedness), as well as creativity. We need to understand where giftedness can lead [and to] focus on mature creativity as an endpoint" (p. 66)

In the light of this argument, we are interested in how the brain supports creative intelligence involving representations and relationships in general and we are seeking evidence for the neural correlates of such cognitive behaviours and cognition amplification in particular.

Teaching to maximise a student's intellectual abilities through the challenge of high-quality creative output. Creative output is conceptualised by Urban (2003) as incorporating:

- the creation of a new, unusual, and surprising product; and/or
- a solution to an insightfully and sensitively perceived problem or of a given problem whose implications have been perceived sensitively; and/or
- a new solution-gestalt, which is elaborated as a product or responds in a product in whatever shape or form; and/or
- a communication that may be grasped directly via the senses or via symbolic representation and experiences by others as meaningful and significant (Yamin, 2002);

When we focus on what we mean by cognitive behaviour, we need to consider the various levels of thought that humans are capable of. The complexity of the cognitive process becomes evident. A four-part model has been developed as a global view of thinking which includes four components, including: cognition (the skills associated with essential and complex processes); Metacognition (the skills associated with the learner's awareness of his or her own thinking); Epistemic cognition (the skills associated with understanding the limits of knowing, as in particular subject matter and the nature of problems that thinkers can address); and Conation (the striving to think clearly, including personal disposition, and to develop and consistently use rationale attitudes and practices).

By asking questions, selecting terms, clarifying ideas and processes, providing data, and withholding value judgments, teachers can stimulate and enhance the thinking of their students in general and of their gifted and talented students in particular.

A high quality teacher channels abilities into competencies and competencies into expertise by introducing a series of sufficiently challenging experiences that can be practiced and mastered.

Several important research questions about the relationship between teacher education and student thinking remain to be investigated. They offer fertile opportunities for action research projects shared by scholars around the world within institutional partnership.

(2) Philosophy of Gifted Education:

Conflicting educational philosophies lie at the heart of many problems in getting appropriate education for the gifted and talented students.

I wish to stress that educational equity will be attained when all students are nurtured so as to perform up to their own level of ability, taking into consideration their interests, learning styles and attitudes.

A step backwards might be necessary in regard to philosophy or values promoted in gifted education. We may call into question the "star system," or the emphasis put in gifted education on "exceptional achievement," "unusual success," or "leaders of tomorrow." We ought to pay attention to the very high expectations or inaccessible models we expect gifted students to follow. Only a small minority of today's gifted students will become the "stars" of tomorrow. Without clipping students' wings, we must cultivate realistic expectations. Concurrently, with regard to the effort and commitment required to develop high-level talent (Tannenbaum, 1997), we must promote values of patience and persistence. This is a big challenge in every society.

Philosophy and practice in gifted education reviewed are emphasizing the need for a comprehensive planning policy which takes into account the total experience of the gifted student and the need for a differentiated curriculum. Gifted education should include basic skills, general curriculum, talent development, and interpersonal relationships and values.

Gifted education policies should work toward the matching of school programming to gifted students' developmental levels, on a subject-specific basis, at the minimum ensuring that students are not required to attend classes covering curriculum they have already mastered.

It is very important to point out that gifted education becomes one of the major sciences (e.g., physics, chemistry) and there is a need for international institutional collaboration that enables us to face the future challenges, and to achieve our aims and objectives in the light of our global vision and values.

This implies that we should have cross-cultural studies that address wide range of: cultures; values; levels of education; fields of study; methods of identification; types of gifted programmes, etc.).

(3) Identification:

A great deal of work has been invested during the last three decades to develop identification procedures and instruments that are culturally and linguistically appropriate. However, as long as the broad spectrum of giftedness is not addressed in our programming or services, multiple criteria identification procedures will remain a meaningless task because many schools and educational systems employed that process inappropriately.

Despite advances in defining gifted children, intelligence testing still plays a large role. Today, most experts generally define a gifted child as one who acquires and processes information and solves problems at a younger age and a faster rate than others. But that's just the tip of the iceberg.

It is essential to bear in mind that the purpose of identification is not to label students, but to find and develop their latent and manifest potential.

In Sum, what about the past, the present, and the future of the identification process?

The Past: (Single Criterion, based on classical Theories, very conservative, and employed cultural biased screening and identification tools).

The Present: (Multiple criteria including: I.Q.; Creativity; achievement; interests, learning styles, attitudes; behavioural characteristics; Wisdom; …and other personality and environmental factors), based on modern theories, more liberal, employing wide range of cultural free identification and screening tools, and offers detailed comprehensive profiles.

The Future: Online (or computerized) reliable and valid measures and tools; online (or computerized comprehensive cultural free multiple criteria identification process (e.g., Renzulli Learning; Giftedness & Creativity Forum; and the Computerised RBCSS).

(4) Gifted Programmes:

Theorists in the field of gifted education such as Benjamin Bloom, Abraham Tannenbaum, June Maker, François Gagne, Sandra Kaplan, Joseph Renzulli, Howard Gardner and others have sought to advise on curriculum models (and modifications) which would better suit the needs of these students. They have argued that the ideal curriculum for gifted students therefore should be presented in a way which include:

- emphasis on higher level thinking skills and problem solving;
- abstractness and complexity;
- originality, novelty, unpredictability;
- freedom of choice and ability to individualise learning;
- self-directed discovery and experimentation as focal points of learning;
- open-endedness and a non-judgemental ('safe') response to student explorations;

- inter-disciplinary learning, making connections across traditional boundaries;
- an opportunity to explore topics in a multiplicity of ways;
- opportunities for self-evaluation and metacognitive assessment;
- process, product and content co-existent; and
- a combined enrichment and acceleration.

Although future actions should be based on current knowledge in the field, answers to the educational needs of gifted and talented students should be more global and touch many sectors: regular and special classrooms, local and specialized schools, instructional methods, curriculum, coordination of stakeholders (educators, parents, other members of the community), resources, learning environments, expectations, assessment, and so forth. Schools should also develop multiple program options to serve the diverse needs of the heterogeneous population of students with gifted potential. Music, sports, sciences, technology, and mathematics constitute valuable options, but more opportunities regarding humanities, literature, and arts should be implemented.

Parallel with efforts being made for developing enriched curricula for all, educators must create, promote, and maintain educational measures uniquely appropriate for gifted education.

In the future, measures that are effective with both gifted students (Shore & Delcourt, 1996) and with general education should be integrated into the regular school curriculum (Richert, 1997). These measures include: enrichment; inquiry; discovery; professional end products as standards; computer science; independent projects; individualized learning; development of thinking skills; such as problem solving, problem finding, and decision making; and creativity. This approach will "kill four birds with one stone." More specifically, using strategies to develop potential in the classroom will:

(1) improve the quality of education for all students instead of a small minority;
(2) satisfy the educational needs of many gifted students;
(3) create opportunities in which the diverse capabilities of students, whatever their background or characteristics, can be supported and developed; and
(4) provide students with more chances to manifest their abilities or talents in the classroom.

We must also take advantage of World Wide Web (www) technologies for offering special services in the regular classroom in schools geographically isolated or with limited instructional resources. "Tele-learning" and "tele-mentoring" will probably increase access to enrichment provisions for gifted and talented students (e.g., Renzulli Learning, the Virtual School for the Gifted (VSG), etc).

In an era of global market and media techniques, students need to grasp international realities and communicate effectively with people of other cultures. Multicultural emphasis and foreign language learning should become an integral part of gifted education.

The motivation issue deserves particular attention. Educational professionals must become more sensitive to the variety of motivations that contribute to the development of individuals with considerable expertise. They must support the commitment needed for the long training that is necessary in every field. They should also cultivate personality characteristics that link to creative performance: tolerance to ambiguity, moderate risk taking, willingness to surmount obstacles and persevere, willingness to grow, open-mindedness, and self-esteem (Sternberg & Lubart, 1993). More room is also needed in programming for social and emotional well-being.

A second challenge concerns establishment of some standards for viable gifts and talents development programs that will integrate current and future knowledge about brain functioning, as well as developmental processes by which abilities interact with environmental factors.

Instructional methods used might be refined for a specific gift or talent and developmental period, and more research will be needed to validate the efficacy of those instructional methods.

Forming a support network to improve program quality and publicize the need for minimum standards is also necessary.

In Sum, what about the past, the present, and the future of gifted programmes?

The Past: very limited number of models including enrichment.

The Present: a number of programmes and special provisions are available to meet the special needs of the gifted and talented, including: different types of enrichment; acceleration; mentorship; leadership; learning about; in school, in/ out school, and out of the school weekend programmes and summer programmes.

The Future: the future will witness a number of programmes and special provisions designed and developed for the gifted and talented, including: telementoring; online enrichment clustering; e-learning and virtual environments; teaching for thinking (Creative Thinking skills; Critical Thinking Skills; and Future Problem Solving); Global Networks and Forums for gifted and talented students, teachers, parents and scholars aimed at sharing: knowledge, experience, interests, values and outcomes and benefits.

The optimal educational response to exceptionally high-level development is to move toward providing a wide range of creatively flexible curriculum adaptations that take into account variability in gifted students' abilities, interests, learning styles and attitudes.

By the year 2010, the "Global Virtual Schools for the Gifted and Talented Students" will be part of our educational system.

(5) Educational Technology & the "Digital World":

Technology has often been considered as an agent of educational change. However, the likelihood of technology fostering such change is greatly increased when cognitive theories guide design. …"there is increasing awareness not only of the way technology shapes human activity but also the way human cognition is shaped by its evolved capacity to profit from cultural tools" (Preiss, 2005: 203), and Dillon (2005) asserted that: "we must enter this world with a commitment to explore. … As we enter a new digital world we are challenged and yet blessed to be part of this transition." (p. 315). But

- What is the impact of different technologies on human abilities?
- How does technology enhance or limit human intellectual functioning?
- How can we design computerised provisions and programmes that foster intellectual growth?
- How does technology mediate the impact of cultural variables on human intellectual functioning?

There are many ways in which information technology is being, or could be used to amplify cognition. Nickerson (2005) listed a number of examples, including: facilitation of idea generation via computer-assisted brainstorming; knowledge assessment; debiasing: antidotes to common biases and illogicalities; value discovering: often we do not know our own values and their relative weight, as they pertain to choice situations, but they can be inferred from expressed preferences between hypothetical alternatives; facilitation of identification of possible state of the world and a decision alternatives; problem solving help; prediction: provision of runable "what if" models that let a decision maker explore possible (probable) consequences of possible actions; error prevention; negotiation and conflict resolution; facilitating probabilistic reasoning; and planning, forecasting, and budgeting.

Nickerson (2005) discussed the risks in cognition amplification, and pointed out that "… there are risks involved in the development of cognition amplification tools. There is, for example, the possibility of cognitive technology being used in "bad" way for propaganda, brainwashing, and manipulation, use of the Internet to facilitate identity theft, distribution of child pornography, false advertising, and other forms of cyber crimes is already a reality and appears to be on the increase. Tools that greatly increase the accessibility of information also sometimes facilitate the invasion of privacy. But such is the price of progress; any tool can be used for bad purposes as well as good, and the more powerful the tool, the greater the potential in both cases" (p: 23).

In the "Digital World" we are moving towards a mobile teaching and Virtual Learning Environments. This world adds another layer of complexity. The current advances enable data to follow us, and to be encrypted, minimized, sent wirelessly, shared and copied effortlessly.

Renzulli Learning System

Renzullilearning system is a completely new adaptation of work that is based on almost 30 years of research designed to help students learn more about their own interests and talents. Taking advantage of state of the art technology, Renzulli Learning searches out an enormous amount of information on the web to find enriching, challenging differentiated enrichment opportunities for all students in their areas of interest and choice. Renzulli Learning is based on research conducted by Prof. Dr. Joseph Renzulli and Prof. Dr. Sally Reis of the University of Connecticut's Neag School of Education. This research suggests that students achieve at higher levels when they pursue topics and activities of personal interest and that enrichment can be provided to all students through the use of Renzullilearning.

The Renzullilearning system is a system for: school's administration, teachers, students and parents that is used to identify and develop the gifts and talents of all children by providing easily accessible high quality materials and resources.

The Renzullilearning system is an exciting new on-line comprehensive system that matches students' abilities, interests, learning styles and preferred modes of expression to many different opportunities designed to provide enriched, challenging learning. All of the activities and options in the Renzullilearning system are based on The Enrichment Triad Model, which has been cited as the most widely used plan for enrichment and talent development in the world. In the Renzullilearning system, the Renzulli Profiler^{TM} generates an individual profile for each student. Then an individualized Enrichment Differentiation collection of Internet and downloadable resources are made available.

Al-Ahliyyah School for Girls in Jordan is the first school, outside the United States of America, that employed effectively Renzulli Learning Systems. This school is attempting to invest in the latest development in virtual learning environments in particular and educational technology in general.

In order to accommodate for the needs of students across many different levels of academic achievement, many teachers have adopted a variety of within-classroom strategies referred to as differentiated instruction. The Renzullilearning system can help teachers access, with minimal cost or time, a wealth of opportunities to provide appropriate differentiation activities for students of all levels of achievement and abilities.

(6) Future Research:

What can we expect to see at the start of the 21st century as issues in the education of the gifted and talented students?

There is a good reason to expect continued research and instructional interest in the fate of gifted students in this decade (Gallagher, 1997).

Surely some continued advances can be expected in the understanding of intelligence itself, which may further redefine what we refer to as gifted students.

Decision making processes and "metacognition" (which refers to one's knowledge concerning one's own cognitive process and products) are sure to become under more extensive investigation.

Some additional and different measures of intelligence, built on information processing models also are likely to emerge.

Mapping the sequential and developmental process by which intelligence interacts with environmental factors to create a superior-thinking individuals is a difficult task ahead of us.

In addition,

- the Future Problem Solving Program itself is rich in possibilities for research. Little has been done, and there is so much more that we need to know. We need to find out how much practice is needed, how much time should be allowed in bowl competitions, how participation influences future achievement and creativity in everyday life, and much more. We already know that it improves creativity as measured by creativity tests. Longitudinal studies should be planned;
- other factors such as motivation, persistence, courage, and loving what one is doing become more important than ability. Torrance called these the "beyonder" characteristics (Torrance & Safter, 1999). We need to know more about these characteristics;
- interest in multicultural influences accelerated as we approached the 21st century. In fact, the 21st century may be known in history as the multicultural century. It certainly promises to be such insofar as developments regarding creativity is concerned. Interest in these multicultural influences on creativity has been slow to develop (Meador, 1999);
- there's a need for more research on personality, especially with a biographical inventory (Cramond, 2001);
- there should be more research on creativity assessment like that done with the multiple intelligences by Gardner. That is a blind spot (Cramond, 2001); and
- there is a need for more research on creative products and environments (Cramond, 2001).

(7) Challenges that Lie Ahead:

What challenges lie ahead in providing appropriate differentiated education for all gifted and talented students?

The major barrier to overcome remains the modification of attitudes toward gifted education, particularly for intellectually gifted students.

The advocates of gifted education might need to consider a change of perspective. Instead of being centered on the raw material (giftedness), they should direct their energy toward the creative products.

We ought to pay special attention to staff development (all teachers and teachers of gifted education). There are many gaps in personnel preparation in gifted education (Gallagher, 1997; Parker, 1996). All teachers must master methods that individualize teaching (learning centers, independent studies, individualized units, compacting, "Tele-learning," and so forth), and methods that develop higher order thinking skills in cognitive, creative, socio-affective, habits of mind, and ethical realms. Teachers must

also be acquainted with different ways to enrich the regular curriculum. This approach will no doubt improve the quality of education for all students.

The training can also include skills in guiding the social and emotional development of gifted youth. Finally, all teachers will need more time in the school setting for planning differentiated curriculum.

In the context of educational reform, we encourage gifted educators to:

- foster continuous improvement to contribute to improved education for all students;
- collaborate with other professionals;
- increase connections between studies of giftedness and mainstream psychological and educational research, taking into account that studies of giftedness have contributed to mainstream theory and may play special roles in theory development;
- set high learning standards and expectations for all students;
- structure new roles for gifted education personnel, and
- integrate gifted education with general education in meaningful ways.

Conclusion

The future of the field of giftedness appears to involve finding the balance between giftedness as a unique entity and as a part of existing fields. This dual perspective would align the necessary supports (e.g., funding for gifted programs) from various political, educational, and societal groups that play critical roles in improving the field of giftedness.

More importantly, this would lead to securing the field's sustainability. We need to collaborate with others, both within our field and outside our field, to communicate an informed understanding of giftedness in a variety of contexts such as research and educational practices.

We are certainly part of a potential support system for general education, but we also should have a degree of separation that helps develop students who will be the top rank of their professions and fields of interests.

We need to recognize ourselves for significant changes in how we deal with the painful issues described in this presentation and perhaps many more.

In agreement with Gallagher (2004) we conclude that: "in the 21st century, we should be able to say proudly that we saw our limitations and took action against them. Much of this action must be done collectively since we, as individuals, are hardly able to make major institutional (Global) changes". (p.: 32)

References

Cohen, L. M. (2003). *A Conceptual Lens for Looking at Theories of Creativity*. In D. Ambrose, L. M. Cohen, & A. J. Tannenbaum (Eds.). *Creative Intelligence: Toward Theoretic Integration*. Hampton Press Inc: Cresskill, NJ.

Dillon, A. (2005). Conclusion: so what is this thing called information. In Oostendorp, H.; Breure, L. and Dillon, A. (2005). Creation, Use and Development of Digital Information. N.J.: Lawrence Erlbaum Associates, Inc.

Gallagher, J. J. (1997). Issues in the education of gifted students. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (2nd ed.; pp. 10-23). Boston: Allyn and Bacon.

Gallagher, J.J. (2004) Unthinkable Thoughts: Education of Gifted Students. In J.J. Gallagher, J.J. (ed.) *Public Policy in Gifted Education*. California: Crowin Press. pp. 21-34.

Gallagher, J.J. (2004). Introduction to public policy in gifted education. In J.J. Gallagher, J.J. (ed.) *Public Policy in Gifted Education*. California: Crowin Press. pp. xxiii-xxix.

Interview With E. Paul Torrance on Creativity in the Last and Next Millennia. Bonnie Cramond. Full Text: COPYRIGHT 2001 Prufrock Press.

Meador, K. (1999). Creativity around the globe. *Childhood Education*, **75**, 324-325.

Nickerson, R.S. (2005). Technology and Cognition Amplification. In R.J. Sternberg and Preiss, D.D. (eds.). *Intelligence and Technology: The Impact of Tools on the Nature and Development of Human Abilities*. N.J.: Lawrence Erlbaum Associates, Inc. pp. 3-27.

Parker, J. (1996). NAGC standards for personnel preparation in gifted education: A brief history. *Gifted Child Quarterly*, **40**, 158-164.

Preiss, D.D. (2005). "Technologies for working intelligence". In J.S. Sternberg & D.D. Preiss (eds.) *Intelligence and Technology: The Impact of Tools on the Nature and Development of Human Abilities*. N.J.: Lawrence Erlbaum Associates, Inc. pp. 183-208.

Rath, L. E., Wasserman, S., Jonas, A., & Rothstein, A. (1986). *Teaching for thinking: Theory, strategies, and activities for the classroom*. (2nd ed.). New York: Teacher's College. p. 194.

Richert, E. S. (1997). Excellence with equity in identification and programming. In N. Colangelo & G. Davis (eds.), *Handbook of gifted education* (2nd ed.; pp. 75-88). Boston: Allyn and Bacon.

Shore, B., & Delcourt, M. (1996). Effective curricular and program practices in gifted education and the interface with general education. *Journal for the Education of the Gifted*, **20**, pp.138-154.

Sternberg, R, & Lubart, T. (1993). Creative giftedness: A multivariate investment approach. *Gifted Child Quarterly*, **37**, pp.7-15.

Tannenbaum, A. J. (1997). The meaning and making of giftedness. In N. Colangelo & G. Davis (eds.), *Handbook of gifted education* (2nd ed.; pp. 27-42). Boston: Allyn and Bacon.

Torrance, E. P. & Safter, H. T. (1999). *Making the creative leap beyond*. Buffalo, NY: Creative Education Foundation Press.

Yamin, T, S. (2002). Comments on "From Creativity to Responsible Createlligence", *World Gifted,* **21**(2), 8-9.

About the Author

Taisir Subhi-Yamin is a professor of gifted education. He has a B.Sc. in Physics, an M.A. in Special Education, and a Ph.D. in Gifted Education and e-learning from Lancaster University in England. He is the recipient of academic prizes and fellowships from Jordan, England, and the U.S.A. including a Fulbright Award (1996). Prof. Yamin is active in developing programmes for excellence in education and gifted education. In addition, he is active in the field of science popularization, and has written ten books and many articles and research papers. He has developed a number of training packages to develop productive thinking skills and conducted a number of workshops in different European and Middle Eastern countries. He is an active member of an impressive list of academic institutions including: the British Educational Research Association (BERA), the European Council for High Ability (ECHA), Bahrain Association for the Gifted and Talented; President, Jordanian Association of Physicists, the

National Committee for Gifted Education; Founder, the Qatari Centre for the Gifted and Talented. He is also the National Chancellor and regional representative of the International Association of Educators for World Peace. He was a delegate of the WCGTC for about ten years. In 2002 he was elected as a member of the executive committee of the WCGTC. Recently, he was named editor of Gifted and Talented International. Professor Yamin was involved in developing UAE project for the gifted and talented in Ulm university. In addition, he has established, in cooperation with Prof. Todd Lubart, the International Centre for Innovation in Education (ICIE-Paris). He is a visiting Professor at Université Paris Descartes (September 2007-September 2010).

Papers

(A.1)

Sieglinde Weyringer, Learning leadership in global responsibility: Gifted children and adolescents are ascribed to own a special potential for leadership. Most of all leadership can be defined as the ability to cope with challenges by taking responsibility for the consequences of personal decisions and actions. The need of viewing responsibility in its global dimension is given. Summarizing historiometric studies on leadership, combining research on the components and conditions of individual moral development with research on the philosophical tendencies in the development of human societies and viewing the influence of modern communication technologies, new and additional goals for the education of the gifted can be established explicitly to make them fit for these challenges. A new educational approach will be presented, which concentrates on the awareness of global responsibility. The practicability of this approach is proved by an international study, which also will be shown.

About the Author

Sieglinde Weyringer is assistant director of the research project "VaKE - Values and Knowledge Education", financed by the Jubilaeumsfond of the Austrian National Bank (Project-Nr. 10946). She is programme director of "Platon Youth Forum". She was co-founder and had established the Austrian Centre for Research and Nurturing the Gifted. Since 2004 she is member of the executive committee of ECHA (European Council of High Ability), and chairwoman of ECHA-Austria. Her research concentrates on the democratic education of gifted adolescents, on constructivism and on virtual communication.

(A.2)

Problem Based Learning (PBL) as a model for improving the learning potential for learners with different educational backgrounds

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Abstract

Since 1974 PBL has been the form of study at Aalborg University. The model has three main characteristics: problem-orientation, which means that the students study in depth a real problem that is relevant to them (and to society, a company, an institution etc.); project-organisation, which means that the work on understanding the problem and finding solutions is carried out as a project; group-organisation, which means that the students work together in groups on the problem for the duration of a semester. The final outcome will be a written project report which will form the basis for an oral examination. Ideally, each of the three characteristics facilitates the development of specific skills, knowledge and competencies. The knowledge and skills acquired through the PBL-model are highly sought after by trade and industry in Denmark. Lately, universities in Denmark have been faced with a number of new challenges as a result of the Bologna process. One such challenge is that some study programmes at master level must accommodate students with bachelor degrees from relatively different educational areas (for instance teaching, nursing, linguistics, social science). This has put an increased focus on the strengths and weaknesses of the PBL-model. The paper presents a case study in a relatively new Master Programme on Learning and Innovative Change with a diverse student group, and discusses whether homogeneity and similarity is a prerequisite for participating in and learning from the PBL-model or whether the model holds a particular potential for integrating and learning from diversity.

Introduction

Since 1974 Problem Based Learning (PBL) has been the form of study par excellence at Aalborg University. The main idea is to emphasise learning instead of traditional teaching and lecturing. Learning is understood to be an active process of investigation and creation and is driven by the student's curiosity and experiences. The student is inspired and motivated to participate in the discovery of problems and the creation of new knowledge. One of the primary learning goals is that the student is expected to learn to think critically and analytically, i.e. to question existing knowledge and the premises for obtaining that knowledge, methodological approaches, and be able to apply theories and investigation and research methods in relation to a specific area or practice. Simple reproduction of knowledge is not the aim. When the process is at its best students will act as researchers and the process will be similar to genuine research.

The model has three main characteristics: 1) problem-orientation, which means that the students study in depth a real problem that is relevant to them (and to society, a company, an institution etc.) 2) project-organisation, which means that the work on understanding the problem and coming up with solutions is carried out as a project 3) group-organisation, which means that the students work together in groups on the problem for the duration of a semester. The final outcome will be a written project report which will form the basis for an oral examination. Ideally, each of the three characteristics facilitates the development of specific skills, knowledge and competencies.

The problem-orientation provides the possibility of an exemplary plunge into a subject area thus giving the students a comprehensive theoretical knowledge and methodological skills in applying it. In the best of cases it holds the characteristics of research. The project-organisation provides the students with project-management skills, and the group-organisation provides the students with skills of cooperation, presentation, and argumentation. The emphasis on the presentation of a written report and an oral examination prompts the students' development of skills in written and oral presentation of subject related matters. The knowledge and skills acquired through the PBL-model are highly acknowledged and sought after by trade and industry in Denmark.

Lately, universities in Denmark have been faced with a number of new challenges. One such challenge is that some study programmes at master level must accommodate students with bachelor degrees from relatively different educational areas (for instance teaching, nursing, linguistics, social science). This new situation has put an increased focus on some of the strengths and weaknesses of the PBL-model. The paper presents a case study in a relatively new master programme on Learning and

Innovative Change with such a diverse student group, and discusses whether homogeneity and similarity in educational background is in fact a prerequisite for participating in and learning from the PBL-model or whether the model holds a particular potential for integrating and learning from diversity.

The potential of diversity in innovation

University graduates will most likely become some kind of knowledge workers, and it is therefore crucial, that they have experienced work situations during their studies which will prepare them for their future work life and the ability to both manage diversity and benefit from it will of the utmost importance.

"From a factual point of view, professionals with diverse knowledge and skills are needed for today's knowledge work, as one person cannot possess or produce the amount of knowledge and knowing needed for innovation. Thus diversity is a necessity." (Darsøe:114)

This point of view is substantiated by a report from the Danish Agency for Science, Technology and Innovation under the Ministry of Science, Technology and Innovation (october 2007). The report studied 4 separate aspects of diversity: education and competencies; nationality and ethnicity; gender; age and experience – and their relation to innovation in industry and business. For the purpose of this paper I will concentrate on the results regarding diversity in education and competencies although the report also investigates the correlation between all 4 dimensions. Diversity in this area refers to both difference in educational category (i.e. Humanities; Social Sciences; Science,Technology and Engineering) and difference in length and scope of education.

When measuring the diversity of a group the report indicates that other studies in diversity operate with three different kinds of measures of diversity: variation, balance and difference, either alone or in combination. The three measures are: Variation, which refers to the number of educational categories or types represented in a group. The higher the figure, the greater the diversity. Balance between the categories refers to the share of each category present in the company or group. The more equal the balance, the greater the diversity. Difference between the categories refers to the 'distance' between the categories represented (for instance between Humanities and Engineering).The greater the difference, the greater the diversity.

Several studies point to the fact that diversity as regards education has a positive effect for the companies studied, either in the form of increased company performance or innovation. Some of the findings of the research carried out as a basis of the report claim that if a company increases its diversity as regards the employees' educational background the chance of the company being innovative increases by a factor 1.5 – i.e. 50%.

A Danish study has, however, also found that diversity in a group can be a hindrance if the diversity becomes too great. The problem will in that case be that the employees will not have sufficient overlap in their knowledge and as a consequence the possibility of synergy and knowledge sharing is limited. (p. 109) These findings are substantiated by an American study among 135 MBA-students. The study shows that educational diversity in a student group has a positive effect on the extent of access to knowledge and the amount of knowledge, but also that this does not apply to the groups with the largest degree of diversity. This is explained by the fact that these groups lack a common knowledge base.

As the invention of new solutions to problems and, consequently, innovation processes are some of the characteristics of the ideal and successful problem based learning process it is relevant to examine if the area of research into innovation may provide us with additional understanding of the workings of the group composition. Darsøe (2001) investigates the potentials of heterogeneous groups versus homogeneous groups in relation to the emergence of innovation processes. Similarity and diversity in this framework is related to professional, cultural, age and organisational affiliation, and although the

study is not conducted in an educational setting the matrix for describing different types of group interaction is relevant for the analysis of the case-study.

Matrix of Diversity and Similarity

		Similarity	
		Not perceived	*Perceived*
Diversity	*Not perceived*	Superficial relations and interaction A	Smooth in-group interaction B
	Perceived	C On guard Culture shock Conflict	D Dynamic tension On the edge of chaos

Matrix of group interaction (Darsøe:113)

In the A-square in the matrix where neither similarity nor diversity is perceived the relationship would often be short-term and superficial. In the C-square where differences are perceived and not counterbalanced with a perception of similarity, the outcome is predicted to be anxiousness and potential conflict. In the B-square, where there is no perception of diversity and similarity is noticed the group work would be facilitated by the mere fact that you are often more comfortable with people you consider similar to yourself. It is, however, in the D-square in the matrix, where there is both similarity and diversity, and the group members are aware of both their similarities and their diversities, that the most dynamic work situation is to be found. This means that the heterogeneous group should hold the greatest potential for the PBL process.

Case Study of a Master Education

In the following I will present a case study in a relatively new master education which on the one hand is based on the PBL model and on the other hand aims at further developing the PBL concept in order to make it possible for the students to develop the competencies necessary for the future knowledge worker. The particular challenge for the education is the variety of educational backgrounds to be found among the students and how they may be integrated and made use of, both in the education as a whole and in the group work in particular.

Master of Arts in Learning and Innovative Change

The education is a two-year full time study programme (120 ECTS), and in order to be admitted to the education you should hold a bachelor degree in subject areas such as pedagogy, school teacher, sociology, languages and culture, but other educational backgrounds may give access as well, based on an individual evaluation. This means that the students have a variety of educational backgrounds and thus have been socialised into sometimes very different educational cultures.

The study programme covers 4 semesters with a gradual progression towards an increased integration of theory and practice. Each semester has a theme around which the project work takes place and there courses related to the theme. The themes are:

1st semester – Knowledge of Learning and Innovative Change.
2nd semester – Design of Learning and Innovative Change
3rd semester – Learning and Innovative Change in Practice.
4th semester – Master thesis.

Each project group is assigned a supervisor who guide and counsel the students in their project work.

The goal of the programme is to allow the student to integrate the knowledge and competencies from the bachelor background thus making it possible for each student to create an individual competency profile during the education. The graduates shall be able to teach, guide, supervise and manage learning processes in private as well as public enterprises. The graduate shall be able to view processes of learning and change in different practice contexts with an understanding of the nuances, and during the education the student shall establish an identity, consciousness and experience of a change agent.

The case study

The study covers a total of 14 informants: 5 informants/students in their fourth and final semester (now writing their master thesis) – and 9 students in their second semester of the education. The informants' educational background was: 5 with a school teacher bachelor degree, 4 with a pedagogical bachelor degree, 2 with a bachelor degree in sociology, 2 with a bachelor degree in music (in one case supplemented with a bachelor degree in nursing, and in the other supplemented with a degree in psychology at bachelor level), and finally 1 with a master degree in languages and psychology. The sample is not entirely representative of the composition of the educational backgrounds of the students in the programme in the sense that the distribution between the educational backgrounds is not exact and not all represented. It does, however, show a range of educational backgrounds present and the relative predominance of students with backgrounds in teaching and pedagogy (from university colleges) and the relatively low number of students with academic bachelor degrees (from university).

The informants received a questionnaire and have been asked to describe their experiences for each semester they have gone through, which results in a description of 37 semesters' project work.

The informants' overall evaluation of the PBL model as a tool for learning from diversity, i.e. from the competencies, knowledge and skills learned or developed by the individual student during his/her bachelor studies show the following results.

A general evaluation of the potential of the PBL model and group diversity

In general the informants give a positive evaluation of the strengths and particular potentials which the diversity in educational background offers the students as regards both personal, social, subject related and study related development when working with problem based learning:

"In this study programme the strength is definitely, that it is possible to se and examine/throw light on problems from various angles. … It is possible to lift the [faglige] level in the group work through your own contributions to the project, but also through the others' contributions" (Female student, second semester, pedagogical bachelor degree).

"I believe that whether there is group work or not, there will always be some that learn more than others, work more than others and so on. It is just that group work has the potential of providing insight into new possibilities of solving the tasks, especially when you come form a mix/variety of educations which have different approaches to solving tasks. … Mixed groups are an advantage for the professional and subject related development." (Female student, final semester, pedagogical bachelor degree).

These two informants, who are not the only ones to praise the benefit of diversity, will most likely have experienced group processes which may be characterised as belonging to the D-square in Darsøe's matrix, i.e. with both perceived diversity and similarity leading to synergy and dynamic processes as well as being on the edge of chaos.

Time, however, seems to be an issue as regards the necessity of spending time on trying to understand your fellow students and where they come from in terms of professional culture:

"New and different perspectives broaden your own horizon and leads to exciting discussions.

You try to spend a lot of time to understand each other as you have different profession oriented languages and so on. You do not speak from the basis of a shared culture." (Female student, second semester, pedagogical bachelor degree).

Group size combined with the issue of time creates yet another problem, which - according to the informants - the study plan must be adjusted to accommodate, namely to allow enough time and room

for the students to fully discover the academic and practical skills, knowledge and experience of their fellow students, particularly when the group size is considerable:

"Large groups (like we had during the first semester) diminish the possibility a little of exploring each other's universe. There is no time to understand everybody's background more than just superficially, which may create/lead to conflicts during the project work because of misunderstandings. By this I mean that when we are put together with so very different professional/educational backgrounds and do not have the time to clarify each others' competencies before the project it self is started, it may create some disagreements on the way." (Female student, second semester, pedagogical bachelor degree).

This means that on the one hand the informants are or have become aware of their fellow students as an important source of knowledge and a resource for their own learning, and on the other hand they do not feel that they are able to fully benefit from this and thus can not reach the full potential offered by the educational context.

One informant calls attention to the cooperative aspect of the PBL model as offering a particular learning opportunity:

"Advantages: You can benefit from each others' experiences and professional background, you learn to cooperate across professional and discipline oriented boundaries." (Male student, second semester, school master bachelor degree).

When comparing this statement to Darsøe's understanding and vision of the knowledge worker and the results presented in Innovation and Diversity (2007) it would seem that the experiences and skills gained through group-based project work in diverse groups would prepare the knowledge worker for future cooperation across professional boundaries.

Criteria for choosing group members

The next question is, to what extent do the students create their groups based on a wish to benefit from diversity, and is it possible to detect a change during the course of their education.

One of the informants with academic bachelor degrees report that initially she found it interesting to work together with students from a different educational backgrounds (teachers from the university college), but eventually she preferred to work with students with the same background as herself:

"In the beginning I found it interesting to work together with persons from the University College (teaching), but later I found that their lack of experience in some areas was an impediment. I therefore chose to work with someone whose subject- and discipline oriented qualifications I knew about from previous cooperation." (Female student, final semester, bachelor in sociology).

Another informant reports that already in the first semester she wanted to work with someone like herself:

"It was important that it was someone who had more or less the same qualifications as I have." (Female student, final semester, bachelor in sociology).

Apart from the wish for homogeneity in knowledge and skills in their project group, there is also mention of another dimension in the criteria for choosing group members:

"I chose group members more or less consciously according to their social standing. By this I mean that I looked for persons without children so that we would have the opportunity to plan our group work independently of children having to be picked up from day care at a specific time. The reason for this was previous experiences where this had been a problem." (Female student, final semester, bachelor in sociology).

In these cases we see that these informants are conscious of the various aspects that may cause problems, aspects which may lead to a preference of homogeneity in the composition of their group, not only based on the professional background, but also to some extent the social conditions surrounding the study situation, such as family obligations and other factors which may limit the individual student's ability to participate in the group work. Some informants like the above refer to previous experience with group work, which according to Darsøe's matrix must be characterised as the C-square, i.e. the in-group similarities that may exist are not perceived or are outweighed by the diversity, thus causing conflict.

The informants were asked to indicate the criteria that had guided their choice of group. The categories were: 'the subject of the project', 'social relations with fellow students', 'educational background of the group members', and 'other criteria'. The informants could tick more than one category as this is most often a complex situation. The study shows that 'social relations with fellow students' was a factor in 22 cases, and 'the subject of the project' was a criteria in 20 cases. In 12 cases the informants have indicated that 'the educational background of the group members' was a criteria, and in 4 cases 'other criteria' was indicated. I had from the outset the hypothesis that if students chose the group based on the criteria of the educational background of the group members this would be done from a 'learning from diversity' perspective, meaning that the students would seek to find groups with a high level of diversity. This is, however, only indicated by two of the 12 informants in this category ("Something which could supplement my knowledge – new perspectives to see theory and practice from"; "Would like to learn more about academic writing"). The comments from the remaining informants are all related to issues of having the same or similar professional/educational background, similar qualifications, and sharing a professional or educational related interest. In the category 'other criteria' it was stated that good previous experiences of cooperation and personality were important factors.

Regarding the development in group composition the study shows a tendency of reduction of group diversity during the course of the education. Among the informants group diversity was gradually reduced from 1st semester to 2nd, and the 3rd and 4th semesters will often be individual project work. However, for those who end up working alone it becomes clear from the study that it is not always by choice and that they would prefer to work in a group, as it appears from the following quote:

"Am working alone this semester because of the context of the project – It is a sad experience, lack the challenge. … There are no weaknesses in group based project work. The strength of the project work is the diversity, which is the crucial strength and challenge. You discipline each other and inspire each other! A quiet student may grow personally and intellectually." (Male student, second semester, bachelor degree in pedagogy).

What do you learn from working in groups?

Group diversity – learning from the others

In the following I will focus on what the informants state that they have learned from their fellow group members related to the degree of group diversity (cf. Annex 1). Informants working alone have – not surprisingly – not indicated any learning resulting from group members or group processes. Informants from groups with a low score on the diversity parameters, i.e. variation (the same educational background), balance (one educational category) and difference (no distance between educational categories), tend to have least to report as regards learning from the other group members. In some cases with a small group (2 participants) the fact that the students have the same educational background and furthermore have worked together on a number of occasions previously leads to the response that they have learned nothing from the other group member. In other cases learning has occurred: in one 2-person group it is explained that although the members had the same education, there was a 'distance' between the two educations in the sense that one member had a relatively 'old' degree, and the education had changed as regards goals and content. So, although having similar educational backgrounds the students could learn from the discovered differences in their educations. Larger groups scoring low on the three diversity parameters seem to have slightly more potential for learning from each other. One informant from a group of four with the same educational background indicates to have learned nothing from the other group members. However, other responses indicate that regarding group work and group processes, writing methods and new angles on how to approach problems learning from other group members has taken place. One explanation of this may be that the students form new groups, and some may previously have been in other groups with a higher level of diversity and bring experience into the new homogeneous group. This interpretation is based on one informant's statement about learning from the previous experiences of one of the group members regarding writing methods, but there may be other explanations such as a growing attention to and acknowledgement of the learning processes taking place during the problem oriented, group-based project work.

The informants from groups scoring high(er) on the diversity parameters almost all indicate some kind of learning outcome. Almost all emphasise various aspects of the generic skills and knowledge related to becoming a university student and mastering the methods related to problem oriented, group-based project work. Skills such as 'academic writing', 'structure in tasks and assignments', 'structure of project report', 'academic problem solving', may be gathered under the heading 'university study skills'. Another category of learning outcome is related to 'knowledge and insights', in the form of theoretical knowledge, such as 'learning theory', 'culture theory', ' psychology and pedagogy' and insight into other professions and knowledge domains such as 'nurses' education', 'how to teach' and 'content from courses at university college'. The third category of learning outcome is related to methodology - 'search for literature and other sources', 'to do research', 'to interview' and 'to collect and process empirical data', and the fourth category is process related skills and knowledge such as 'group work and cooperation', 'fruitful discussions', 'group process' and 'process tools'. Finally one informant states that the process has lead to an increased self acknowledgement through new knowledge about 'own profession, skills and knowledge'.

Teaching the others

I had the hypothesis that the students in groups with a high level of diversity would benefit from each other in a slightly more formal way, in the sense that they would act as teachers of each other on the subjects of their respective educational backgrounds. The study shows that out of the 37 cases of project work described informants indicate that during 9 of these they have in some way or other been teaching their fellow group members. The subject areas have been: learning theory (3), didactics (2), management and leadership (1), theory of science (1), discussion skills (1), regarding a problem from different angles/perspectives (1), critical literature (1), punctuation (1), nursing related subjects (1). There is no significant relation with the diversity parameters except that in the small groups with shared educational background there are no instances of mutual teaching reported. The findings in this category can only indicate that in some cases students teach each other. Whether or not this will take place, is, however, likely to depend on a) the individual's inclination to take that role b) the subject area and the specific problem under investigation by the group and, subsequently, c) the relevance of the individual's educational background and knowledge.

Learning together

Finally, the informants were asked what they had learned together as a group. Here there is one indication of generic study skills: 'to work in an academic way'. There are several answers relating to the group process: 'discipline and to keep appointments', 'group work and group solutions', 'that we worked very differently', 'process tools', 'structuring the process', 'argumentation technique', and 'the importance of language barriers for cooperation'. The predominant answers are however related to the subject area of the semester in question and the specific project work, such as: "specific theory from the study, i.e. organisational learning and learning theory', 'the subject of the project', 'to design a course', 'learning theory', 'didactics', 'making an analysis without collecting own empirical data', 'different ways to present a project and its results'.

Several answers indicate something along the lines that the informants feel that they have learned a lot and that it is very fruitful that they have different strengths and thus supplement each other. One informant expresses it like this:

"We had a god synergy which together brought our knowledge to the next level." (Female student, second semester, bachelor degree in pedagogy).

Another informant expresses the overall learning outcome in this way:

"Through your education you have developed certain views and opinions on what is right and wrong, but these views and opinions were shaken, and you discovered that things may be done in many ways." (Female student, final semester, school teacher).

This response indicates that the informant has both become aware of and gained an insight into the premises of her former beliefs and opinions, and has thus become able to integrate new or alternative views. Being able to reflect on the premises of previous problem solving could be seen as a sign of transformative learning processes in Mezirow's sense of the concept. As there is no further evidence

regarding this kind of learning process in the data of this study it would, however, be necessary to examine this issue more specifically to determine if this would be an appropriate interpretation.

Discussion

If we accept that one of the aims of university education is also to meet the labour market's needs and thus prepare the students for their future work situation, diversity and the ability to both handle it and benefit from in a learning perspective, is a key competence in the future knowledge worker and should ideally be learned during the education, especially when an education provides the opportunity for it through its set-up.

In general the study shows that there is an interest in and a motivation among the informants for working in groups with a certain and - you might say - manageable degree of diversity. Manageability seems to be related to the D-square characteristics in Darsøe's matrix in the sense that the students need to not only perceive the similarities and dissimilarities, but also to be able to acknowledge that this combination will hold a potential for the group work. Otherwise, the students may dismiss diversity as criteria for group composition and opt for the more 'secure' group compositions with a high level of similarity (the B-square in Darsøe's matrix). In order to motivate the students to 'risk' a higher level of diversity the students should ideally be given the opportunity to establish good experiences with group diversity, both as regards learning outcome and, not least, good cooperation, as problems or conflicts regarding cooperation may be very time consuming and drain the energy of the group. One way to facilitate this would be to allocate resources to group supervision specifically aimed at following the group processes and the potential of diversity – as an addition to the project related supervision and guidance.

The study does not indicate that homogeneity and similarity in educational background is a prerequisite for participating in and learning from the PBL model, but it does indicate that when an education has students with a variety of educational backgrounds an important issue must be to allow time to discover what each group member can contribute to the group process, i.e. time to explore each member's educational background and relevant experiences. Only then will the full potential of the diversity in the group be available for the members.

The study shows that the problem oriented, group-based project work provides a framework in which the students both learn from each other, teach each other and learn together, and in doing so realise some of the potential for integrating and learning from diversity. If the education focuses on a deliberate development in this area the potential of and motivation for learning from diversity among the students may be increased.

References

Aarup Jensen, A. and Bækkelund Jensen, H. (2004) Back to the Future – Theory and Practice in Adult Practitioners' Problem Oriented Project Work. In: The Aalborg PBL model. Progress, Diversity and Challenges. Anette Kolmos, Flemming K. Fink, Lone Krogh (eds). Aalborg: Aalborg University Press

Aarup Jensen, A.; Christensen, O. Ravn. New Challenges for the Problem Based Learning-Model: Postmodern Conditions for University Education. Department of Education, Learning and Philosophy. Working paper. Online. 2008.

Darsøe, L. (2001) Innovation in the Making. Samfundslitteratur

Innovation og mangfoldighed. Ny viden og erfaringer med medarbejderdreven innovation. Forsknings- og Innovationsstyrelsen. Ministeriet for Videnskab, Teknologi og Udvikling. Oktober 2007.

Innovation and diversity. New knowledge and experiences with employee driven innovation. Danish Agency for Science, Technology and Innovation under the Ministry of Science, Technology and Innovation. October 2007.

http://fi.dk/site/forside/publikationer/2007/innovation-og-mangfoldighed-ny-viden-og-erfaringer-med/Rapport_mangfoldighed_endelig_oktober_2.pdf

Mezirow, J. (1991) Transformative Dimensions of Adult Learning. San Francisco: Jossey-Bass.

About the Author

Annex 1
Table of group diversity

Group size / semester	**Educational background**	**Variation** (number of educational types /categories)	**Balance** (share of each category)	**Difference** (distance between educational categories)	**Learning from others in the group – stated by informants**
2 / 7. sem.	*Pedagogy** Highschool teacher (Psychology – English)	2	50-50%	*Humanities (uni. coll.)*** Humanities (university)	University study skills Methods How to teach
2 / 8. sem.	*Pedagogy* Physiotherapist	2	50-50%	*Humanities (uni. coll.)* Science (uni.coll.)	About the other profession Insight into theory from other educations
5 / 7. sem.	*Pedagogy (2)* Bio-analyst Chef, gastronomer Librarian	4	40-20-20-20%	*Humanities (uni. coll.)* Science Technical college Humanities (Royal school of library and information)	A lot About own profession, skills and knowledge About group work and cooperation To be a university student
2 / 8. sem.	*Pedagogy (2)*	1	100%	*Humanities (uni.coll.)-2007* Humanities (uni.coll.) - 1989	Supplementing each other as the education in pedagogy from 2007 is different from 1989. Content from courses at uni.coll.
4 / 7. sem.	*Pedagogical psychology* Pedagogy (2) Bio-analyst	3	25-50-25%	*Humanities (uni.coll.)* (3) Science	Structure in writing assignments Fruitful discussions Searching for literature and other sources of information
Alone / 8. sem.	*Pedagogical psychology*	-	-	-	-
7 / 7. sem.	*Pedagogy (2)* Pedagogy/schoolteacher (2) Philosophy Music Sociology	5	Approx. 28-28-14-14-14%	*Humanities (uni.coll.) (4)* Humanities (university) (2) Social sciences (university) (1)	About academic writing To structure tasks and assignments
3 / 8. sem.	*Pedagogy* Music Sociology	3	Approx. 33,3-33,3-33,3%	*Humanities (uni.coll.)* Humanities (university) Social sciences (university	Focus on academic problem solving and writing
Alone / 9. sem.	*Pedagogy*	-	-	-	-
Alone / 10. sem.	*Pedagogy*	-	-	-	-
5 / 7. sem.	*Schoolteacher* Psychology	4	20-20-20-40%	*Humanities (uni.coll.)*	How to make assignments at University

	Language and international studies Nurse (2)			Humanities (university) (2) Science (uni.coll.)	About primary literature Learning theory Nurse's education
3 / 8. sem.	*Schoolteacher* Psychology Nurse	3	Approx. 33,3-33,3-33,3%	*Humanities (uni.coll.)* Humanities (university) Science (uni.coll.)	Culture theory Research Interview
4 / 7. sem.	*Schoolteacher (4)*	1	100%	*Humanities (uni.coll.)*	Nothing
3 / 8. sem.	*Schoolteacher (3)*	1	100%	*Humanities (uni.coll.)*	About writing methods (from one group member's experience)
4 / 7. sem.	*Schoolteacher (4)*	1	100%	*Humanities (uni.coll.)*	New angles on how problems and group work can be approached
Alone / 8. sem.	*Schoolteacher (4)*	-	-	-	-
3 / 7. sem.	*Schoolteacher* Pedagogy Sociology	3	Approx. 33,3-33,3-33,3%	*Humanities (uni.coll.) (2)* Social sciences (university)	Academic writing Structure of project
3 / 8. sem.	*Schoolteacher (3)*	1	100%	*Humanities (uni.coll.)*	Group process
3 / 7. sem.	*Schoolteacher (2)* Sociology	2	Approx. 66,6-33,3%	*Humanities (uni.coll.)* Social sciences (university)	To manage the structure and drive of a large project report
3 / 8. sem.	*Schoolteacher (2)* Sociology	2	Approx. 66,6-33,3%	*Humanities (uni.coll.)* Social sciences (university)	To collect empirical data To process data
Alone / 9. sem.	*Schoolteacher*	-	-	-	-
2 / 10. sem.	*Schoolteacher* Sociology	2	50-50%	*Humanities (uni.coll.)* Social sciences (university)	-
5 /7. sem.	*Music* Schoolteacher Psychology International studies Nurse	5	20-20-20-20-20%	*Humanities (academy of music)* Humanities (university) (2) Humanities (uni.coll.)	Work methods Process tools New theoretical perspectives
7 / 7. sem.	*Music* Philosophy Pedagogy (4) Sociology	4	Approx. 57-14-14-14%	*Humanities (university) (2)* Humanities (uni.coll.) (4) Social sciences (university)	Pedagogy and psychology Computer and information processing
3 / 8. sem.	*Music* Pedagogy Sociology	3	Approx. 33,3-33,3-33,3%	*Humanities (university)* Humanities (uni.coll.) Social sciences	Supplemented each other

				(university)	
Alone / 9. sem.	*Music*	-	-	-	-
Alone / 10. sem.	*Music*	-	-	-	-
2 / 7. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same background
2 / 8. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same background
Alone / 9. sem.	*Sociology*	-	-	-	-
2 / 10. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same background
2 / 7. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing
2 / 8. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same education. Have worked together many times
2 / 9. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same education. Have worked together many times
2 / 10. sem.	*Sociology (2)*	1	100%	Social sciences (university)	Nothing. Have the same education. Have worked together many times
Alone / 7. sem.	*Languages and psychology*	-	-	-	-
Alone / 8. sem.	*Languages and psychology*	-	-	-	-

**Italics indicate the information regarding the informant's own background*

***The abbreviation 'uni.coll.' stands for university college*

(A.3)

Creativity and Innovation in Teacher Training Programmes in Initial Teacher Education – Reforming Representations of ITE Programmes Through Crossing Disciplinary and Chronological Boundaries

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Abstract

A university school-based project was piloted in Initial Teacher Education (ITE) in the UK to foster innovative thinking in approaches to teaching the primary curriculum through the arts, together with promoting 'creativity' in teaching and learning across the curriculum. The pedagogical model, implemented as part of the Bachelor of Arts with Qualified Teacher Status (BA QTS), was scheduled to co-operate with teacher trainees' final school practice and identifies opportunities and processes for ITE institutions to work in partnership with students, arts specialists, educators and primary practitioners. The model promotes the notion of tripartite collaboration between the key players; schools, ITEs and cultural organisations in which each player is a contributor and integral part of the programme. An essential feature of the programme requires the subject specialist teacher trainee to assume the role of both 'artist' and 'pedagogue' in which he/she is required to lead and inform planning and teaching in collaboration with all participants. The framework was constructed to foster an essentially student-led, self-enquiry approach to the integration of arts in the primary curriculum in which activities are designed to take place both on site and at other cultural venues outside school. The criteria for success of this particular model however, is dependent on its flexibility to accommodate and operate within different school settings. In addition, the model needs to be conducive to sustainable development in an ITE training programme which can be delivered to subsequent cohorts of students within the network of partnership schools. The study investigated participants' views, including those of the pupils regarding the effectiveness of the project and ultimately whether the programme enhanced subject knowledge and confidence in the arts, together with promoting creativity across the curriculum. The findings from the study indicated that the project had a positive impact on the attitudes of teachers with respect to how creativity may be conceptualised in the primary curriculum. The subject specialist teacher trainees' use of role-modelling benefited schools with their 'extended expertise' in offering direction for an integrated curriculum for the arts, improving subject knowledge and raising levels of confidence in teachers and teacher assistants, together with capitalising on the subject specialist expertise of students as 'artists-in-residence.

Keywords: inter-professional, artists-in-residence, creativity, collaboration, student trainee, school-based learning, teacher practitioners (teachers and classroom assistants), action research

Introduction

This research was part of a Higher Education, Arts in Schools (HEARTS) project*, undertaken by Initial Teacher Education (ITE) institution in a drive to reinstate the arts in teacher education and schools.

The research undertaken is a part of a larger school- based action research project started in 2004 and known as the Higher Education, the Arts and Schools project (HEARTS). The third and final stage of the project took place in 2007-08

The project set out to consider new initiatives and methods for the provision of teacher training in the arts through the implementation of a school-centred, pedagogical model, designed to encourage collaborative practice between creative practitioners and to enhance the student trainee teaching and learning experience.

The project was conceived as a pre-cursor to a new BA QTS programme at Liverpool Hope University, in a motion towards encouraging pedagogues to assume greater

autonomy in the development of a less prescriptive school curriculum, together with challenging present norms in the value of arts education and creativity.

The HEARTS project was undertaken in three primary schools as an alternative pedagogical model in ITE, to challenge and re-frame current thinking about teacher education. The aim of the project was not only to promote the arts within education and across the curriculum, but more importantly, to develop new and innovative programmes in ITE, directly linked to school practice. The model advocates ITE institutions as the principal agent of such change, in response to both the schools' needs and to inform future policy; to take the lead initiative, to plan and deliver new and innovative training programmes. Other stakeholders are the schools themselves where the process of a

reflective narrative in teaching and learning takes place between students and teacher practitioners in a continual assessment and evaluation of collaborative professional practice.

The challenge therefore, was to consider different constructs towards a working framework in which ITE institutions, schools and creative organisations could work collectively on a longer-term sustainable programme within the educational environment. The initiative was based on a set of principles which were to be integrated into the programme; innovation, interdisciplinary working, partnership, collaboration and dissemination. Furthermore, the programme was constructed to foster an essentially student- led approach in which pedagogical and leadership skills would be enhanced through action research and through partnership and collaboration with other educators. Accordingly, it recognised opportunities for working in partnership with students, art specialists, primary practitioners and other cultural arts educators.

The project identified the following aims:

- To foster innovative thinking in approaches to teaching the primary curriculum through the arts;
- To encourage and promote creativity in teaching and learning across the curriculum;
- To identify opportunities for developing arts education through collaboration with the higher education institutions, schools, artists and creative/cultural organizations; and
- To develop innovative teaching and learning approaches with trainees and schools through curriculum enrichment and action research, which will enable them to identify and move forward their own arts agenda.

In accordance with these aims are the expected outcomes of the project:

- To foster collaborative planning and teaching involving all key players;
- To enrich the teacher education programme, promote and integrate the arts across the school curriculum;
- Explore alternative teaching & learning methodologies in arts education through an integrated curriculum approach;
- Model an innovative schools-based practice to be evaluated as an action research pilot project; and
- Develop an ITE programme based on a student-led, reflective-enquiry narrative towards the integration of arts in planning and teaching the primary curriculum.

Previous research has revealed the extent to which the arts have been marginalised in ITE. Rogers (1999, 2003), documents the decline in arts provision in teacher education and in schools, and highlights an increasing demand from schools that Newly Qualified Teachers (NQTs) bring some arts expertise into schools. Further, Rogers, and Barnes (2001), have shown that in addition to much decreased curriculum time in ITE, a large percentage of prospective teachers in the arts are failing to be given the opportunity to teach and lead their subject specialism during their school-based learning (SBL) experience. To compound the problem, teacher competencies have become an issue in the teaching of arts, as generalist teachers more often than not, lack the subject knowledge and skills to teach the arts confidently to a satisfactory standard at primary level. To address this wide-spread problem, the HEARTS project sought to rectify and improve the situation by employing the students' subject expertise as a means of support to teacher educators in which to develop their practice in the teaching of art, and as a part of their continuing professional development (CPD). 'Nurturing Creativity in Young People (2006), a report by the DfES to inform future policy, highlights as one of the key proposals, the notion of, 'leading creative learning' through 'preparing new entrants to the education workforce in developing partnerships with creative organisations', but fails to acknowledge the potential contribution to be made by the subject specialist student trainee. It does however support the concept of 'Practitioner Partnerships' and the growing change in mindset towards a more complementary arts education experience, employing a broader workforce.

Creative Partnerships, a government flagship which aims to find creativity and promote it state:

'Creative learning, in the context of Creative Partnerships work, is a particular type of learning experience that occurs when a collaborative relationship between young people, teachers and creative professionals is established. It is long-term and collaborative in nature; it demands a joint commitment and shared vision and a willingness to embrace open-ended outcomes, challenge and risk. It offers an opportunity to look at the world in new ways, to value difference and experience new things. It encourages creative, critical and reflective thinking and produces excited, enthusiastic, enquiry-driven learners.'

Whilst the 'Excellence and Enjoyment Initiative (DfES (2003), illustrated the potential of the arts on teachers and their pupils to support learning, the Teacher and Development Agency (TDA) had already included in their plan for raising standards, a greater emphasis on teacher competences, together with the ability to work in partnership with other professionals as part of the Qualified Teacher Standards (QTS) 2002. "They ensure that all new teachers are well prepared for the wider professional demands of the job, taking into account of new work practices, including working more closely with other teachers and teaching assistants."

The move in schools from a prescribed and target –driven curriculum, dominated by the performativity discourse, towards an 'integrated, creativity –led curriculum' had been firmly placed on the education agenda for the past decade, following reports such as 'All Our Futures'(DfEE,1999) 'Excellence and Enjoyment' (DfES, 2003)and 'Every Child Matters'(2005). These reports, together with the implementation of the new Primary National Strategy (2007), aim to offer teachers more flexibility in the delivery of the curriculum, and were conceived in part, to provide opportunities for pupils to explore their creative potential. Accordingly, these recent initiatives would seem to indicate a shift in official Government thinking on education and a move to embrace the creativity discourse. However, despite the agenda for change and the current argument for creativity in education, attitudes towards the teaching of arts in schools and their perceived importance and status within the curriculum, have been shaped by previous education policy, with the focus on raising levels of attainment in Literacy and Numeracy as being the main priority within the climate of perfomativity. The outcome of the move towards a prescribed curriculum influenced schools' practice, generating a cohort of teachers with reduced confidence and skills to teach the arts to a satisfactory standard. The DfES (2003) report strongly supports the notion that the quality of children's learning is dependent on the requisite knowledge and skills of the teacher. 'Improve the ability of primary teachers to teach the arts and so enrich the learning of children and young people."

In response, the TDA currently is seeking ways in which to encourage NQTs to take arts expertise into the classroom through the introduction of subject leader initiatives and delivery of training programmes in Higher Education. This has created a portal for ITE institutions to be the main agents of change in the curriculum, permitting in one particular institution, innovative thinking in how to re-conceptualise teacher training provision. The challenge to the ITE provider to address issues such as collaboration, creativity and in-service training in the form of CPD was established through the conception of an inter-professional working and learning framework.

Inter-professional working and learning – the process of collaboration

Key elements of the proposed programme include working in partnership with other professionals and in other educational settings, where learning is not only school-based, but also takes place outside the classroom in 'other educational settings' In parallel with the government's 'Workforce Remodelling' and 'Extended Schools' agenda, * a wider vision of ITE was requisite, which would enable educators to look further a field in developing strategies towards forging new partnerships between the ITE provider and creative practitioners, and strengthening existing relationships with schools. The concept of working between, as opposed to working alongside professions was thus conceptualised.

* Extended Schools – government initiative to provide a range of services and activities to meet the needs of children, their families and the wider community. Workforce Remodelling – a process encouraging teachers, educators and members of the wider community to work together as a whole school team

The notion of 'inter-professional working and learning' in education was introduced in the 1960s and previously associated with work done in the field of Health and related subject areas. However,

with the move towards an increasingly multi –professional mode of practice, there would appear to be a strong case for this concept to be extended and applied to school education.

The contexts in which multi-professional, cross-professional and inter-professional may be defined and differentiated from one another, remain a matter of debate and are beyond the scope of this paper. However, within the context of the HEARTS project and according to its aims, inter-professional working and learning is most aptly defined as, 'A learning process in which different professionals learn from and about each other in order to develop collaborative practice' (Oxley A . 2002). Strategies for the development and implementation of inter-professional working and learning were therefore an essential component of the framework, involving all stakeholders and drawing on their multi-disciplinary knowledge bases and expertise. It was also acknowledged that the development of further strategies to produce a more effective inter-professional working and learning model would be needed in consideration of the differing attitudes and perceptions of professionals, according to the different roles adopted. Key players in the schools' workforce, for example, worked together in both a complementary and inter-dependent manner. External partners however, perceived

their role and responsibility as being dominantly complementary to the process, rather than an actual core, integrated element.

Barr(1998), cited in (Oxley A et al 2002) claims that by definition, inter-professional education aims to encourage collaborative practice, but believes that the objectives may differ: modifying attitudes and perceptions, enhancing motivation, securing common knowledge bases, reinforcing collaborative competences and effecting change or improvement in practice. Barr (1996) argues that inter-professional education has many dimensions which need to be considered in the collaborative practice process:

Implicit or explicit in the educational process

The structure and content of the model encouraged collaborative practice between the different professionals through communication in one-to-one exchange, during team meetings and in the interactive process during workshop activities. This was important to the success of the project in a conscious and determined effort to ensure the key players' roles were integral to the teaching and learning process.

Discrete or integrated into other modules / All or part of a programme

The programme was part of a larger degree module, including professional studies in education and school-based learning. In addition, the project was a discrete component and operated independently within the SBL student trainees' experience.

Positive or negative in its influence on relationships and collaborative work

Data collected from teacher-practitioner questionnaires highlighted the positive influence on the teacher practitioners in 'improving relationships and laying foundations for effective collaboration in practice'. The success criteria for such practice is dependent on the foundation of a structured and well-coordinated partnership network, led by the ITE institution, yet in which each of the stakeholders assume responsibility for its individual contribution.

Individual or collective in its emphasis and focus

The project through its objectives, aimed to promote a collaborative approach, developing skills and working practices across the participant educational sectors, based on common learning needs and comparative learning about roles, responsibilities, powers, duties and perspectives. Further to this understanding, Tucker et al (2004) argue, it is not just a question of reconfiguring relationships and methods of practice, it is also a matter of recognising that there is a common core of skills and knowledge that all those who work with children and young people in a range of settings require.

Work-based or college-based

Inter-professional learning may occur in the workplace, informally or discretely, at university, or in other educational settings. The objective of this pedagogical model promotes teaching and learning to be primarily, but not exclusively school-based, serving student trainees in imparting their subject specialist knowledge and skills, and as a vehicle for delivering CPD for the primary generalist

practitioner. In addition, student trainees develop their pedagogy through the modules they undertake at university and in planning their schemes of work to include other adults i.e. teachers, teacher assistants and other educators.

Interactive or didactic in approach

Didactic teaching methodology, used in its entirety as an approach, is alien to most educators in UK involved in the teaching of young people. Although it has its place to provide structured inputs and systematic knowledge, is used mainly to complement and reinforce interactive learning. The principles linked to an interactive approach, which are founded on exchange and action-based learning, have been the ethos and basis of teaching since the late1960s. Recent developments in education however, have set out to challenge this approach, although the majority of teachers would agree that this is the preferred and standard teaching and learning style across primary schools in UK.

Applied to the proposed model, and central to its educational philosophy, learning is based on an interactive approach, which encourages and promotes all participants to have a valued role and status within the group. The notion of inter-dependency between participants according to their professional roles and responsibilities creates a complex, yet interestingly multi-dimensional arena for purposeful, trans-disciplinary teaching and learning to take place. Further, interactive teaching methodology does not, as a rule, follow a linear line of enquiry with prescribed outcomes, but rather encourages discussion and values open-ended outcomes. Such are the dimensions of the proposed pedagogic framework.

The model promotes several innovative features, including school-based (practice-based) teaching and learning, schools working in partnership with ITE providers, partnerships between schools and creative practitioners, learning outside the classroom, multi-disciplinary initiatives and in-service training for existing teachers. However one of the main characteristics of the model is shaped by the fact that teacher trainees are subject specialists, following a combined Education and Arts Degree with QTS course. Hence, as artists in their own right, students are required to adopt the roles of both 'pedagogues' and 'artists- in- residence', the aim of which is to facilitate the development of students' pedagogical and leadership skills, together with meeting the relevant QTS Professional Standards.

The involvement of arts students from other non-teaching education degree pathways serves a similar outcome in that these students are specialists in their chosen field of study and are also practicing artists in their own right. As such, they work together with the teacher practitioners in the 'value-added' enrichment of the project in their role and experience as 'artists-in-residence'. These students, on qualification, will potentially become part of the 'schools' extended workforce' group. Their role is essentially to participate as 'artists-in-residence' under the guidance and direction of the teacher trainee; to stimulate thought, turn ideas into action and to motivate teachers and pupils through inspiration drawn from responding to their work.

'Practice-based learning', according to Anderson et al (1992) is defined as, 'where a student from one profession is placed with workers from another', with the aim, to prepare and equip trainees with knowledge and skills in effective collaborative practice for their future roles as multi-disciplinary practitioners. In the construction of the pedagogical model and to fulfil its objectives, it was imperative the framework was ITE informed, school-based, providing student trainees with school placements for training, including in-service training for the teacher-practitioners. It also had to provide work placements for the specialist art students who were not destined to teach in the classroom, but who nonetheless, would be working in the future in some educational capacity. The final component in the programme was the addition and inclusion of three creative/cultural organisations whose foundations would support the principles of the initiative and who could contribute to the learning process through a negotiated and agreed educational provision. Accordingly, collaboration took place between the following three main stakeholders:

1. Pedagogical Higher Education-based (ITE);
2. Pegagogical school-based; and
3. Creative/ cultural organisations in other educational settings.

Key players comprised ITE tutors and their students (BA QTS and non-BA QTS), the teacher workforce and creative practitioners in other educational settings. Due to the nature and structure of the programme, the organisations targeted, were those which would be able support teaching and learning in the arts. Participant organisations; the TATE Liverpool Art Gallery,

Royal Philharmonic Orchestra and the Liverpool Anglican Cathedral, all assumed an active role and their involvement was integral to the learning process. For example, all contributed to the programme in their commitment to planning and providing subject expertise to varying degrees. Such involvement was evident in the form of workshop sessions, involving the key players and pupils, and whereby teaching and learning was actively planned to take place out of school in the respective cultural venues.

Establishing a Schools' Network

It was an essential feature of the project that the three participant primary schools should not work in isolation from one another, but together, as part of a schools' cluster or network group. Pupils from all three schools came together in out of school venues, on three separate occasions to foster positive working relationships; sharing ideas and outcomes. A Schools' Activity /CPD Day at the ITE institution was organised for pupils and teacher practitioners from each school and a carrousel of activities in art, music and ICT was organised. Pupils benefited from the creativity sessions through the opportunity to be self-expressive and in the social interaction with other children and working with the creative practitioners. Teacher and classroom assistants were able to work artistically with pupils under the direction of the tutor, the student trainees, and with members from the Royal Liverpool Philharmonic Orchestra, who delivered the music workshop activities.

Research Methdology

To facilitate the research methodology, it was necessary to select appropriate methods of data collection that would inform the degree to which the HEARTS project had been successful in enhancing creativity and collaboration in the primary school. Two methods were selected that provided both qualitative and quantitative forms of data; interviews and questionnaires. Questionnaires were chosen to reduce the possibility of researcher intrusion and bias and interviews to elicit further description and analysis. To support the qualitative and quantitative nature of the inquiry, both open and closed questions were included in the questionnaire, including responses to statements on a scale of one to five; (strongly disagree, strongly agree).

Evaluation of the project took place in each of the three participant primary schools, inviting teacher practitioners and pupil response according to the set questions and statements in the survey. Cluster sampling or area sampling was the chosen format for the data, the information for which was collected and collated by the student trainees and analysed as part of the action research process. The targeted audience was a small cluster group from a larger schools' population, all of whom shared some common characteristics, but otherwise as heterogeneous as possible. The partnership network and communication set up between the three schools allowed trainees to compare results and led to more reliable conclusions, as information was collected and evaluated from each school, which was then further analysed in the wider context of all three schools. As such, each student trainee took responsibility for the compilation of their own results, which were subsequently used and compared with the results obtained from the other two schools to identify and analyse the common features. Respondents' views across the three schools were corroborated in a participant triangulation, providing evidence of the emergent patterns and key features of the programme and thus facilitating a wider analysis of data.

For the purpose of this investigation, pupil response will be curtailed to brief analysis, as the focus of the study is primarily, to understand the effects of the programme on teachers' knowledge, skills and confidence in enabling them to plan and teach an arts curriculum conjointly with other practitioners. Nonetheless, the results of the enquiry highlighted that both teachers and teaching assistants strongly agreed the project had helped to enhance pupils' achievement and confidence during the project duration. This imitates the data collected from the pupils' questionnaire.

Accordingly, the study investigated participants' views, regarding the effectiveness of the project and ultimately whether the programme enhanced pupils' self-esteem, their confidence and levels of attainment in the arts. Burns (1979) maintains that creativity and self-esteem are linked and as such,

should possess an equally valued position in teaching and learning. In support of this, he draws attention to the way in which the teacher's level of confidence can influence that of the pupil. Teachers act as important role models for the children and it is therefore essential that their levels of subject knowledge and confidence are sufficient to support children's learning. Burns' (1982) research shows that teachers exert a powerful influence on their pupils and existing positive attitudes of children can be reversed if taught by a teacher lacking skills and confidence. This would indeed support the rationale for continued in-service training for teachers.

The findings from the study indicate sufficient evidence to support the widely-held belief that self-esteem impacts on pupils' artistic abilities and levels of creative expression. Quantitative and qualitative research demonstrated a clear correlation between high levels of self-esteem and confidence, the data of which would suggest that self-esteem may enhance creative ability. The findings also revealed the extent to which self-esteem and confidence influence pupils' and teachers' creative potential by engaging more confidently in their 'sense of possibility', enabling them to take the risks to think and behave innovatively. It would therefore be a realistic assumption to expect primary schools to provide a teaching and learning environment which supports open-ended, creative and innovative learning. The degree to which creativity can be taught is still questionable but it has been shown that teachers can employ teaching strategies to develop creative thinking and behaviour in young people through an investigative, open-ended approach. In the case of the HEARTS project, the intention was to model an innovative school-based practice by promoting and integrating arts across the curriculum, capitalising on the 'extended expertise' of the subject specialist trainee teachers, and working in collaboration with other creative practitioners.

All teachers agreed that the project had helped to raise levels of understanding in planning and teaching the arts. Collaboration was a key aspect of the project and planning was carried out conjointly between all educators, with the student trainees as the 'lead professional' in developing schemes of work. This created an alliance which allowed the student trainees to model good practice without the threat of appearing patronising. It was observed that as teacher confidence increased, individual input increased significantly. Conclusions could therefore be made that this method of collaborative working supported teachers' development of subject knowledge and skills, fulfilling one of the potential outcomes of the project 'to foster collaborative planning and teaching involving all key players'. In addition, the benefits to teachers of an integrated CPD programme are in themselves a noteworthy 'value-added' component.

Teachers' responses to the survey were corroborated in a participant triangle and results from each individual school supported the whole sample analysis with respect to the inclusion of CPD in the training programme. Teachers in all three schools considered that participation in the project had helped to promote creativity and raise levels of confidence in the delivery of the arts curriculum. Furthermore, practitioners in all schools were guided and informed by the subject specialist trainees, in their dual role of 'pedagogue' and 'artist-in-residence'. This raises the question of whether levels of subject expertise and confidence modelled by the trainees, not only influence pupil confidence, but also that of the teacher practitioners. In view of the fact that the results demonstrated increased levels of teacher confidence and subject understanding following participation in the project, would suggest that continued in-service training for the primary generalist teacher is both desirable and essential in teachers' professional development. Furthermore, all teachers strongly agreed that the teacher trainee had been successful in the introduction of innovative approaches to the curriculum. This was evidenced through the pedagogic leadership approach and roles adopted by the student trainee.

In response to the following statement, 'The BA non-QTS art/music specialist provided a positive contribution and input into the collaborative process.'

Teachers largely considered that the contribution provided by non-BA QTS arts specialist students enhanced the creative experience and had a positive effect on assisting the integration of the arts. In the opinion of the teachers, the collaborative process was supported by the partnership and between all participant practitioners. However, they also added that the position and status of the teacher trainee was a vital factor in leading and strengthening the integrated arts element of the project.

'Working in collaboration with students, ITE institutions and cultural organisations has had a positive impact on the curriculum and teaching and learning.'

Every member of staff interviewed, responded with 'strongly agree'. Participation in triangulation with the ITE institutions, schools and external partners necessitated the movement of groups between

all learning venues. A shared vision, with common values and aims was strongly identified by all key players.

Agenda for change

Overall, the interpretation of data from the questionnaires and interviews conducted with teacher practitioners identified the following strategies in the process of change:

- Involvement and mobilisation: a successful initiative for change requires dialogue and participation. From this narrative a basis of common values, experiences and perspectives may be established.
- Using resources flexibly: increasing efficiency in order to create space for new activities and allocation of resources to support learning.
- Benchmarking: identifying achievement through moderation and comparison, inspiration and best practice in all educational contexts.
- Networking: building partnerships locally and regionally for the common development; collaboration on projects, sustainable partnerships, schools' partnership network expansion
- Assessment: evaluation of projects and initiatives using the collated data to develop and improve existing provision
- Developing skills: deepening, widening and renewing teacher-practitioner skills to improve the ability to work with new content, new forms of expression and new educational methods. Skills development was seen as a driving force in transforming practice and as a strategy towards preparing the way for new working methods and teaching programmes for working in partnership and in collaboration.
- Development of content and working methods: new content and teaching approaches, working in partnership with other educators on a new model of practice.
- New roles: schools become stakeholders in the wider community, benefiting from their involvement with other cultural organisations. Developing new dimensions of practice; collaboration, partnerships, inter-professional working and learning, multi-disciplinary initiatives.

According to Tucker et al., (2007) the development of new partnerships may mean more radical approaches, including the pooling of budgets, combining resources and working in partnership across organisational boundaries. 'Within such an approach, a refocusing and potential restructuring of the teaching role appears possible and even likely'. To some extent, according to the present model of practice, this has already been addressed and implemented within the context of working across professional boundaries and challenging present perceptions of teaching roles. Accordingly, those occupying teaching roles may find new demands and expectations being placed on them, as in the case of the student trainee who assumes the position of 'lead professional' and the teacher practitioners, in their role as valued partners and contributors in the teaching and learning process. 'At the heart of the agenda lies the recognition that professional groups will require new skills, knowledge and competences to work more effectively across professional boundaries.' Nonetheless such innovatory ways of working in partnership with external partners will require a flexibility in approach a sharing of values and attitudes, together with a set of professional competences, summarised by Barr (1998) as:

- Contribute to the development and knowledge of others;
- Enable practitioners and organisations to work collaboratively;
- Develop, sustain and evaluate collaborative approaches;
- Contribute to joint planning, implementation, monitoring and review;
- Coordinate an interdisciplinary team;
- Provide assessment of needs so that others can take action; and
- Evaluate the outcome of another practitioner's assessment.

Conclusion

The outcomes of this small-scale action research would appear to support the proposed pedagogical model in ITE in which students from other education pathways are part of the process,

with other creative - and teacher practitioners. The initiative was based on one model of inter-professional education, underpinned by a set of principles which were integrated into the programme: innovation, inter-disciplinary working, partnership, collaboration and dissemination. Within the context of the three sample schools, these principles were largely met. However it must be borne in mind, the implemented training programme was an isolated initiative. This, together with the widely-held view, that for cultural change to take place, requires organisational change at an institutional level, rather than on single innovations is reinforced by Barr (2000), who argues that in terms of introducing any inter-professional learning dimension, "inter-professional learning seems more likely to take root and flourish in the mainstream of multi-professional education rather than in isolated and vulnerable initiatives".

The HEARTS project set out to consider new initiatives and methods for the provision of teacher training in the arts through the implementation of a school-centred pedagogical model, designed to encourage collaborative practice between creative practitioners and to enhance the student trainee teaching and learning experience. The findings indicate the feasibility of establishing successful partnership programmes between key players where the integration of the arts in the primary curriculum can effectively contribute to wider cross-curricular learning, and in which ITE institutions, schools and external partners are able to work creatively in collaboration and cooperation with one another. Positive outcomes to the project on school-based inter-professional education included changes in the organisation of practice and effects on all key players through a developed collaborative and inter-disciplinary approach. Central to the success of this particular model was the strengthened role of the subject specialist student trainee as 'lead professional'; 'pedagogue' and 'artist-in-residence', together with teachers working in collaboration across professional and organisational boundaries.

It would now seem to be timely for change to take place, as the practice of inter-professional education, which is becoming increasingly important in the context of an integrated children's service delivery, will have a direct impact on the organisational structures and systems of our schools in the future.

References:

Anderson, D. Bell, L. Eno, S. Littlefore, E. and Walters, P. (1992). Common ground: an experience of transdisciplinary practice learning. *Journal of Interprofessional Care 6*(3).

Barnes, J. (2007). *Cross-Curricular Learning 3-14*. London: Paul Chapman Publishing

Barr, H. *Perspectives on shared learning*. London: CAIPE

Barr, H. (1996). *Ends and means in interprofessional education: Towards a typology*. *Education for Health 9*(3).

Barr, H. (1998). Competent to collaborate: towards a competency-based model for interprofessional education. *Journal of Interprofessional Care 12*(2).

Barr, H. (2000). *Interprofessional Education: 1997-2000. A Review.* United Kingdom Central Council of Nursing, Midwifery and Health Visiting

Burns, R. (1979). *The self-concept in theory, measurement, development and behaviour*. London: Longman

Burns, R. (1982). *Self-concept, development and education*. London: Holt, Rinehart and Winston

Charlton, H. (2006). *Creative Partnerships: 'Building creative partnerships. A handbook for schools*. Arts Council England. London: Attic Design Consultancy

DfES (1999). *All Our Futures: creativity, culture and education.* National Advisory Committee on Creative and Cultural Education Report

DfES (2003). *Excellence and Enjoyment: A Strategy for Primary Schools*. London: DfES

Downing, D. Lamont, E. with Newby, M. (2007). *HEARTS Higher Education, the Arts and Schools: an experiment in educating teachers*. Slough: NFER

Fisher, R. and Williams, M. (2004) Unlocking Creativity, teaching across the curriculum. London: David Fulton Publishers

Oxley, A. and Glover, C. (2002) *Inter-professional Education – a brief introduction*. FDTL3 Better Together

Roberts, P. (2006). *Nurturing Creativity in Young People: A Report to Government to inform future policy*. Department for culture, media and sports. London: DfES

Roche, J. and Tucker, S. (2007) 'Every Child Matters: 'tinkering' or 'reforming' – an analysis of the development of the Children Act (2004) from an educational perspective', *Education 3-13*, *35*(3)

Rogers, R. (1998). *The Disappearing Arts? The Current State of Arts in Initial Teacher Training and Professional Development*. London: Royal Society for the Encouragement of Arts, Manufactures and Commerce (RSA).

Rogers, R. (2003). Time for the Arts? *The Arts in the Initial Training of Primary School Teachers: A Survey of Traininig Providers in England*. Wednesbury: Wednesbury Education Action Zone.

Tucker, S. Strange, C. O'Hagan, C. and Moules, T. (2002) Conceptualising, processing and developing: the construction of an interdisciplinary framework for working with children, young people and communities. *Journal of Vocational Education and Training, 52*(2)

Notes:

1. The HEARTS project funded by, the TDA, Esme Fairburn, Calouste Gulbenkian Foundation and the Paul Hamlyn Trust.
2. The findings also indicate the feasibility of establishing successful partnership programmes between key players where the integration of the arts in the primary curriculum can effectively contribute to wider cross-curricular learning, and in which ITEs, schools and other outside organisations are able to work creatively in collaboration and cooperation with one another.

(A.4)

Conceptions of Creativity in Secondary School English

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Abstract
This paper explores trainee teachers' conceptions of Creativity in Secondary School English. Whilst there are many promising attitudes, the data collected by means of questionnaires and interviews also reveals some evidence of narrow conceptions and some misconceptions whose origins are connected, in part, to the Romantic literary tradition and its philosophy regarding creativity and the imagination. There are also misconceptions which arise out of spurious notions about the nature of English as a discipline whose source may be traced to a Progressive school of thought regarding expressive arts. This suggests that there are significant implications for teacher trainers in universities and schools if we are to equip our students with the knowledge, understanding and skills to teach, support and facilitate creativity in their new careers. Contrary to Romantic notions of original and innate genius, and an emphasis on boundless, directionless play, this paper propose s that creativity can be taught, learnt and developed within pedagogical frameworks and settings. Drawing on Sternberg's 21 suggested strategies for "Developing creativity as a decision" this paper also considers how these might be adapted for implementation in the English classroom. Therefore, practical teaching methods and competencies are presented which could be developed and incorporated into graduate trainee teacher programmes.

Introduction

Creativity is the *process* of making connections and, sometimes, about *productivity*, about making something new from those connections (Gardner, 2003, Sternberg 1988, 2003, Newton & Newton, in press). Creating spaces where these symbiotic activities can take place is an exciting and pedagogically sound venture. Creativity is also about problem solving (Gardner, 2003, Sternberg 2003) and this is an essential life skill which can be explored in the Secondary English classroom. Imagining alternative worlds through reading fiction and engaging in original writing can enable children to develop coping strategies for their own lives. Knowledge and understanding of ethics, human empathy and citizenship can be taught and learnt in English lessons. Critical analysis, personal response to and interpretation of texts also enables children to develop their creativity. Sternberg's 'investment' theory of creativity (2003) and Robinson's theory of how to promote creativity (2001) both point to the complexities of the relational and human resources required when creative activity is at play. "Intellectual skills, knowledge, styles of thinking, personality, motivation and environment" all take key parts and conspire together to open up the space for creativity (Hall and Thomson, 2005, p.15). The effect of creative teaching and learning on children's personal development has been well documented (NACCCE, 1999; QCA 2003, 2005; SEED, 2006; Ofsted, 2006). Creativity has an impact on self-esteem, social skills and strategies which are valuable for life-long learning (Sternberg, 2003, Craft, 2002).

Weston (2007) and Sternberg (2003) argue that creativity can be taught, learnt and developed within pedagogical settings. Both these authors offer practical guides to this effect. Drawing on Sternberg's 21 suggested strategies for "Developing creativity as a decision" (Sternberg, 2003, pp. 110 – 123), it is useful to consider which of these enter into trainees' pedagogical thought. Sternberg offers general explanations alongside some specific practical illustrations of strategies which would facilitate the conditions for creative teaching and learning under the following headings: *Redefine Problems, Question and Analyze Assumptions, Do Not Assume that Creative Ideas Sell Themselves: Sell Them, Encourage Idea Generation, Recognize The Knowledge Is a Double-Edged Sword and Act Accordingly, Encourage Children to Identify and Surmount Obstacles, Encourage Sensible Risk-Taking, Encourage Tolerance of Ambiguity, Help Children Build Self-Efficacy, Help Children Find What They Love to Do, Teach Children the Importance of Delaying Gratification, Role-Model Creativity, Allow Time for Creative Thinking, Instruct and Assess for Creativity, Reward Creativity, Allow Mistakes, Take Responsibility for Both Successes and Failures, Encourage Creative Collaboration, Imagine Things from Other's Points of View, Maximize Person-Environment Fit* (Sternberg, 203, pp. 110 - 123). Each of these pedagogical strategies is adaptable for specific subject areas such as English. They are also useful for categorizing into themes the conceptions which the

trainees have offered in their questionnaires and interviews. Teacher trainers may then address any neglected areas and consider how to prepare future student teachers.

Creativity and English

In 1797, Samuel Taylor Coleridge famously composed his poem "Kubla Khan: Or a Vision in a Dream. A Fragment" and then published it "rather as a psychological curiosity, than on the ground of *poetic* merits". The poem, he claimed, came to him effortlessly, the images rising up unconsciously as he slept. When he awoke, he wrote down all that he could recollect of his vision before he was interrupted by a visitor, the rest was lost (Bloom and Trilling, 1973, pp. 254-255). This account of an extraordinary event serves well as an illustration of an attitude towards original genius, the muse and the unconscious which saturates Romantic ideas about creativity whereby the isolated artist becomes a channel for some kind of divine inspiration. This view leaves little room for the notion of fostering creativity in the English classroom. It is worth noting that a significant number of post-graduates who opt for teacher training in Secondary English in the U.K. have studied Romantic literature in some depth. A narrow or misconceived view of creativity may be a result of this ideology. Weisberg's interrogation of such myths surrounding conceptions of creativity are insightful (Weisberg, 1986, 1993). He points out that at least two versions of "Kubla Khan" exist and this suggests that the poet consciously crafted and edited the work before it was published (Weisberg, 1986, p.115).

Another pit-fall for trainees' thinking about creativity is the 'free-for-all' notions which were born out of the Progressive ideology and its effect on English teaching in the 1960s. Both Abbs (1982) and Craft (2002) offer a useful history and evaluation of teaching methodology during this period. They highlight the flaws within Progressive philosophy largely expounded in *The Plowden Report* (CACE, 1967). The critique of Progressive education known as *The Black Papers* (Cox and Dyson, 1971) and the consequent birth of the National Curriculum (1989) are well documented in Craft (2002). The Progressive movement, which had as its central aim child-centred, experiential, spontaneous learning, may be held responsible for many misconceptions which undermine the teacher's role: "It paved the way to a spurious notion of creativity, a notion which lacked reference to any cultural context, any evolving mastery of form, any adult guidance and criticism" (Abbs, 1982, p.5).

The notion of teacher as a facilitator, rather than an expert who will intervene, guide and teach, is an issue teacher trainers in the expressive arts subjects may need to address. Children need instruction and explanation if they are to use the skills necessary to think or act creatively (Craft, 2002). Also, if trainee teachers conceive of creativity as being related to critical thinking skills and problem solving (Sternberg 1999, Weisberg, 1986), then they can perhaps begin to understand that the idea of boundaries and training in creativity is beneficial. Teachers do need to create spaces for creativity, both physical and conceptual but there needs to be structure in order for this to be successful. Boden (1996) argues that there needs to be constraints and these emerge from an understanding of the domain and knowledge of the skills needed to produce or to think something which will be valued as creative: "The dimensions of a conceptual space are the organizing principles that unify and give structure to a given domain of thinking" (Boden, 1996, p. 79). We can modulate, challenge and reframe once we understand what the frame is and of what it consists.

The Study

This study explores what 'Creativity' means to a group of post-graduate trainee Secondary English teachers in the North East of England. Conceptions of creativity were investigated through questionnaires at the very beginning of their one year course and before the trainees' first school placement (see Appendix A). There were 17 participants in the group. Briefly the questionnaire was designed to explore: conceptions of creativity in the context of the English classroom with specific examples from their experience of teaching and learning so far; what trainees considered to be evidence of creative thought / work; what would they value as being creative and why; whether they thought that encouraging creativity in English was easy or hard; what they thought the teacher's role was; and whether they conceived of problem solving as being related to creativity. The responses in the questionnaires were categorized following Marton's suggestions for phenomenographical analysis (1981), a procedure exemplified in another context in Newton and Newton (in press). This amounted to an iterative sort of responses into groups of conceptions under distinct headings, although, as we shall see, the data reveals some overlap and blurring of boundaries between the categories of ideas

expressed. The list of categories presented here cannot be considered as complete as a larger sample could add new categories; however, the data and interpretation is valid because the findings here will stimulate discussion and raise questions about students' conceptions in other disciplines and institutions.

A third of the cohort were interviewed after the trainees' first school placement which consists of four weeks of close classroom observation and then four weeks of planning for and delivering their own lessons across a range of ages and abilities in Secondary Schools in the North East of England. The interview questions were devised to elicit clarification and expansion of the categorized ideas and emerging themes expressed in the questionnaires and the participants were able to give specific practical illustrations based on their experiences in schools.

Findings

An informal examination of the responses suggested that there were recurring themes in the students' expression of creativity in English. These are presented in figure 1.

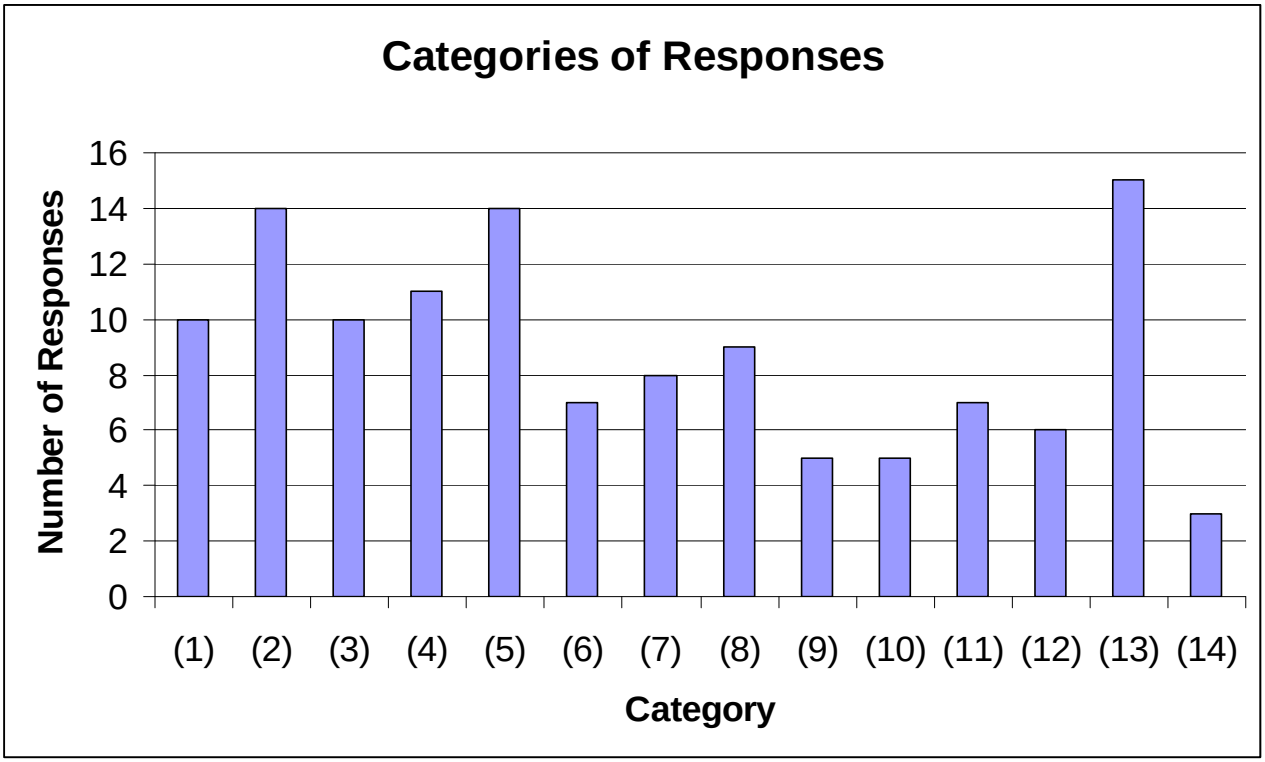

Figure 1: Categories of responses from Conceptions of Creativity Questionnaire (maximum possible in each category = 17).

Key:

1) Personal construction of meaning
2) Construction of a novel product
3) Playing with language to create effect
4) Using imagination
5) Individuality / subjectivity / self-expression
6) Personality traits required (confidence- 6, trust – 1)
7) Emotions, feelings
8) Original ideas, unexpected, unpredictable
9) Outside the box, way out, lateral or abstract thinking
10) Approaching things and seeing things from different points of view
11) Freedom of choice, no barriers or structure / frameworks
12) Need for frameworks / structure, teacher intervention
13) Need for teacher support, stimulation and facilitation
14) Discussion, debate, collaborative work

There were many interconnections and evidence of some overlapping concepts, inconsistencies or incoherent thinking within some of the participants' questionnaires. Creativity was conflated with original thought, going beyond standard ideas and exploring beyond the obvious. Thinking "outside the box" was a repeated phrase. Exploring, playing with and manipulating language to create effect was seen as part of the creative process. Creative work or products would be valued if they were interesting, out-of-the-ordinary and engaging. There was a definite emphasis on individuality and subjective response embedded within this group's conceptions of creativity in English. Self-expression and production of original texts was seen by most within this cohort as a creative opportunity offered in English lessons. Using one's imagination was seen by over half the group as being synonymous with being creative: "English is a creative subject because it allows children to let their imaginations run riot in writing poetry and stories. Also reading itself develops imagination which is the root of creativity." The ideas, one which runs contrary to notions of structure and conscious control and one which highlights the close relationship between creativity and the imagination were interrogated further through the interviews.

Three main areas emerge from the responses to the questionnaires which merit further discussion; the role of the teacher and the blurring of conceptions as regards intervention and facilitation, conceptions which relate to pupils' personality traits and how the trainees linked creativity to problem solving in English.

The Teacher's Role

Nearly all the trainees were clear that teachers should be creative in their planning and in their manner of encouraging and supporting creative activity. The importance of valuing creative ideas is included in the teacher intervention category; three trainees wrote about this in their questionnaires. Valuing among these trainees is linked to self-esteem and confidence building. Here the need for valuing in order to create the conditions for creativity is clear: "In some cases it is hard as in Secondary at some ages pupils find it embarrassing to demonstrate creative thought. However, once one pupil suggests something which is received well this usually sparks debate."

Two trainees said that teachers could inspire children to be creative by making work relevant; children can be engaged by drawing on prior knowledge, this helps them to make connections to their own lives. Other teacher intervention included teachers modeling creativity, teaching basic skills and frameworks with which children could be creative and engaging children by offering interesting or unusual work. Four trainees conceived of English as a creative subject because of the variety of activities and texts it offers. Five trainees offered examples of creativity in English which had cross-curricular links to other subjects (Art and Music in particular).

However, absolute freedom of choice and activities which do not follow rules were also seen as examples of creativity in English. These trainees thought that having no constraints or barriers, no fixed or correct outcomes was desirable. Less than half the group thought that teachers should teach for creativity and that pupils need frameworks and guidance from teachers in order to use the skills required to produce valuable original work or insightful interpretations of texts. A majority of the participant trainees thought of English as a creative subject because analysis and interpretation of literature and language invites personal and individual interpretations: "Poetry is open to personal interpretation. There is rarely a set or correct 'answer' to poetry, so children can be creative in how they analyse it and how they choose to view it."

Here is an example of the blurring of boundaries between teacher interventions in terms of instruction and support and the notion of creativity as being boundless: "Sometimes confidence (or lack of it!) gets in the way of creative thought. Pupils are so used to being given a framework to work by but creative thought by its very nature has no boundaries. Maybe a combination of a loosely structured framework and freedom would help"

The Pupils' Personality and Emotions

This data reveals trainees' ideas about the personality traits needed in order to be creative, confidence in particular emerged as being necessary for self-expression and one trainee said that sharing ideas required trust. Confidence was also related to the question about encouraging creative thought. Two participants explained that this is hard because:

(a) “There is a certain amount of trust involved, as putting something you have created out into the world can be a traumatic experience.”
(b) “It is a confidence thing – creativity often comes from deep within and teenagers are often embarrassed to share their intimate thoughts or opinions.”

Within those answers which linked creativity to emotions and feelings, only two trainees wrote about the development of empathy as being an opportunity provided within English. A promising response offered empathy through role play as an example of a creative lesson: “creating a part and thinking creatively about how someone else would feel in certain situations, thinking outside of own personal experience / ideas is creative.”

Problem Solving

Two trainees related empathy to problem solving in English lessons: “Problem solving involves identifying the different elements of the problem and deciding on how to approach it. This involves an open and creative mind and being able to bring different concepts together to find a solution. An example of problem solving in English - analyzing a poem involves identifying the key issues, using the skills they have learnt elsewhere and bringing all their knowledge together to decide what the poem is about.”

The second trainee related problem solving to life long learning and skills needed beyond the English classroom: “Empathy and understanding are built upon communication. Being able to express yourself fluently means you will be able to understand and be understood by others which means you are more likely to get to the position you want to be. These can be theoretical subjects in a class debate or at home when negotiating with family.”

Anomalies

One trainee suggested that being creative depends on ability. Two trainees highlighted assessment procedures as being barriers to creativity in the English classroom. Two trainees offered conceptions which related creativity to a world view: “Creativity in English is about approaching ideas and concepts in different lights, exploring and conceptualizing them in different forms. It is about imagination and originality, not just in the creation of original pieces of work but in the way we view the world.”

It is noteworthy that only three trainees related creative activity in English to discussion, debate and collaborative work and that none wrote about physical space or the classroom environment in the questionnaires as being important for establishing the conditions for creativity.

Responses in the interviews

The data collected through the interviews reveals that some of the trainees’ thinking had been modified by the experience of being in school. However, there was still evidence of narrow conceptions, misconceptions and inconsistencies within the participants’ understanding. For example, one trainee did emphasize the importance of group work and classroom display as being conducive to creative teaching and learning. However, in her questionnaire she had written that creativity is “innate” and I asked her to explain further: “I do think that there are certain individuals born with a certain amount of creativity and sometimes that can be stifled in school or sometimes it can be developed in a very creative environment. I do think that some people have it or not. You know, you’re born with it but the right sort of teaching can really develop that.”

This trainee also thought that a creative child might be “eccentric” and isolated from his peers.

Another trainee intelligently highlighted the distinction between creativity as process rather than product. Creativity is difficult to observe, she suggests, because “it might be the process leading up to the product, rather than the product itself which is creative.” However, this trainee also expressed her frustration that “inferences” should be taught and that pupils were expected to give “right” answers. She felt that children should be encouraged to think that, as regards interpretation of texts, there are no right or wrong answers, that their individual and personal responses are what matters most.

As a response to the categories emerging from the questionnaires, the following themes were areas for further exploration in the interviews:

- Nature of English with regard to creativity – specific examples and necessary conditions;

- Teacher's role: Frameworks versus freedom, choice and autonomy;
- Observable signs and Evidence of creativity;
- Relationship of creativity to the imagination;
- Conditions for Creativity; and
- Trainees' Concerns.

The conceptions regarding individuality, self-expression, freedom and autonomy were also explored further in the interviews. The responses revealed consensus, tensions and contradictions, misconceptions, concerns and some anomalies.

Conceptions of Creativity with specific examples from English lessons

Experiential learning was offered as an opportunity for creativity in English. One participant described a teaching method which helped pupils to understand the text through experiencing what the character was experiencing (empathy) - being shut in a totally dark room. Another participant also gave as an example experiential learning linked with empathy. Here the teacher was modelling creativity, she suggested, by lying curled up on the floor while the students shouted Shakespearean insults at her. One interviewee gave the example of an unusual activity which stimulated quick-thinking; the teacher threw a football to randomly selected pupils who had to think of an adverb by the time they had caught the ball.

For one participant creative teaching is all about "offering different ways into texts or topics" which are engaging and relevant to the pupils so they can make connections to "real life". This was illustrated with an example of a teacher who had brought in media material about serial killers to stimulate engagement with poetry about murder: "to give a different real life perspective – something real to point to. All of a sudden it wasn't so remote and far removed and they could see what it actually meant." Relevance was also important to another participant; she said that making texts or tasks relevant to pupils so that they could make connections to their own lives was a creative teaching method.

This participant also associated creativity with independent thinking: "I associate creativity with learning to think by yourself, independent thought and sometimes learning to think in quite abstract ways as well." Another example of the emphasis on individuality emerges here: "English offers a unique opportunity for students to show off their creative flair in their own original writing". This interviewee thought that students enjoy English more at university because, as regards interpretation of texts, in schools there is a "given" response that teachers or examiners are looking for. "Essentially creativity and English marry very well together because there aren't any absolute answers. That's what drew me to English, I disliked the idea that you can be absolutely right or absolutely wrong."

In terms of originality and novelty one participant articulated the distinction between creativity as product and process. He saw creativity as relating to process but also mainly concerned with productive activity: "My loosely conceived idea of creativity has always involved the idea that it is something that has been produced now, in that moment, in that process. Something that wasn't there before. If it was there before then in a sense it's not creativity as a lot of people would understand it."

The Teacher's Role

There was evidence of some understanding of the need for frameworks, guidance and teaching of skills: "I like the idea that I'm there as a tool and not for me to say 'you have to do this, this and this. By the same token you have to understand that younger children especially don't have the confidence to just do something. So I'll give them a framework or guidance but then they have to be – I remember describing it as organic and allowing for room to let them express their ideas and to feel safe to express those ideas. Not that there's one set things and they have to get the answer right or wrong or whatever".

The idea further expanded here was that, in order to create the conditions for creativity, the teacher would need to create space for the pupils but also enclose them within a safe environment. Teacher intervention would involve sharing knowledge and understanding, inviting children to be creative but also realising that pupils need to know the skills and techniques: "They need the skills in order to be creative because if you just create space without any skills then you're just left in a kind of no-man's land and don't know how to express those things in the way that you might want to."

In her questionnaire another participant had written that pupils need self-confidence in order to express their creativity. I asked her to clarify further whether she had meant confidence in 'self' and to say whether or not she still held this view. Her answers provide evidence that she is now relating confidence with knowledge of skills. Evidence of a moderation of ideas regarding teacher intervention following is clear in this instance: "I think that at the time of writing this it was about confidence in your self. Since then and the experience I've had in schools, I can understand the skills side of it. If you've been given the tools to use, the skills, or if people have guided you how to use them, that boosts your confidence and you've got more understanding of what you're doing. If you know you're using the skills correctly and you've been shown that that's acceptable then you've got more confidence to do that. If everyone in class is using the same skills then it's not like you're standing alone."

This interviewee understood the foundational value of teaching pupils the knowledge and understanding of skills: "It builds the foundations. Then you put your own ideas in and your own little bit of creativity to build up from there." She also saw the need for balance as regards choice and structure – pupils need "room to manoeuvre" without feeling limited. In her questionnaire she had written about giving children a free rein with no barriers and no structure. Her experience in schools had tempered that view. She had observed a teacher giving pupils a range from extracts from different writers in order to explore with them the effects of different literary techniques before they began their own original writing coursework: "I can understand now how that can be difficult for children, not being told 'this is what you need to do'. They need to know what good writing looks like, what techniques they can use so they can make decisions. No barriers and no structure is too much scope and that results in 'I don't know where to go next and I don't know what to put in there. Without limiting they do need some guidance and support."

Examples of creative teaching involved cross-fertilisation, the unexpected and quick thinking in order to motivate and engage pupils. One participant was disappointed that his experience in schools had revealed that pupils are often unwilling to take the creative opportunities of free choices and would prefer more structured guidelines or rigidly defined titles for post-16 coursework, for example. This seemed to belie a lack of confidence due to the habitual dependency associated with earlier experiences of teaching and learning: "creativity must mean the production of something new – something original – and they seem to be wary of offering the wrong answer if they're doing something that's not been rehearsed in advance."

The importance of valuing in terms of encouragement emerged again and was linked to confidence and motivation: "As soon as you say to a child 'oh, that's a good idea, that's a different way of thinking', they immediately become willing to take that further and try to think a little more."

Evidence of creativity, observable signs

One participant thought that creativity was demonstrated by the ability to look at things in different ways, children are more able to do this, she explained, because they are less "restrained in terms of rules" than adults. Adults become restrained as they become integrated into society but children still have the freedom to think about things in ways that are out of the ordinary. Based on her own experiences at school confidence to express one's own ideas was of central importance; she felt that it was important that children should be encouraged to express their individual ideas even if they were different to other people's without fear of being wrong: "I would try to encourage that individuality and repeat that there isn't always a right or wrong answer, there's more than one answer. English definitely lends itself to that, to be able to express yourself and how you think as an individual because if you can't you're stuck in a box and not able to talk really."

Eagerness and pupil participation was also considered to be an outward sign of creative thought and activity. Children need to be interested in order to be creative. The teacher's role then is to entice, engage and stimulate this kind of response.

One participant thought that the process of creativity was about asking oneself questions about decisions and choices – providing oneself, for example, with a simultaneous rationale whilst writing or reading. This stimulates criticality which is creative. Being curious without actually needing definite answers is part of the creative process. Another participant saw creativity as being related to questioning in a reflective and critical sense. Evidence of creative thought would be questioning: "frameworks which are prescribing a process – 'this is how we go about it'. For me, creative thinking

would involve first and foremost trying to unpack and rework some of the assumptions that are implicit in the question. I suppose that in a sense creativity is metacognitive."

Relationship between Creativity and the Imagination

This question stimulated different responses but each respondent saw strong links between creativity and the imagination. In one response the boundaries between the two are quite blurred: "I always think the imagination is that extra stretch. You might have creativity there but the imagination is that extra stretch to get to expressing the creativity. Again, it's an individual thing – I do think that imagination and individuality are connected.

Everybody's imagination is going to be different. The way you perceive things. You have to have a bit of imagination to be able to be creative in some way. Once you've become comfortable with the notion of creativity and the imagination maybe then you become more confident to be able to express them. To become more creative and imaginative."

One candidate thought of the imagination as being necessary for creativity but explained that she saw this relationship as "one-way": "I see creativity in terms of creative process and something achieved at the end. Whereas, for me, imagination's more of an outlet for everything you've got going on. Imagination kind of feeds your creativity but it's that kind of one way relationship. I don't see it the other way round."

Another view attempts to make a clear distinction: "I wouldn't say that the imagination works in symbiosis with creativity because I think that sometimes imagination can draw you back in some ways. You need it to take you somewhere and sometimes imagination can be somewhat overwhelming. There are similarities between the two but sometimes the imagination can be too wayward so then you couldn't put it to good use. If used constructively imagination can push the creative limits. You need to stream it in the right way."

Another participant attempted to articulate a conceptual distinction between creativity and the imagination which related to control: "I think that creativity is probably more consciously orchestrated than imagination." This conscious (autonomously willed) orchestration of creativity was conceived of as organic rather than mechanistic.

These interesting and various ideas about the relationship between the imagination and creativity merit further discussion. However, it is not within the scope or aims of this paper to explore these here since the evidence would suggest that these conceptions would not hinder trainees' ability to foster creativity in Secondary English. Writers such as Abbs (1976, 1982), Egan (1992), Harrison (1994) and Fleming and Stevens (1998, 2004) offer useful insights into the place of the imagination in English teaching.

Conditions for Creativity

One interviewee gave an example of a creative classroom or environment as one where there would be "lots of different sorts of group work where pupils have to draw on things from their own experience." A creative classroom would be colourful with lots of displays of pupils' creative work. This would be visually stimulating and create a positive environment. The arrangement of tables would be set out for group work and that there would be flexibility so that practical spaces could be provided for drama activities. However, she considered collaborative work she had observed was successful because "the more creative ones were engaging the less creative ones and helping them to think outside the box". "The box" as she conceived of it was "a very traditional school of thought from education, probably pre-1960s which includes rote learning, no depth or opportunities to really think." Here is further evidence of inconsistent and muddled thinking.

Some concerns

Some concerns were raised by the students which had also emerged in the questionnaires about the assessment and teaching of creativity.

"My major concern is that creativity is squashed by the education system we currently have. Assessment gets in the way because students have to get a certain response. Also, "Can you actually instruct people in creativity because by trying to teach it aren't you just squashing their own or putting

yours onto them, trying to give them a rigid set of rules for being creative? It seems to be contradictory."

Discussion

The data reveals that many of Sternberg's 21 suggested strategies for "Developing creativity as a decision" (Sternberg, 2003, pp. 110 – 123) have been addressed at least in part by some of the participant trainees in this group. There was evidence that some trainees understood the value of cross-curricular work, engaging and enjoyable activities and the positive effect of teacher modelling. The benefits of questioning, redefining problems and problem-solving also relates to Sternberg's notion of "choice" (Sternberg, 2003, p. 110). The idea of asking oneself questions and providing a rationale for creative work is sound. What was not addressed by the trainees was the value of giving children the opportunity to recognise and reflect upon mistaken choices (Sternberg, 2003, p.111). The development of this analytical skill offers pupils the chance to redefine choices. Weston (2007) also suggests that we reframe problems in order to see them as opportunities for autonomous or collaborative learning. Negotiating different pathways around an obstacle or side-stepping in order to think laterally, "outside the box" are useful suggestions if we are to re-evaluate our notion of a problem.

Analytical thinking, critical questioning and reflection were also touched upon. Helping children to decide which assumptions are worth questioning is also important. It would be a waste of time and energy to debate the whys and wherefores of our idiosyncratic grammatical rules or spellings, for example. Nevertheless, commonly held beliefs which may lead to oppression or tolerance of inequality in any form must be held up for scrutiny in the English classroom. There is pedagogical value in encouraging children to ask the right questions.

Sternberg's distinction between the 'big C' and 'little c' creativity (Sternberg, 1999, 2003) relates to the students' conceptions of the teacher's role: "On the one hand, one cannot be creative without knowledge. Quite simply, one cannot go beyond the existing state of knowledge if one does not know what the state is. Many children have ideas that are creative with respect to themselves, but not with respect to the field because others have had the same ideas before. Those with a greater knowledge base can be creative in ways that those who are still learning about the basics of the field cannot be" (Sternberg, 2003, p.173).

Pupils and teachers need to be flexible, 'big C' Creativity unsettles frameworks but we need to have a secure grounding in our knowledge and understanding of them before we can go further. As teacher trainers it is clear that we need to foster a more pedagogically sound view which incorporates both the need for a knowledge and understanding of techniques, rules and structures whilst facilitating creative work by allowing freedom and choice where appropriate. We need to "Encourage Sensible Risk-taking" (Sternberg, 2003, p.114) and allow space and time wherein children can learn despite the pressures of assessment. Teaching to the test may be playing safe in the short term but this does not empower children or enable them to become independent learners. We do need to "Instruct and Assess for Creativity" (Sternberg, 2003, p. 119). A sensible method would be to implement a balanced approach. Assessment objectives need to be transparent and teaching constructively aligned. At the same time we must encourage pupils to think for themselves by allowing them the freedom to play with ideas and to take risks, in order to offer independent, thoughtful and insightful responses as long as these are justified and defendable.

A key theme which emerged from the trainee's responses related to Sternberg's strategy as regards "Tolerance of Ambiguity" (Sternberg, 2003, p.115) but this was also the source of some misconceptions about the nature of English. Conceptions which related to questioning and curiosity as evidence of creativity were promising and part of the riskiness of English is due to its creative possibilities. Both original writing and interpretation of literary texts require subjective and personal responses and pupils fear they may be wrong, or exposed. Confidence building in English lessons is vital, therefore, as is an ethos of empathy and mutual support. Children have to respect one another in an effective English classroom. "Children need to be taught that uncertainty and discomfort are a part of living a creative life" (Sternberg, 116). Some ideas are not black or white, some ideas are not immediately right or wrong and exploration of texts is at the heart of English teaching. Therefore, helping "Children Build Self-Efficacy" is part of the teacher's role: (Sternberg, 2003, p.118). However, this view must work alongside a tempering of the "anything goes" ideas expressed by some

trainees. Children need to be open to teacher, peer and self evaluations which may highlight mistakes. Confidence is necessary if pupils are to thrive in a constructively critical environment; thus they will be enabled to hone and craft their creativity into valued work. There was evidence that trainees from this cohort understood that creating a climate where creativity is both encouraged and valued will build confidence and self-belief. However, there was less emphasis on the idea of valuing creative work through self, peer and teacher review. Careful textual analysis takes time and depends on a foundational knowledge and understanding of the use and effect of language in order to evaluate the author's choices and form an interpretation of meaning. Similarly, original writing can be deemed as valuable if there is a use of language drawn from knowledge and understanding of the effect of literary techniques which then creates meaning, pleasure and engagement for a reader.

Neglected or Undeveloped Areas

Only one trainee from this group thought about the practical conditions for creativity in terms of physical, external spaces: a flexible arrangement of tables in the classroom for group work and drama activities and using the classroom walls as a space for celebration by displaying children's creative work. This means of publication is motivating, encouraging and builds confidence. It is a powerful strategy and far more effective for creating the conditions necessary for creativity than a display of film poster or book covers. A focus on the ideal "environment" for creative teaching and learning emerges, then, as an area for further attention (Sternberg, 2003, p.122).

"Encourage Creative Collaboration" and "Imagine Things from Others' Points of View" (Sternberg, 2003, p. 121-122) are two related strategies which were neglected by the trainees in this cohort. Understanding how a character develops in fiction as well as entering into discussion with peers about potentially provocative subject matter will enable pupils to understand, respect and respond appropriately to others; this relates to 'empathy' in English which was addressed but only by two of the trainees. This also relates to group work. Encouraging collaborative creative work, Sternberg suggests, provides an opportunity for children to imagine themselves in someone else's shoes (Sternberg, 2003, p. 122). Group work can be introduced in English lessons which will be difficult, challenging and perhaps frustrating; sustained collaborative and co-operative effort will create the opportunity for children to develop perseverance, patience, mutual support and encouragement. This will help to "Teach Children the Importance of Delaying Gratification" (Sternberg, 2003, p. 117). It takes time to build an argument, to ground critical analysis which rings true, to create a piece of writing or speaking which is effective and sometimes children need to reflect on unfinished work; here effort and discipline is its own reward as children learn to work steadily and step by step towards the final goal. An interim sense of achievement can be encouraged by asking children to look at how they have progressed in the short term.

In English, pupils need to plan, draft, compose, review and edit their short stories or poems, for example. Children need to know that original writing is only a small percentage of inspiration and then a much larger percentage of craft and skill. Having a display of carefully finished work helps children to understand what is required for the final piece to be published. However, short term goals, interim review and constructive feedback is vital for maintaining motivation. Whilst we have looked at the benefits of quick thinking activities above, we also need to "Allow Time for Creative Thinking"; creative ideas sometimes need to be "incubated" (Sternberg, 2003, p. 119; Wallas, 1926).

Another area which was not addressed by this cohort relates to the strategy of encouraging children to "Identify and Surmount Obstacles" (Sternberg, 2003, p.113). This connects to other strategies such as allowing mistakes, and taking responsibility for successes and failures (Sternberg, 2003, p. 120-121). Perseverance in the face of resistance, criticism or even hostility is an important life skill. Being creative has to be a long term project because it takes time for creative ideas to be accepted and valued.; being creative often involves breaking the mould or, in Sternberg's terms "defying the crowd" (Sternberg, 2003, p.113). Children can be prepared to persevere if they are informed about possible obstacles they will encounter. They can be told stories about the sorts of resistance or obstacles met by other creative people in the field such as lack of parental support or poverty, or in extreme cases, exile.

Concluding remarks

This study has offered a focused view into a small group's ideas about creativity in English teaching and learning. If the sample had been larger additional conceptions may have emerged. While the findings may not be generalisable, there may be conceptions here which other teacher trainers will recognize within their own students and this may inform how we teach others who are training to teach their native language and literature. Therefore, this study is valid in terms of 'relatability' (see Bassey, 2001). That is, trainers should find they can relate their experiences and the conceptions of their students to these findings. Drawing on Sternberg's work might offer new dimensions to trainees' thinking about creativity in English such as the importance of group work and collaborative learning, the need for perseverance, determination, hard work and the notion of creativity as process, critical thinking and its relationship to problem solving. From within this cohort narrow ideas, inconsistent thinking and misconceptions have been revealed which may inform future teaching about creativity in Secondary English as regards notions about individuality, value and teacher intervention. Overly narrow conceptions of what creativity is need to be expanded and made more inclusive. We might also consider in future research whether inconsistent or conflicting views are evidenced in practice through observations of trainees' teaching in the English classroom.

References

Abbs, Peter. (1976). *Root and Blossom: Essays on the Philosophy, Practice and Politics of English Teaching*. London: Heinemann Educational Books.

Abbs, Peter. (1982). *English within the Arts: A Radical Alternative for English and the Arts in the Curriculum*. London, Sydney, Auckland and Toronto: Hodder and Stoughton.

Bassey, M. (2001). A solution to the problem of generalisation in educational research: fuzzy prediction. *Oxford Review of Education*, 22(1), 5-22.

Bloom, Harold and Lionel Trilling. (1973). *Romantic Poetry and Prose*. New York and London: Oxford University Press.

Boden, Margaret. (Ed.). (1996). *Dimensions of Creativity*. Cambridge, Mass., London: The MIT Press.

Boden, M.A. (2004). *The Creative Mind - Myths and Mechanisms*. London: Routledge.

Craft, A. (2002). *Creativity and Early Years Education*. London: Continuum.

DfES (Department for Education and Skills). (2003) *Excellence and Enjoyment*. London: DfES.

Diakidoy, I-A.N. & Kanari, E. (1999). Student teachers' beliefs about creativity. *British Educational Research Journal*, 25(2), 225-243.

Egan, Kieran. (1992). *Imagination in Teaching and Learning ages 8-15*. London: Routledge.

Eysenck, H.J. (1996). The measurement of creativity, in: M.A. Boden, (Ed.) *Dimensions of Creativity,* (pp. 199-242). Cambridge, Massachusetts: The MIT Press.

Fasko, Daniel. (2001). Education and Creativity. *Creativity Research Journal*, Vol.13, Nos. 3 & 4, pp. 317-
327. Lawrence Erlbaum Associates Inc.

Fleming, Michael and David Stevens. (1998). *English teaching in the Secondary School: A Handbook for*
Students and Teachers. London: D. Fulton.

Fleming, Michael and David Stevens. (2004). *English teaching in the Secondary School: Linking Theory*
and Practice. London: D. Fulton.

Fryer, M. & Collings, J.A. (1991). Teachers' views about creativity. *British Journal of Educational Psychology*, 61, 207-219.

Harrison, Bernard. (1994). *The Literate Imagination: Renewing the Secondary Curriculum in English*. London: David Fulton Publishers.

Hall, Christine and Pat Thomson. (2005). Creative tensions? Creativity and basic skills in recent educational policy in *English in Education: Creativity and Change*, Vol. 39, No. 3.

Marton, F. (1981) Phenomenography – describing conceptions of the world around us, *Instructional Science*, 10, 177-200.

NACCCE (National Advisory Committee on Creative and Cultural Education). (1999). *All Our Futures: Creativity, Culture and Education*. London: DfEE.

Newton, D.P. (2000). *Teaching for Understanding*. London: Routledge-Falmer.

Newton, D.P. (2001). "Teaching for Understanding". *Evaluation and Research in Education*, Vol. 15, No.
3, pp. 119-127.
Newton, D.P. & Newton L.D. (in press). Some student teachers' conceptions of creativity in school science,
Research in Science and Technology Education.
Nystrand, M. & Zeiser, S. (1970) Dewey, Dixon, and the future of creativity, *The English Journal*, 59(8), 1138-1140.
Ofsted. (2006). *Creative partnerships: initiative and impact* (Ref no. HMI 2517). London: Ofsted see www.ofsted.gov.uk.
QCA (Qualifications and Curriculum Authority). (2003, 2005). *Creativity: Find It! Promote It!* London: QCA/DfEE.
Robinson, Ken. (2001). *Out of our Minds: Learning to be Creative*. Capstone: Chichester.
SEED (Scottish Executive Education Department). (2006) Promoting creativity in education: overview of key national policy developments across the UK, http://www.hmie.gov.uk/documents/publications/hmiepcie.html.
Sternberg, R.J. & Lubart, T.I. (1995). *Defying the Crowd: Cultivating Creativity in a Culture of Conformity*. New York: The Free Press.
Sternberg, Robert. (Ed.). (1988). *The Nature of Creativity: Contemporary psychological perspectives*. Cambridge: Cambridge University Press.
Sternberg, Robert, J. (Ed.). (1999). *Handbook of Creativity*. Cambridge: Cambridge University Press.
Sternberg, R.J. (2003). *Wisdom, Intelligence and Creativity Synthesised*. Cambridge: Cambridge University
Press.
Storr, Anthony. (1972). *The Dynamics of Creation*. Middlesex, England: Penguin Books Ltd.
Vernon, P. E. (Ed.). (1970). *Creativity: Selected Readings*. Middlesex, England: Penguin Books Ltd.
Weisberg, Robert W. (1986). *Creativity: Genius and Other Myths*. New York: W.H.Freeman and Company.
Weisberg, Robert W. (1993). *Creativity: Beyond the Myth of Genius*. New York: W.H.Freeman and Company.
Weston, Anthony. (2007). *Creativity for Critical Thinkers*. Oxford and New York: Oxford University Press.

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Appendix A:
Questionnaire given to17 trainee teachers before their first teaching practice.
(N.B. Spaces for responses have been omitted)

Questionnaire: Conceptions of Creativity in Secondary School English

- Do you think of English as a creative subject? Why do you think this?

- Can you give me an example of an English lesson you may have observed, participated in or taught recently which involved creativity? Which was the creative part? What was creative about it?

- Suppose you had to teach poetry in an English lesson. Are there opportunities for creativity in it? What are they? Can you explain what is creative about them?

- Suppose you had to teach punctuation in an English lesson. Are there opportunities for creativity in it? What are they? Can you explain what is creative about them?

- If you wanted to award marks to someone who showed creativity in a lesson on original writing in English, what would you give the highest marks for?

What would you give the lowest or no marks for?
What would you look for as evidence of creative thought?

- Which English topics do you see as offering the best opportunities for creative thought? Put them in order with the best first.

What makes your top choice the best?

- Do you think that encouraging creative thought in English is easy or hard? Why?

- Do you see problem solving as being related to creativity? In what way? Can you give me an example of a problem children might solve in English?

- So, in light of your responses above what would you say that creativity in English is about?

- Is there anything you want to add about creativity in English? Have I missed something out?

(A.5)

Marcelino Pereira; Maria João Seabra Santos, Longitudinal study of the early admission to primary school: 1994-2007: The impact of the early admission to primary school on children, families and school itself is analysed. A longitudinal methodology on a sample of 40 children who were admitted in primary school earlier than conventional between 1994 and 1999 is adopted. Curriculum acceleration is first discussed. Findings are analysed taking as references: school achievement and behavioral adjustment of children; degree of satisfaction of parents and teachers. The conclusion is that early admission to primary school is a positive educational strategy for children with clear developmental precocity and who are motivated to accede to school.

(A.6)

Nabaa Abdulateef Rashid; Bassam Talib; Taki Ali, Assessment of QTdispersion by the electrocarediogram: Normal electrocardiographic recordings were analyzed to evaluate the influence of QT, QT peak and T peak-Tend dispersions measurements obtained from subsets of electrocardiograms to approximate the QT, QT peak and T peak-Tend dispersion values to those obtained from a complete 12 lead electrocardiograms. Subjects and Methods: Resting 12 lead electrocardiogram of 60 healthy subjects were investigated. In each lead, the QT, QT peak and T peak-T end intervals were measured manually. The dispersion of each interval was evaluated by the difference between the longest and the shortest QT, QT peak and Tpeak-Tend intervals among all leads. The actual dispersions were assessed from all the 12 measurable leads and then the dispersion values obtained from different combination of leads were compared to the actual dispersion values. Results: For the selection of a group of three ECG leads for the determination of QTd, a combination of leads V1, V2 and V3 reflects closely the actual mean QTd obtained from 12 ECG leads, while a combination of leads II, III and aVF reflects closely the actual mean QTpd obtained from 12 ECG leads, the mean (TpTe)d obtained by a combination of leads V4, V5 and V6) reflects the best correlation with the actual (TpTe)d obtained from 12 ECG leads. For the combination of six leads, a combination of leads I, II, III and V1 to V3 reflects closely the actual mean QTd and QTpd obtained from 12 ECG leads. The mean (TpTe)d obtained by a combination of leads V1 to V6 reflects closely the actual mean (TpTe)d obtained from 12 ECG leads. For the combination of nine leads, a combination of leads I, II, III and V1 to V6 reflects closely the actual mean QTd and QTpd obtained from 12 ECG leads, the mean (TpTe)d obtained by a combination of leads aVR, aVL, aVF and VI to V6 reflects the best cor relation with the actual (TpTe)d obtained from 12 ECG leads. Conclusions: it is likely to be more appropriate to assess QT dispersion from standardized constant sets of electrocardiographic leads.

(A.7)

Evaluation of the Electronic Portal in Distance Education: A Comparative Analysis between Ethnic Groups

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Abstract
This articles reports on the study that elucidates the perceptive evaluation of the electronic portal used as part of the academic support system in distance education at Universiti Sains Malaysia, Malaysia. A total of 716 students were involved in this study and they comprised 72.2 percent of the Malay ethnic group, 18.6 percent of the Chinese ethnic group, 4.7 percent of the Indian ethnic and 4.7 percent of other ethnic groups. The dimensions of evaluation are (a) the technical aspects, (b) the instructional design, (c) course content and (d) learning activities. Their perceptive evaluations on these dimensions were compared between the three major ethnic groups namely, the Malay, Chinese and Indian ethnic groups. In addition, the aspects of improvement and the effectiveness of the portal as perceived by the students were also studied among the ethnic groups. A special Likert-scale based questionnaire consisting of 61 items was developed for this study. The results of the ANOVA analysis revealed that there was significant difference among the ethnic groups in terms of their perceptive evaluation in the dimensions of learning activities. A post-hoc analysis revealed that the Chinese ethnic group differed significantly from the Malay and the Indian ethnic groups with higher means recorded for the Chinese ethnic group. There was no significant difference between the Malay and the Indian ethnic groups in this dimension. There was also a significant difference among the ethnic groups in terms of the perceived improvement needed to increase efficiency and empower more participation among the geographically dispersed groups of students. In terms of the dimensions of technical aspects, instructional design and course contents as well as opinions in terms of the effectiveness of the portal, no significant difference were recorded among the ethnic groups. They provided a similar level of perceptive evaluation in these dimensions with no difference. Possible reasons attributing to the observed results will be discussed and elaborated.

Introduction

The e-portal is an educational platform which is centrally integrated to the main student and course data base that enables the delivery of the instruction to be managed centrally by the lecturers and administrators (Hanafi et al., 2006; Kuan 2004). It is widely used by open and distance learning (ODL) institutions as an instructional delivery mechanism to supplement print-based course modules and face-to-face meetings (Hanafi et al., 2006). Embedded in the platform is an extensive range of functionalities for teaching and learning for the students and lecturers as well as for the administrators. With such tools, the instructional delivery mechanism and the course design can be organised and managed comprehensively and effectively (Marshal, undated).

The deployment of the e-portal can be achieved via a proprietary platform such the Black Board and WebCT which controls almost 85% of the market in higher education (Berkely, undated), or via open source or homegrown/outsource platforms. At the School of Distance Education (SDE), we commenced the development of a homegrown e-portal called the *Interactive Distance Education Application* (IDEA) in 2003 and in mid-2004, the homegrown IDEA was rolled out to support the delivery of more than 230 courses offered by the SDE. On average, more than 5,000 students were the registered users of this portal enrolled in courses managed by more than 70 lecturers (Ahmad et al., 2008). The detailed development of the e-portal, including the pedagogical design, database design, web structure and screen design, was reported by Kuan et al. (2004). Basically, it consists of four main

functionalities which are further sub-divided into sub-functionalities as shown in Table 1 (Kuan et al., 2004; Ahmad et al., 2008).

Table 1: The main and sub-functionalities of the IDEA e-portal.

Main functionality	Sub-functionality
Announcement	The General Bulletin Course Notices
Learning Activities	Information on Study Programmes Course Information Past Examination Papers Assignment Questions Links to Other Course Resources
Communication	The Forum Board E-mail
The General Support System	The Staff Directory The Video Conferencing Schedule

The continuous evaluation of the e-portal is imperative to ensure that the embedded resources and learning activities tools are continuously upgraded and the functionalities upgraded when taking into account the differing characteristics of the students such as social differences (gender and ethnic), learning styles as well as attitudes and preferences towards ICT. Many evaluations of the e-portal have been conducted from various perspectives and dimensions and include those by Marshall (undated), Illinois (undated), Zulham et al. (2002), Wyles, (2004), Belyk et al. (2002), Hanafi et al. (2006) and Ahmad et al. (2008).

There is currently interest in looking into ethnic issues with the evaluation of the web-based educational platform (Elspeth, 2005; Monique et al., 2005). The evaluation of the web-based educational platform from the ethnic perspective in the Malaysian setting is imperative as Malaysia is a multiethnic country comprising largely of Malay and other ethnic groups in Sabah and Sarawak (65%), Chinese (26.0%) and Indians (7.7%) (DSM, 2005). With such multi-ethnicities, the skills, attitude and learning preferences towards the web-based educational platform for instructional delivery – especially in the use in open and distance learning – are diverse. The design of distance instruction and learning support must take into consideration culturally diverse students as different ethnic groups and deploy different learning strategies and activities for planning and self-regulation as well as different learning goals and motivation (Hisham & Walker, 2003). In the usage of ICT in the multi-ethnic groups of students, most researchers agree that there is a disparity among the minority and majority ethnic groups in terms of access, usage, skills and attitudes towards computers. For instance, Monique et al. (2005) reported that pupils from an ethnic-minority background consider themselves to be less skilled ICT users. They use the computer less for gathering information and preparing talks and papers but more for drills and practices in developing new knowledge and skills (Monique et al., 2005).

This study is a continuation of the previous study which looked at the overall perceptual evaluation of the e-portal deployed at the SDE, USM (Hanafi et al., 2006) and the study of the portal from the perspective of genders (Ahmad, et al., 2008). Unlike the previous study undertaken, this study looks at evaluation from the perspective of ethnicity. In undertaking this study, the following questions were asked:

a. Are there any differences among the ethnic groups of the students regarding their opinions towards the *technical* and *design* aspects of the portal?
b. Are there any differences among the ethnic groups of the students regarding their opinions towards the embedded *learning materials* and the *learning activities* incorporated in the portal?

c. Are there any differences among the ethnic groups of students in their opinions towards the *improvement* needed in the portal?
d. Are there any differences among the ethnic groups in the perceived *effectiveness*?

Methodology

The evaluation of the e-portal from the perspective of the ethnic groups of the students was undertaken using a specially designed questionnaire. It was the same questionnaire used in our earlier study as reported by Hanafi et al. (2006) and Ahmad et al. (2008). The questionnaire consisted of six dimensions embedded in the portal, namely, the *technical* and *design* aspects, the embedded *learning materials*, the incorporated *learning activities* and the aspects of *improvement* and *effectiveness*. Apart from the demographic details, the questionnaire contained items related to six dimensions of the portal and the number of items for each dimension is shown in Table 2 (Hanafi et al., 2006; Ahmad et al., 2008).

Table 2: Dimension and number of items.

	Dimension	**Number of Items**
1.	Technical Aspects	11
2.	Design	08
3.	Learning Materials	15
4.	Learning Activities	08
5.	Improvement	09
6.	Effectiveness	10

Each item in the questionnaire was accompanied by a 5-point Likert scale, with 5 being the most agreeable and 1 the least agreeable. The sample consisted of senior students who have exposure using the e-portal as an instructional delivery system for the courses they registered. The questionnaires were distributed during the 2005/2006 annual residential course when distance learners throughout Malaysia converged at the university main campus. More than 1,000 questionnaires were distributed and 718 questionnaires were finally used in the analysis. The analysis of the perceptive evaluation of the dimensions of the portal in terms of the ethnic groups was based on the ANOVA and the post-hoc test using the standard statistical analysis software.

Results and Discussion

The demographic analysis between the students of the various ethnic groups is shown in Figure 1. The figure revealed that the percentage of students of Malay ethnic origin was 72.2%, Chinese 18.6% and Indians 4.5% while that for the other races was 4.7%. The composition of the ethnic groups adhered closely to the national compositions.

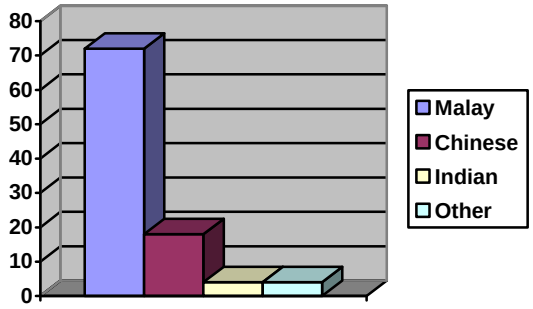

Figure 1: The composition of the ethnic groups

The results of the ANOVA analysis for all the five dimensions being studied are shown in Table 3. The table shows that there was significant difference among the students of the various ethnic groups in terms of their perceptive evaluation in the dimensions of *learning activities* as well as *evaluation.* There were no significant differences among the students of the three ethnic groups in the *technical, instructional design, learning content* as well as *effectiveness* dimensions.

Table 3: ANOVA analysis of the dimensions of the e-portal across ethnic groups.

Dimension	**Malay**			**Chinese**			**Indian**			***F***	**Sig**
	N	Mean	std	N	Mean	std	N	mean	std		
Technical	483	3.39	0.61	129	3.32	0.61	29	3.31	0.74	0.99	0.372
Design	456	3.79	0.56	127	4.69	0.53	28	3.72	0.54	1.58	0.207
Learning Content	463	3.84	0.49	126	3.94	0.44	29	3.81	0.52	2.31	0.099
Learning Activities	429	3.49	0.58	117	3.30	0.58	27	3.61	0.72	5.70	0.004*
Improvement	435	3.71	0.63	119	3.50	0.52	27	3.63	0.76	5.37	0.005*
Effectiveness	428	3.70	0.58	121	3.60	0.53	27	3.58	0.55	1.96	0.141

In order to compare the perceptive evalautions among the students of the different ethnic groups, a post-hoc test was conducted for the dimensions of *learning activities* and *evaluation*. The post-hoc test of the learning activities is shown in Table 3. Items of the learning activities focused mainly on the asynchronous forum board such as the extent of participation of the lecturer, the level of student participation, the group size for the collaboration, the ease of use of the forum board and the effect of the forum board it self. As can be seen in Table 4, there was a significant difference between the mean scores of the students of Indian and the Malay ethnic origins and the students of Chinese ethnic origin with higher agreement scores obtained by the students of Indian and Malay ethnic origins compared to those of Chinese ethnic origins. This is an indication that the Malay and Indian students agreed more than the Chinese students on the following: that the lecturers are actively involved in the asynchronous forum board, that the students are actively involved in the forum board, the group size must be of the right size for effective collaboration, the forum board is user friendly and easy to use and that the forum board fosters social relationships among peers beside enhancing learning through the articulation of ideas and knowledge.

Table 4: The post-hoc test of the learning activities.

Ethnic (I)	**Ethnic (J)**	**Mean Difference (I-J)**	**std**	**sig**
Malay	Chinese	0.187	0.061	0.002
	Indian	-0.123	0.116	0.290
Chinese	Malay	-0.187	0.061	0.002
	Indian	-0.311	0.125	0.013
Indian	Malay	0.123	0.116	0.290
	Chinese	0.311	0.125	0.013

The difference in the responses recorded between the students of the ethnic groups probably reflect the preference towards the usage and the attitude towards the asynchronous forum board and learning in distance education in general. It is likely that Malay and Indian students indicate positive preferences in response to the need for guidance and assistance in undertaking learning tasks and the collaborative tools provided by the e-portal serve such a purpose. The Chinese students, on the hand, may be more independent in nature when they undertake learning via distance learning (Hisham and Walker, 2003). They seek the learning resources themselves and are effective in undertaking self-study. Moreover, they establish closed networking among the students of their own ethnic group and

guidance and support in learning are achieved within the group. In that regard, these students probably have different views vis-a-vis the learning activities provided by the e-portal as reflected in Table 4.

The post-hoc test of the improvement of the e-portal is shown in Table 5. The aspect of improvement pertains to the additional resources and activity tools required in the portal. These include the provision of the synchronous chat, streaming videos, online assessment and additional resources including the digital course content needed when the e-portal is further upgraded.

Table 5: Post-hoc analysis of the improvement dimension.

Ethnic (I)	Ethnic (J)	Mean Difference (I-J)	std	sig
Malay	Chinese	0.210	0.064	0.001
	Indian	0.079	0.123	0.521
Chinese	Malay	-0.210	0.064	0.001
	Indian	-0.131	0.132	0.323
Indian	Malay	-0.079	0.123	0.521
	Chinese	0.1313	0.132	0.323

The post-hoc test revealed that the Malay students responded positively to the improvement needed followed by the Indian students and to a lesser extent, the Chinese students. The differences indicated by the students of different ethnic groups may again be due to their different attitudes towards the current instructional delivery mechanism and learning design made available by the SDE. The Malay students may probably feel that an improvement to the e-portal is imperative to provide the platform of collaboration especially with the lecturer assisting and guiding them through the course contents. The synchronous chat provides live guidance and scaffolding to these contents. They also need more resources given by the lecturer through video streaming and digital contents to supplement the course modules.

On the hand, the Chinese students are probably comfortable with the current instructional delivery. Students of Chinese ethnic origin are more independent in nature, possess effective self-learning strategies and are often able to establish and sustain effective study groups (Hisham & Walker, 2003). In addition, students of Chinese ethnicity are more collective and deploy collectivist/group orientation studies compared to the individualistic nature of students from the Malay ethnic group. The difference in learning strategies between the different students may have resulted in the significant differences in the dimension of *improvement* as seen in Table 5.

Summary

The study found seveal dimensions in the evaluation of the e-portal which recorded significant differences from the perspective of the ethnicities of the students. The students of Malay and Indian ethnicities agreed more on the dimension of the *learning activities* and *improvement* of the e-portal than the Chinese students. It appears possible that the differences in this perceptive evalaution may be due to differences in the nature of the learning strategies deployed by the students of different ethnicities. The differences in self-regulation and planning as well as learning goals and motivation may also explain the situation. It is therefore imperative that the design of the e-portal should be adaptive in nature and be able to take into consideration the personalisation differences in the students themselves, including not only the social differences, such as ethnicity and gender, but also learning styles and preferences.

References

Ahmad H Mohamad, Hanafi Atan, Omar Majid, Zuraidah A Rahman, Noriada A Ghani, Wong Su Luan & Fong Soon Fook. (2008). Gender Differences in the Perceptive Evaluation of the Electronic Portal among Distance Education Learners. CD Proceedings of the International Conference and Workshop on e-Learning Strategies, 7-11 March, Bangkok, Thailand.

Berkeley. (undated). Web-based learning management system. [online] http://ist-socrates.berkeley.edu/~fmb/articles/web_based_1ms.html

Belyk, D., Schubert, J. & Baggaley, J. (2002). Technical Evaluations Report *5*. Classification of DE Delivery Systems*, IRRODL, 2*(2)
http://www.irrodl.org/index.php/irrodl/article/viewPDFInterstitial/42/537
DSM (Department of Statistic, 2005). Census of Population and Housing Malaysia 2000.
http://www.statistics.gov.my/english/frameset_census.php?file=census.
Elspeth M. (2005). Human-computer interaction closes the digital divide: A multicultural, intergenerational ICT case study. Proceedings of the 2005 South East Asia
Hanafi Atan, Omar Majid, Zuraidah A Rahman, Syed Abdullah Syed Othman, Hisham Dzakiria & Wong Su Luan. (2006). The usefulness of the functionalities of the distance education e-learning portal. CD Proceeding of the Fourth Pan-Commonwealth Forum on Open Learning. *Achieving Development Goals: Innovation, Learning, Collaboration and Foundations.* Vancouver: Commonwealth of Learning.
Hisham Dzakiria & Walker, R. (2003). Understanding the culturally diverse Malaysian distance learners: Does culture has a role and an effect on learning and practice in distance education? *Malaysian Journal of Distance Education*, *5*(1), 95-107.
Illinois (undated). "Enterprise learning management System – evaluation factors, University of Illinois at Urbana Champaign" [online].
http://www.cites.uiuc.edu/edtech/projects/compass/enterprise_archive
Kuan Y. Shen, Hanafi Atan, Rozhan M. Idrus, Zuraidah A. Rahman & Norazam Ariffin. (2004). "Realisation of an e-learning portal for distance education learners at the Universiti Sains Malaysia", *Malaysian Journal of Educational Technology,* vol. *4* no.1, pp. 65-75.
Marshall. (Undated). "Comparison of online course delivery software products". [online].
http://www.marshall.edu/it/cit/webct/compare/compariosn.html
Monique, V., Edith, V.E., Irma, H & Kuiper E. (2005). New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education . *Computers and Education*, *45*(1), 35-55.
Regional Computer Science Confederation (SEARCC). Vol. 46. Sydney: Australian Computer Society, Inc.
Wyles, R. (2004). "Evaluation of learning management system software" [online].
http://www.utoronto.ca/cat/services/lms_results/lsm_evaluation_educational_principles.pdf.
Zulham Hamdan, Norzila Manap, Noorhayu Kassim, Hanafi Atan & RozhanM Idrus. (2002). "Learning management system benchmarking: An assessment of the open source learning management system" . In Hanafi Atan & Rozhan M Idrus (eds.). *The Integration of Instructional design and technology on Teaching and Learning,* pp. 351-360. Kuala Lunmpur: Malaysian Educational Technology Association.

About the Author

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Conceptions of Creativity in Elementary School Science

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Abstract
Creativity is generally seen as something good but it is commonly viewed as something which happens in the arts rather than in the sciences. This study of trainee teachers identified their conceptions of creativity in the context of elementary school science lessons. In a class of sixteen final year students completing an education degree leading to qualified teacher status in the U.K., conceptions of creativity in science were narrow. They focused mainly on practical investigations of facts and included misconceptions. Implications for teacher trainers are considered. They are advised that trainee teachers' conceptions of creativity can be flawed. Significantly, they may omit opportunities for creativity such as the imaginative processing of scientific information and the construction and testing of explanations. It is proposed that science educators might widen conceptions of scientific creativity by introducing students to the broader concept of 'productive thought'. Productive thought combines creativity and critical thought, both of which tend to be valued goals of science education.

Introduction

An interest in fostering creativity in the classroom is fairly widespread (for example, in Australia, Cyprus, Japan, Korea, New Zealand, Singapore, and the U.S.A. (A.A.A.S., 1990; Schwartz-Geschka, 1994; Ritchie & Edwards, 1996; Diakidoy & Kanari, 1999; Tan, 2000; Park *et al.*, 2006; Milne, 2007)). Creativity, however, is not universally encouraged in the classroom as perceptions of its desirability depend on the culture of the society (Kwang, 2001). An interest in fostering children's creativity is evident in the U.K. where it may be described as a thinking skill or a life skill (S.E.E.D., 2006) yet there is the view that schools largely ignore it (Fisher, 1990; Craft, 2002; Garner, 2007).

Although creativity has been defined in several ways (Eysenck, 1996; Mayer, 1999) there are common elements, most notable being that creativity is successful personal activity intent on producing an appropriate new idea or object. For example, creativity is "Imaginative activity fashioned so as to produce outcomes that are both original and of value" (N.A.C.C.C,E., 1999, item 29). However, it is for others to agree what is considered of value

(Csikszentmihalyi, 1996). Boden (2004) argues that everyone is more or less creative. For example, we are creative when we make sense of a description, construct an explanation, compile a plan, thoughtfully change our behaviour, or otherwise make mental connections to construct an understanding (Newton, 2000), in effect, producing something new, at least for the person concerned.

Piaget believed that the main goal of education is to produce creative people (Fisher, 1990, p.30) and Taylor (1999) argued that only a creative life is meaningful. Greenfield (2008), in discussing human identity, emphasises the importance of , "…the "Eureka" scenario, where the experience of creativity enables you to feel both fulfilled and to have a sense of individual identity." Creativity contributes to personal independence, autonomy and the ability to cope in new situations (Craft, 2002; N.A.C.C.C.E., 1999). In the classroom, creativity may develop social skills and self-esteem, encourage motivation and achievement and improve behaviour (Q.C.A., 2003, 2005; Ofsted, 2006). Not surprisingly, the U.K.'s Department for Education and Skills (D.f.E.S., 2003) want primary teachers to foster creativity in the classroom.

Creativity in science and science education

Scientific processes can involve creative thought and action. Scientists are being creative when they construct scientific arguments, models, explanations and theories and when they test them with experimentation. According to Osborne, *et al.* (2003) and Kind and Kind (2007) ideas in science are created through rationally-governed, imaginative thought. However, Kind & Kind recommend caution in expecting children to be creative exactly like a scientist and argue that it is simplistic to try to have learners imitate what scientists do (see also Klahr *et al.*, 2000; Milne, 2007). Children thinking meaningfully, however, are being intrinsically creative (Newton, 2000; Howe, 2004; Ovens, 2004). While teachers try to support children to help them notice what is important, the noticing and mentally connecting (meaningful thinking) is something children have to do for themselves.

Similarly, when we ask them to devise a practical test of an idea (experiment), the children must try to construct it themselves. Opportunities for creative thought in science lessons are listed in Table 1.

The first field focuses on making scientific sense of the world. Sub-categories 1.1 & 1.2 provide opportunities for creativity by extending or articulating descriptive and explanatory understandings to produce new possibilities, as when a child uses an understanding of the reflection of light to explain why rough paper does not behave like a polished mirror. The descriptive and explanatory understandings that a child creates (or recreates) may not be new to the world but is likely to be new to the child.

The second field focuses on gathering and evaluating information. Sub-categories 2.1. & 2.2 are commonly referred to as doing 'experiments' or 'practical investigations'.

Opportunities in these first two fields are not mutually exclusive. For example, a child may extrapolate from observations in 2.1 to arrive at a causal explanation (1.2) *(as when a child speculates that running shoes with spikes will have more grip than those without spikes)* or might revise an explanation after examining the results in 2.2 *(as when a child decides that simply adding more wheels to a toy car does not make it go faster)*.

Table 1:

Field	Sub-category and focus	Opportunity for Creativity
Field 1: Making scientific sense of the world	1.1 constructing more or less tentative descriptions of, for instance, properties, scenarios, trends and patterns, structural models and analogies	- *as when a child 'sees' a pattern in data or uses scientific information to imagine living on Mars or describes a rock as being like cinder toffee*;
	1.2 constructing more or less tentative explanations involving, for example, reasons, causes, hypotheses, theories, functional models and analogies	- *as when a child thinks of a reason for the appearance of an image in a mirror or connects a ball bouncing off a wall with a light ray reflecting off a mirror*
Field 2: Gathering and evaluating scientific information and evidence	2.1 constructing a practical way to find reliable, descriptive information	- *as when a child devises a way to see if sound travels through water, if light bounces off a mirror like a ball off a wall, or if this shoe has more grip than that shoe*
	2.2 constructing a practical way to test a tentative explanation of an observation or event	- *as when a child devises a practical investigation to see if roughness increases friction or 'light for its size' is what matters for things which float*
Field 3: Applying science	3 solving practical problems	- *as when children use knowledge of the properties of materials to make a waterproof roof for a model house*

According to Simon (1977), such opportunities may be presented to the learners in the form of problems or challenges. For instance, after the story of the Titanic (an 'unsinkable' ship that sank after hitting an iceberg in April 1912), children may be set the problem: "Does it matter if the hole is just below the water line or at the bottom of the ship? Find out". Where science is broadly interpreted to include applied science or technology (as it is in elementary science in Scotland) children may also be creative when using science, as shown in Field 3. Such opportunities may be attached to the earlier Fields as enhancement activities.

Of course, scientific creativity is "more than having fun and coming up with wacky ideas" (Howe, 2004, p.15) or "doing your own thing" (Fisher, 1990, p.33). There must be some form of quality control, perhaps stemming from a child's evaluative thought. This can happen when a child alters an explanation to bring it in line with new information or changes an investigation to make it feasible. However, it must take into account the child's practical ability to translate an idea into a product (Sternberg and Lubart, 1995, 1999). There may be other opportunities for creative activity and thought in a science lesson, as when children draw what they think the surfaces of planets look like or write a poem about pollution or act out dramatically the behaviour of electrons in a circuit. Such

opportunities for expressing ideas and feelings are important and should not be ignored but they represent creativity in art, language or drama, not in science.

To what extent can opportunities for creativity in science lessons enhance self-reliance and autonomy? Creating descriptions and explanations of the world (Field 1) puts it in order in the child's mind and makes it more amenable to action. Being able to use knowledge outside its original context, manipulate it and relate it to other knowledge to produce something new (at least for the learner) comprises Fields 1 and 3. Being able to construct an explanation from data and experience (Field 2) aids independent thought and action, exercising the imagination to generate new possibilities and alternatives.

We know that young children can be creative (Torrance, 1975). The question is whether or not they can be taught to be creative in science. This depends upon what is meant by 'teach'. As with constructing an understanding, being creative is something the learner has to do for himself or herself. Teachers can provide opportunities and support with conditions which increase the possibility that children will make mental connections (Weisberg, 1988; Nickerson, 1999; Newton, 2000). But we also want children to be creative in the absence of a teacher. This is what Eysenck (1996) calls private novelty, what Boden (1996) calls personal creativity and what Craft (2002) calls small c creativity. In other words, learners should develop the skills and attributes which increase the likelihood that they will be creative unaided and in independent contexts. There are programmes which claim to enhance problem solving and creative abilities, some of which have been around for a number of years (for example, Osborn's (1957) training in brainstorming or de Bono's (1985) thinking hats approach). Such programmes can work (Osborn, 1957; Torrance, 1975; Shneiderman, 2000; Moseley *et al.*, 2005) but they are not devices which *make* someone creative. Rather, they introduce and practise routines which make creative thought more likely and establish skills, traits and habits of thought which support creative thinking. Teaching children to be creative, then, amounts to providing conditions which draw attention to what matters, provides opportunities to practice being creative and establish ways of thinking and working which make independent creativity more likely. When what we mean by teach is to provide a conduit for success (such as these might do) then we can say that children can be taught to be creative. But children may vary in creative capability, particularly in their independence, scope, interest in the detail and in their departure from common or stereotypical responses (Nystrand & Zeiser, 1970).

Teachers' conceptions of creativity

At a general level, teachers' beliefs about creativity are remarkably similar. In Sweden, Bjerstedt (1976) found that teachers see creativity as original, independent work like that practised in art. Similar views were noted by Fryer and Collings (1991) amongst British teachers and Diakidoy and Kanari (1999) amongst Cypriot student teachers. An examination of parents' and teachers' beliefs about the traits of creative children in the USA and in India showed that they agree that creative children are artistic, imaginative and inventive (Runco and Johnson, 2002). Generally, however, science is seen as offering fewer opportunities for creative thought than other subjects. In the U.S.A., for instance, pre-service teachers believed that, "there is no creativity after data collection [in science] because a scientist has to be objective" (Dickinson *et al.*, 2000, p. 12). Similarly, in the U.K., Davies *et al* (2004) found that elementary teachers have a narrow, arts-based view of creativity, with science being fairly uncreative. Such conceptions matter, particularly at the specific level where they can shape lesson planning and teaching practices in the classroom (Pajores, 1992; Hardy & Kirkwood, 1994; Hofer and Pintrich, 1997; Beswick, 2004; Water-Adams, 2006).

The problem

Since the nature of creativity varies with the subject, it is not enough for a teacher to know what constitutes creativity in general. To foster and assess scientific creativity in a systematic way, teachers need to know what constitutes creative thought in the context of elementary science. This study was carried out in order to:

(1) identify some student teachers' conceptions of creativity in elementary science;
(2) comment on how appropriate the conceptions are for teaching science; and,
(3) consider their significance for those who train teachers.

The sample and method used

As recommended by Marton (1981), sixteen, final (third) year students on a first degree course which also led to qualified teacher status completed the questionnaire. These students were being trained to teach across the curriculum in English primary schools (5–11 years old), following a course covering the full range of National Curriculum subjects generally taught in England. As required by the government in England, this included the teaching of science and instruction on lesson planning. Throughout their training these students had observed, planned and taught lessons for some twenty weeks in four primary schools. By this stage, the students were generally expected to plan lessons without detailed support. At the time of the study, these students had elected to take a science education option to give them some insight into science curriculum leadership. The topic of creativity in elementary science was to be a part of their course but none had had formal instruction on creativity at this stage.

Marton's (1981) phenomenographic method for identifying conceptions was used. This involves interviewing students to generate a data pool. First, the students were asked to complete a questionnaire about creativity in elementary science. The questionnaire was designed to elicit views about:

- Creativity generally: For example*, Do you think of science as a creative subject? Which subjects offer more opportunities for creative thought than science?*
- Creativity in science lessons: For example, *Give me an example of a science lesson which involves scientific creativity? What was creative about it? What would you look for as evidence of creative thought in the topic you chose?*
- Creativity in science as a discipline: For example, *Here is a list of aspects of science. Which of them do you see as offering the best opportunities for scientific creativity? Do you think that encouraging creative thought in science is easy or hard? Why do you think this?*

(Newton & Newton, *in press*).

Second, the responses to the questionnaire were clarified, extended and supplemented through interviews. The students were interviewed individually over three successive weeks. The interviews were conducted by one of the authors who was known to the students. Most interviews lasted between twenty and thirty minutes. The interview structure was designed to elicit:

1. specific examples of science lessons that students believed would provide opportunities for children to be creative in science;
2. clarification of what children would do in these lessons which students considered was creative;
3. what was seen as worth high (and low) marks for creativity in these lessons; and
4. responses regarding the accuracy of the interviewer's perceptions of their beliefs.

Third, the responses (from the questionnaire and interview) which purported to describe creative lessons were transcribed to form a data pool. This pool included, for example: *'The children need to pool all their ideas from teaching to design a vessel which will sail'*, *'Absorbing water in different types of paper to find the best to use to make a hat for the school chef'*, and *'A lesson on testing materials for strength'*.

Fourth, the two authors jointly sorted the data pool into groups on the basis of similarities in the kind of creativity the students considered the lessons to support. This was an iterative process: as the sort progressed and new groups formed, earlier groups were re-sorted and items re-allocated so that self-consistent, mutually exclusive groups evolved. In accordance with Marton's (1981) procedure, each group was given a descriptive label, the attributes were listed and the group was exemplified. This process produced what Marton called 'categories of description'. Each category described a conception of creativity. It is important to stress that the list of categories may not be complete, as interviews with additional students may add to it. It was noted, however, that as data from students at the end of the list were added, no new categories appeared. In practice, it will be seen that this is not an obstacle to using the results in discussion about certain questions relating to students' conceptions.

The Results

The findings are presented first in broad terms and then in the specific context of science teaching where we describe five categories of conceptions held by these students.

Background beliefs

From responses to the questionnaire, none of these students believed science to be uncreative. However, almost all students saw art, drama and music as offering more opportunities for creative thought than science. Technology attracted similar attention, largely because of its problem solving opportunities. These subjects tended to be seen as more 'open-ended', 'less theoretical', involving 'less writing', more open to 'self-expression', 'imagination', 'independent activity', 'your own ideas rather than explaining ones that already exist', and did not involve 'right answers'. Most students believed modern foreign languages, geography, history, mathematics, and religious education offered fewer opportunities for creativity than science because they were about 'presenting facts and subject knowledge' and as having 'right or wrong answers', 'rules and patterns to follow' and involved children being 'told what to do'. These students generally held conceptions of creativity which, although favouring the arts, can be related to accepted descriptions of creative thought in general.

Categories of conceptions about creativity in the science classroom

The students generally said they found it difficult to think of examples of creativity in science lessons. From their responses to the questionnaire, explored in the interviews, these students had a range of conceptions, summarised in Table 2.

In Category 1:1a (where creativity is seen as being in the generation of a causal explanation), one student suggested that after children had a period of self-directed activity making circuits, *'Ask them why do lights go dimmer when you add more to a circuit?'* This is extended in 1:1b, for example, *'The children try out lots of different objects to see if they would float or sink in water. They try and guess which would float and say why.'* This is followed by testing to see if the outcome is in accordance with prediction.

In Category 2, creativity is seen as being in the use of imagination. The teacher encourages this through scenarios that stimulate imaginative thought, for example, *'Visiting planets using imagination.'*

Explanations of underlying phenomena or events are not required in Category 3:3a, where creativity is seen as being in designing the investigation. For example, *'Do different surfaces have different amounts of friction?'* and *'What are the best conditions for seeds to germinate?'* were suggested by students. In 3:3b, creativity is seen as being in applying that knowledge in the design of a solution (often an object) to solve what is often a technological problem.

Table 2:

Category	Sub- category	Exemplification
Category 1	*1a Children experience the world and generate explanations*	- direct experience of some scientific phenomenon is generally provided and the children are asked to explain it
	1b Children experience the world, generate explanations and test them	- an extension of 1a in which children are also asked to test their explanations practically
Category 2	*Children imagine using scientific information*	- making facts more interesting, memorable or meaningful by having the children integrate them using their imaginations to make, for example, mental pictures
Category 3	*3a Children do fact-finding practical investigations to answer given scientific questions*	- emphasis is on finding a way to collect relevant data which answers a factual question
	3b Children apply scientific knowledge to solve a given practical problem	- emphasis on the practical application of scientific knowledge
	3c Children do fact-finding practical investigations and apply what they find to solve a given practical problem	- emphasis on a practical problem calling for fact-like information which must be found through practical investigation
Category 4	*Children's positive feelings about science are aroused by the lesson*	- the aim is to excite, enthuse or surprise children
Category 5	*Children make or do things in science*	- emphasis on producing or making something following a teacher's detailed instructions.

For example, children are asked to find a way of cleaning dirty water to make it usable: *'They devise their own way of doing it.* and *'Children use past knowledge and initiative to make a boat.'* 3:3c is a combination of 3a and 3b, with creativity being both designing the investigation and in designing a solution to the problem. For example, *'Absorbing water in different types of paper to find the best to use to make a hat for the school chef.'* and *'What material would be the best to use to make a set of ear muffs to block out the sound? Then making and testing the ear muffs.'* In Category 4, creativity is seen as being largely in the atmosphere and engagement which the lesson generates. The science lesson is provided to excite, enthuse or surprise children, with events that arouse comment and attract their attention. For example, referring to a lesson involving demonstrations with bottled gas, one student suggested, *'Very little writing involved. Getting them thinking. Getting a Wow!'* Finally, in Category 5, the task is generally to make information more concrete, memorable or meaningful for the children. For example, *'Children to create the planets (e.g. in card) and stand to scale in order of planets. Demonstrate the movement of the earth around the sun, etc.'*

Assessing and encouraging creative thought

Students suggested that children showing creative thought were *'thinking for themselves', 'giving reasons', 'asking questions', 'expressing in their own words'*. Making choices of equipment and method, interpreting results and applying knowledge was suggested by over half the students while two thought evidence of creative thought was in a child's *'participation'* and *'interest and enjoyment'*. On the other hand, rote learning and lack of reasons for thought and action were seen by over half as indicative of an absence of or poor quality creative thought, for example *'just getting results, not meaning'*. Two students proposed a lack of participation as indicating an absence of creative ability. The remaining students said they felt unable to assess creative thought.

Two thirds of the group felt encouraging creative thought in science was difficult. The other third said it depended on the child and the topic. The reasons given were diverse. Some suggested creativity in science was '*hard to define'* because young children have an insufficient grasp of science to be creative; children are not aware that they are allowed or expected to be creative; and, the nature of science itself, dealing with *'the invisible'*, makes the task difficult. One student wrote that being creative was more appropriate for very young children (3 – 7 years) than for those who are older. Another felt it depended on resources and *'how well the children relate to the topic'* and one believed that creative thought was *'beyond the teacher's control'*. Three were unable to supply reasons.

Science and opportunities for creativity

Areas of science required to be taught in England were ranked for the opportunities they provide for creativity. There was little agreement in the rankings of these areas by the students. The Kendall coefficient of concordance was only 0.06 and not significant (Siegel, 1956). For example, *Earth in Space* and *Changing Materials* were considered to provide the best opportunities for scientific creativity by one student yet the worst by another, with the other students spread between them. *Earth in Space*, however, was generally treated slightly more favourably, being seen as offering opportunities for imaginative thought about other worlds but not necessarily in the scientific sense. On the other hand, *Keeping Healthy* was treated slightly less favourably on the grounds that it offered fewer opportunities for practical activity. The most common reason for the perceived presence or absence of opportunities for creativity was given as the opportunity for practical activity.

Discussion

The sample could hold other or additional conceptions. Also, the sample is too small to allow us to do more than speculate about the relative prevalence of the identified categories in the general population. (The matter of prevalence is the subject of further study.) Nevertheless, teacher trainers will be able to see the extent to which these students are like their own and will relate their own experience to these findings. (For an account of the concept of 'relatability' as opposed to 'generalizability', see Bassey (2001).) Note that these students had opted for a science education course so it could be argued that science found favour with them and their ideas for lessons in science may have been better than those of other students. Consequently, their conceptions of creativity may be more appropriate than for students in general. Despite this, creativity tended to be seen by these students in terms of self-expression, imagination and pupils thinking for themselves. This suggests an

expectation of novelty in pupils' thinking. Also, and in line with the findings of Diakidoy and Kanari (1999), Davies *et al.*, (2004) and Edmonds (2004), the students saw creativity as centred more on the arts. Nevertheless, it is important to remember that it is how these are interpreted, if at all, in the specific context of the classroom that matters.

The first three categories of conception of creativity in the context of science teaching identified by the study involved having children:

1. make scientific sense of the world by constructing explanations of phenomena and events and possibly testing their explanations;
2. construct descriptive understandings of the scientific world by using their imaginations to construct mental images; and
3. apply facts and information to solve problems and carry out fair tests to produce factual information, or both.

These three categories relate to the suggested opportunities for creative thought in science reasonably well (Fields 1 to 3) but the majority of students tended to confine themselves mainly to the third category reflecting an emphasis on factual knowledge (also seen in experienced teachers in elementary science (Newton & Newton, 2000)).

A further category focused on creativity as expressed through the engineering of a shared, positive feeling about some topic in science. This confused creative activity with its possible effects (such as generating interest and excitement). As Barrow and Woods (1975) point out, such a lesson does not necessarily stimulate creativity although it could reflect a teacher's creativity in planning or delivering a lesson. The last category saw creativity in following instructions to make something. However, this can often mean reproduction without novelty and is what is implied here. Both of these are misconceptions.

A final point relates to assessment. Students were uncertain about this process as it relates to creative thought. Their comments were limited to assessment of its presence or absence. It could be that, as McPherson (1975) suggests, they would "recognise it when they saw it" (p.27) or be able to judge it intuitively (Boden, 1996, p.115), but this is unlikely. The study suggests that the meaning and assessment of creativity in elementary science may not be understood by pre-service teachers.

Creativity rarely has much time allocated to it in over-crowded science education training programmes yet teacher trainers may need to give it explicit attention (Strauss, 1993). This study suggests that teacher trainers are likely to meet both erroneous and narrow conceptions of what counts as creativity in science education, shaped by creativity as it is in the arts.

In science education, instead of using the term 'creativity', it might be more useful to refer to 'productive thought'. Productive thought (as opposed to reproductive thought) subsumes creative thinking and critical thinking. It entails constructing understanding, imagining situations, planning what to do, solving problems, generating new perspectives, designing and making products and deduction within and evaluation of such constructions (Moseley *et al.*, 2005, p.313-314). All these figure in one or more of the three fields of science education: making sense of the world, collecting and evaluating scientific evidence, and applying science. Further, this productive thought can be supported by dispositions or habits of mind which can be developed through practice, opportunities for which can be provided by the teacher in the science lesson. By focussing students' attention on specific goals of teaching in a science lesson context, it may by possible to strengthen their understanding of what creativity involves.

References

A.A.A.S. (American Association for the Advancement of Science) (1990). *Project 2061: Science for All American.* New York, Oxford University Press.

Barrow, R. & Woods, R. (1975). *An Introduction to Philosophy of Science*, London: Methuen.

Bassey, M. (2001). A solution to the problem of generalisation in educational research: fuzzy prediction. *Oxford Review of Education*, 22(1), 5-22.

Beswick, K. (2004). The impact of teachers' perceptions of student characteristics on the enactment of their beliefs. *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education (IGPME)*, *Vol.* 2, *Bergen,* (pp. 111-118). Cape Town: IGPME and http://www.emis.ams.org/proceedings/PME28/

Bjerstedt, A. (1976). *Explorations in creativity*. Lund: Liber Laromedel/Gleerup.

Boden, M.A. (1996). What is creativity? In M.A. Boden (Ed.), *Dimensions of Creativity.* Cambridge, Massachusetts: Massachusetts Institute of Technology, 75-117.
Boden, M.A. (2004). *The Creative Mind - Myths and Mechanisms*: London: Routledge.
Craft, A. (2002). *Creativity and Early Years Education*. London: Continuum.
Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
Davies, D., Howe, A., Rogers, M. & Fasciato, M. (2004). How do trainee elementary teachers understand creativity? In E. Norman, D. Spendlove, P. Graver & A. Mitchell (Eds.), *Creativity and Innovation – DATA International Research Conference*. Wellesbourne: D.A.T.A. Project website: http://www.bathspa.ac.uk/schools/education/projects/creative-teachers/default.asp.
de Bono, E. (1985). *Six Thinking Hats.* New York: Key Porter Books.
D.f.E.S. (Department for Education and Skills) (2003). *Excellence and Enjoyment*. London: D.f.E.S.
Diakidoy, I-A.N. & Kanari, E. (1999). Student teachers' beliefs about creativity. *British Educational Research Journal*, 25(2), 225-243.
Dickinson, V.L., Abd-El-Khalick, F.S. & Lederman, N.G. (2000). Changing elementary teachers' views of the NOS: effective strategies for science method courses, ERIC No: ED 441 680.
Edmonds, J. (2004). Creativity in science; leaping the void. In: R. Fisher & M. Williams (Eds.), *Unlocking Creativity*. London: David Fulton.
Eysenck, H.J. (1996). The measurement of creativity. In M.A. Boden (Ed.) *Dimensions of Creativity.* Cambridge, Massachusetts: Massachusetts Institute of Technology, 199-242.
Fisher, R. (1990). *Teaching Children to Think.* Hemel Hempstead: Simon & Schuster.
Fryer, M. & Collings, J.A. (1991). Teachers' views about creativity. *British Journal of Educational Psychology*, 61, 207-219.
Garner, R. (2007). Schools 'must do more for creativity'. *The Independent*, 31 Oct. 2007.
Greenfield, S. (2008). Reinventing us: What is technology doing to human identity? *New Scientist,* 17 May 2008, pp.48-49.
Hardy, T. & Kirkwood, V. (1994). Towards creating effective learning environments for science teachers. *International Journal of Science Education*, 16, 231-251.
Hofer, B.K. & Pintrich, P.R. (1997). The development of epistemological theories: beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research,* 67, 88-140.
Howe, A. (2004). Science is creative. *Elementary Science Review*, 81, 14-16.
Klahr, D, Dunbar, K., Fay, A., Penner, D. & Schunn, C. (2000). *Exploring science: the cognition and development of discovery processes.* Cambridge, Massachusetts: Massachusetts Institute of Technology Press.
Kind, P.M. & Kind, V. (2007). Creativity in science education: perspectives and challenges for developing school science. *Studies in Science Education*, 43, 1-37.
Kwang, N.A. (2001). *Why Asians are Less Creative than Westerners.* Singapore: Prentice-Hall.
Marton, F. (1981). Phenomenography – describing conceptions of the world around us. *Instructional Science*, 10, 177-200.
Mayer, R.E. (1999). Fifty years of creativity research. In R.J. Sternberg (Ed.), *Handbook of Creativity* Cambridge: Cambridge University Press, 449-460.
McPherson, J.H. (1975). A proposal for establishing ultimate criteria for measuring creative output. In: C.W. Taylor & F. Barron (Eds.), *Scientific creativity: its recognition and development.* New York: Krieger, 24-29.

Milne, I. (2007). Children's science, *Elementary Science Review*, 100, 33-34.
Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S. Miller, J. & Newton, D.P. (2005). *Frameworks for Thinking.* Cambridge: Cambridge University Press, 119 *et seq*.
N.A.C.C.C.E. (National Advisory Committee on Creative and Cultural Education) (1999). *All Our Futures: Creativity, Culture and Education*. London: D,f,E,E.
Newton, D.P. (2000). *Teaching for Understanding.* London: Routledge-Falmer.

Newton, D.P. & Newton, L.D. (2000). Do teachers support causal understanding through their discourse when teaching elementary science*? British Educational Research Journal*, 26(5), 599-613.
Newton, D.P. & Newton, L.D. (*in press).* Some Student Teachers' Conceptions of Creativity in School Science. *Research in Science and Technological Education.*
Nickerson, R.S. (1999). Enhancing creativity. In R.J. Sternberg (Ed.), *Handbook of Creativity.* Cambridge: Cambridge University Press, 392-430.
Nystrand, M. & Zeiser, S. (1970). Dewey, Dixon, and the future of creativity. *The English Journal*, 59(8), 1138-1140.
Ofsted (2006). *Creative partnerships: initiative and impact.* (Ref no. HMI 2517). London: Ofsted see www.ofsted.gov.uk.
Ovens, P. (2004). A 'SANE' way to encourage creativity. *Elementary Science Review*, 81, 17.
Osborn, A. (1957). *Applied Imagination.* New York: Scribner.
Osborne, J., Collins, S., Ratcliffe, M., Millar, R. & Duschl, R. (2003). What ideas-about-science should be taught in school science? A Delphi Study of the expert community. *Journal of Research in Science Teaching*, 40(7), 692-720.
Pajares, M.F. (1992). Teachers' beliefs and educational research: cleaning up a messy construct. *Review of Educational Research*, 62, 307-332.
Park, S., Soo-Young, L., Oliver, S. & Cramond, B. (2006). Changes in Korean science teachers' perceptions of creativity and science teaching after participating in an overseas professional development program. *Journal of Science Teacher Education*, 17(1), 37-64.
Q.C.A. (Qualifications and Curriculum Authority) (2003; 2005). *Creativity: Find It! Promote It!* London: Q.C.A./D.f.E.E.
Ritchie, S.M. & Edwards, J. (1996). Creative thinking instruction for aboriginal children. *Learning and Instruction*, 6(1), 59-75.
Runco, M.A. & Johnson, D.J. (2002). Parents' and teachers' implicit theories of children's creativity: a cross cultural perspective. *Creativity Research Journal*, 14, 427-438.
Schwartz-Geschka, M. (1994). Creativity in Japanese Society. *Creativity and Innovation Management*, 3(4), 229-232.
S.E.E.D. (Scottish Executive Education Department) (2006). Promoting creativity in education: overview of key national policy developments across the UK, http://www.hmie.gov.uk/documents/publications/hmiepcie.html.
Shneiderman, B. (2000). Creating creativity: user interfaces for supporting innovation. *ACM transactions on Computer-Human Interaction*, 7(1), 114-138.
Siegel, S. (1956). *Nonparametric Statistics.* Tokyo: McGraw-Hill, 229-238.
Simon, H.A. (1977). *Models of discovery.* Dortrecht: Reidel Publishing.
Sternberg, R.J. & Lubart, T.I. (1995). *Defying the Crowd: Cultivating Creativity in a Culture of Conformity.* New York: The Free Press.
Sternberg, R.J. & Lubart, T.I. (1999): The concept of creativity: prospects and paradigms. In R.J. Sternberg (Ed.), *Handbook of Creativity*, Cambridge: Cambridge University Press, 3-15.
Strauss, S. (1993). Teachers' pedagogical content knowledge about children's minds and learning: implications for teacher education. *Educational Psychologist*, 28, 279-290.
Tan, A-G. (2000). A review of the study of creativity in Singapore. *Journal of Creative Behavior*, 34(4), 259-284.
Taylor, R. (1999). The meaning of life. *Philosophy Now*, 24, 8-10.
Torrance, E.P. (1975). Explorations in creative thinking in the early school years. In C.W. Taylor & F. Barron (Eds.), *Scientific creativity: its recognition and development.* New York: Krieger, 173-183.
Waters-Adams, S. (2006). The relationship between understanding the nature of science and practice: the influence of teachers' beliefs about education, teaching and learning. *International Journal of Science Education*, 28(8), 919-944.
Weisberg, R.W. (1988). Problem solving and creativity. In R.J. Sternberg (Ed.), *The nature of creativity.* Cambridge: Cambridge University Press, 148-176.

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(A.10)

Individual differences in the development of creative competencies in school children

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Abstract
Studies on the development of creativity have highlighted the impact of learning environments. In particular, pedagogical approaches are hypothesized to differ concerning their emphasis on individual initiative, and action-based learning. A semi-longitudinal study was conducted during two consecutive years with 210 children in elementary schools with traditional and alternative (Freinet and Montessori) pedagogical approaches. We used various measures of creativity which differed on type of task (divergent thinking versus integrative task) and domain of expression (verbal versus figural). Our results highlight differences in creative development due to two factors: type of school learning environment and type of creative task.

Keywords: development of creativity, children, alternative and traditional pedagogy.

(A.11)

Coping with the latest linguistic development to achieve excellence in Education

Huda Buslama

Abstract

Teaching and learning have been the oldest human activities since Adam and Eve received instructions from God before their failure to comply. Has the lesson of their Fall been learnt? In this era of the Internet, the satellites and the cloning technology, excellence in education has furnished man with new concepts of excellence in education and more importantly with the impetus to achieve it. However, formal education involves a lot of people whose excellence may not be up to the requirements of achieving the aspired targets. To achieve excellence in formal education, the teachers must be excellent, the school planners and administrators, the learners' parents, the national education policy makers, and so on should be of certain caliber, mentality and excellence that inspire others. simply inspires This, unfortunately, might suggest frustration rather than hope, lamentation rather than motivation. Yet, genuine excellence means the will, determination and perseverance to overcome all these obstacles and achieve the aspired goals of excellent, functional and effective education for the majority of learners rather than for the elite.

Foreword

Teaching and learning are the oldest of human activities, and have been so since Adam and Eve received instructions from God – up until their failure to comply. Has the lesson of their Fall been learnt? What have we learned since the lesson of their Fall?

In this era of the Internet, the satellites and the cloning technology, a variety and plethora of research in education have furnished man with new concepts of excellence in education and, more importantly, with the impetus to achieve it. However, formal education involves a number of people whose degree of achieved excellence may not be adequate for achieving the intended targets. To achieve excellence in formal education, the teachers must be excellent, the school planners and administrators, the learners' parents, the national education policy makers, and so on should get deeply involved and be of certain caliber, mentality and disposition that would inspire both learners and teachers. In order to inspire others, one should be equipped with the knowledge, skills and strategies necessary in one's field of specialization since, in spite of all the new sophisticated technologies, the human mind still needs to be guided and honed to perfection. Failure in this respect, unfortunately, might lead to frustration rather than hope, lamentation rather than motivation. Yet, genuine excellence means that we must have the will, determination and perseverance to overcome all these obstacles and achieve the intended goals [or the goals to which we aspire] of excellent, functional and effective education for the majority of learners rather than for the elite. This has become a vital necessity in a world where competition in almost all walks of life leaves no room for the mediocre or the inefficient.

Introduction

As I am an English language teacher at university level, I will concentrate on the Teaching of English as a Foreign Language, and more specifically, teaching English to native speakers of Arabic. For this type of learner, English is a survival language in a world in which the computer, the internet and almost all the manuals of technical devices, equipment and instructions are in English. Generally speaking, to survive in this world, the speakers of other languages need to have a firm command of the English language. According to a report issued by the Arabic Linguistic Committee* in June 2001, only 10 % of the Arab World population can speak English. This is a simple and telling illustration of the status of English in the Arabic speaking world, a status which is deplorably far from any standard of excellence.

First and foremost, the English language instruction in formal educational settings does not only fail to cope with the current language evolution initiated by the globalization of information but it is extremely at odds with it. In an interview with a Libyan teacher, the language expert "interviewer" was surprised to get the following response:*

"Interviewer: "And what about the influence of learning English through American television shows or movies -- has that been a big influence?"

Interviewee: The English they learn in class sounds different than the one they see on TV. So they always have these examples: 'Well, I heard this on TV and in class you're telling me this, so which one is correct?"

This is an unquestionable proof of the mismatch between education and language functionality and / or effectiveness. It seems that inside the Arabic speaking world the information boom, the technological renaissance and the media global prevalence have not been adequately utilized to promote Excellence in Education.

http://www.voanews.com/specialenglish/archive/2007-03/2007-03-28-voa6.cfm?renderforprint=1&textonly=1&&TEXTMODE=1&CFID=186260422&CFTOKEN=85206311

Statement of the Problem

In the light of the above exposition it is a warranted corollary that the English language that the Arab learners, in Qatar, are exposed to in formal classroom situation is impractical and almost pointless, due to the fact that it is not the same language used today around the world. It should also be realized that the great informational and technological revolution of the 21st century has either been unexploited or misused. Excellence in foreign language education must necessarily refer to the ability to use the language to communicate globally, to interact appropriately in global settings and situations, and to be able to understand what is going on in the outside world. Any analysis of the language teaching status quo in the Arab world will doubtlessly indicate the teachers' adherence to the traditional teaching methodologies and the ineffective obsolete target language vocabulary and grammar structural approaches. To make matters worse, no matter what might be done to change the language content, the entire educational process will wind up in complete failure as there are no qualified teachers to implement the change or promote the educational reform process that the State of Qatar has embarked upon through the initiative of "Education for a New Era".

Most teachers of English in Qatar are non-native speakers of English who have themselves been taught in the old fashioned and conventional pedagogy which was mainly based on: "Teachers Deliver, Students Receive" In fact, these teachers need to be trained to be able to cope with the latest advances in this particular pedagogical context, teachers need to be trained so as to assume the function of learning facilitators rather than information deliverers or providers.

Key Points

In this research developed the following key points have been developed to address the above-cited problems based on the state of the art and the literature available. This paper is an attempt at garnering effective teaching methodologies that are deemed to achieve educational excellence. Moreover, this paper intends to provide some helpful information drawn on personal professional experience along with what is available in the state of the art.

1. Focus should be placed on the teacher rather than on the learner alone. The teacher who is adequately trained and qualified should be of great benefit to thousands of students and be able help them to achieve excellence through guiding them to carry on learning all life long and outside the school, to be able to think critically, analytically and to come up with their own innovative and creative learning techniques or approaches:

*"The quality of learning engagement in the classroom does not depend on students' cognitive abilities alone, but is also influenced by complex motivational and affective factors. Extensive research in the fields of L2 motivation and educational psychology has generated two important premises: first, the classroom environment is powerful in activating motivational beliefs of the students (Pintrich, Marx, & Boyle, 1993), which, in turn, affect their learning outcomes and second, teachers play a crucial role in creating motivating learning environments by employing a number of conscious and proactive motivational strategies."(*http://cwp60.berkeley.edu/TESL-EJ/ej38/a5.html).

It is quite evident from this quotation that the most important role teachers play in the foreign language classroom is that of enhancing the learners' motivation to learn the target language. Presumably, motivated students rely on their teachers at the early stages, and on their own endeavors and capabilities at later stages. Once the flame of the desire to learn, to acquire and master is lit and fueled, it is expected to continue to grow and require more fuel.

EFL teachers should be instructed and trained to be well versed in the grammatical, phonetic, semantic and stylistic domains of the target language. They should be ready to answer any of their

students' queries. Teachers should be a living linguistic, psycholinguistic and rhetoric sources as well as a learning facilitators and performance mentors.

2. Language learning should be the responsibility of the learners themselves in the first instance. They could avail themselves of programs, courses, tests etc. on the Internet. They can get useful information from the TV or newspapers or magazines. When in an electronic test / exercise the students get some answers wrong and they do not know why, the teacher should try indirectly (by asking questions, giving examples, or hints etc.) help them to understand what went wrong and what the correct answer should be.

The type of teachers who love their students and consequently facilitate learning are the ones who are not comfortable as disciplinarians. Enduring learning takes place in an atmosphere of mutual acceptance and freedom from fear, as loving parents give in the home, which provides an environment much more conducive to learning than the traditional school. Each child discovers his own best way to learn, and the home is usually the most desirable environment. Merrill L. Tew, 2002: http://www.creatinglearningcommunities.org/book/additional/tew.htm)

This quotation here proposes that the relationship between the learner and the teacher should be one of mutual interest, understanding, and common goals. This is a quantum transition which might be a novelty to the community in this part of the world where there has been a demarcation line between the teacher and the student, and which might not be readily overstepped. Consequently, it is a national necessity that this new approach should be adopted. Students should be allowed to get their teachers' help while they are trying to carry on learning on their own outside the school. Home now is a learning environment where the computer, the TV, newspapers and the radio are educational resources.

The EFL learners who are given the responsibility to learn independently, as indicated above, will learn English more efficiently and should be able to read and understand most texts written in modern and everyday language English. This paper is a proposal of new teaching outlook where the teaching material is authentic, natural, accessible, and available. Experimenting with this proposed methodology does not impinge on the formal instructional time since the activities occur mainly in the students' homes or outside schools. Watching the TV, reading the newspapers in English, listening to English songs, are some of these activities.

3. The teacher's role in this respect is to monitor the students' learning activities, provide advisement and guide the students to correct their errors and / or mistakes themselves. This could be done in groups or individually. This new trend relies heavily on what is called now "Media Literacy". Watching the TV, reading the newspapers in English, listening to English songs, could function very much like the native language environment where the first language is spontaneously assimilated and / or acquired. The teacher's role in this respect is very much like the child's parents who correct his / her language mistakes.

Media literacy includes reading and writing, speaking and listening, critical viewing, and the ability to make your own messages using a wide range of technologies, including cameras, camcorders, and computers. Media literacy is not a new subject area and it is not just about television: it is literacy for the information age (Hobbs, 1996).

First: **Vocabulary Learning:**

In the context of foreign language learning, a learner is forced to make ardent and conscious efforts to learn vocabulary outside the classroom simply because the exposure to the target language is limited in class. Moreover, most of the vocabulary items used in the world media are not included in the formal English language textbooks. In this case the learners are not expected to just "pick up" lexical items as language native speakers naturally do. They need to know how and when to use each word they have learnt. This makes explicit teaching of vocabulary an inevitable necessity.

"However, vocabulary is notoriously difficult if not impossible to teach because of the complexity of its linguistic, semantic and psycho-cognitive aspects." (http://www.teachingenglish.org.uk/think/vocabulary/vocab_autonomy.shtml#one)

Helping students acquire effective learning strategies in this respect is apt to make the entire process of foreign language learning successful. A useful strategy is to utilize available informal resources such as the TV, DVD, newspapers, the Internet, magazines, short stories, novels, etc. Learning lexical items from such resources guarantees their usability and authenticity.

*Children have vast amounts of information thrust upon them, much of it from media sources, much of it verbal or written, much of it visual, much of it manipulative. It is the child's task to make sense of it all, to construct reality from this information.**

For a start, the teacher may allocate 10 -15 minutes at the end of any formal lesson to brief the students on "how to use the search engines" on the Internet. Students could find electronic newspapers and read the headlines as a preliminary step. The teacher might allocate ten minutes to put down on the board some of the headlines the students have come up with. The teacher then could ask some questions about the linguistic features of headlines (e.g. brevity, use of abbreviations, use of certain words in lieu of others [probe instead of investigation], etc.) Once the students manage to understand most of the headlines, they could proceed to news / story or article paragraphs. Students should be encouraged to infer the meanings of the new words and then look them up using the Internet dictionaries. The students should also be encouraged to tell their colleagues about the new words they have learnt and how to use them.

Second:

The TV is a marvelous source of teaching and learning. Animation and colors are not only attractive, but they also help with making the word meanings clearer and with enhancing the viewers' analytical and creative thinking. However, in this Arab part of the world most parents espouse negative attitudes to the media culture and so do most old fashioned educators. They usually condemn the satellite channels as sources of pornography, indecency and violence. Such an outlook should be changed and they should know that they do not refrain from the use of knives in the kitchen just because they could be used to kill. The poison that kills could also be used to protect and cure. There are many, many TV programs which are extremely informative, and absolutely useful in educating children and preparing them to cope with this fast moving electronic and media world.

Third:

What is proposed here is that "Media Literacy" is not a subject to teach, but a new practical approach to other subjects inclusive of the language arts and skills. It is a realistic way of bringing young learners into closer contact with their lives, at present and in the future. Media mirror the societies' realities, problems and hopes. Language learning should be linked with such realities.

In more and more classrooms in the United States, educators are beginning to help students acquire the skills they need to manage in a media-saturated environment, recognizing that in its broadest sense, literacy must include the ability to skillfully 'read' and 'write' in a wide range of message forms, especially considering the dominance of image-based electronic media (Considine, 2002).

This is apt to keep the students well informed linguistically and well versed in global communication socially. In order to use the TV programs for the acquisition on new vocabulary items, students need to know something about the relationship between the language orthographic and sound systems. They could be much helped if they learn some rules about the representation of sounds into letters For example, it is extremely useful for the students to know that the / ʃ / (sh) sound could be represented by any of the following consonant-vowel combinations:

Cia as in special	tia as in martial	sh as in shallow	ssion as in passion
Cie as in ancient	tie as in patient	ture as in nature	sure
Cio as in spacious	tio as in nation	su as in sugar	

It would also be easy for the student to pronounce new words which have any of these combinations by analogy:

Example, facial - ratio – patio – quotient, etc.

It is also useful for the students to be guided by their teacher's questions to determine when the [c] letter stands for the /s/ sound and when it stands for the /k/ sound. The teacher just presents the following words already familiar to them and asks them to look closely into the world and find the spelling-pronunciation rule:

Lace- lack –city – cat – certify –codify – cereal – cut, etc.

Training the students to utilize familiar word pattern in order to learn new words that are similar to such patters could be a useful technique in learning new lexical items. For example, the students know the orthographic pattern of "night", the teacher could invite them to create new words using the same pattern then look them up to see if they are meaningful, such as:

Plight – fright – tight - or even, thigh, weigh – where some letters are added or

Out – snout – sprout – shout – tout – scout - deleted from the root structure of [igh]

Such approach stimulates the learners' creativity, ingenuity, and imagination. It inculcates in them the analytic and critical abilities as independent thinkers rather than passive information receivers. It also fosters observation and general memory skills. It could also foster the learners' interest in looking into linguistic phenomena that may have great impact on their ability to learn and use the foreign language.

Contextualized Words:

Excellence is not coincidental, but is an outcome of deliberate, conscientious individual efforts and ingenuities. Moreover, this approach provides a streamlined movement from the passive skills into the positive productive ones. When the teacher asks the learners about what they have watched or heard, their answers come as products of high level mental processes. For example, a question like: "What was the program producer trying to emphasize?" requires the learner's personal interpretation, analysis, and production. In this case words already learnt through the "Media Literacy" will be used in context, in other words in sentences or phrases. Ideally, the learners would use more or less the same language they have already seen or heard in the media.

This is quite different from the traditional "learn by heart" language chunks or responses. For example, during the researcher's lifelong career, the response of all the learners' to the question: "How are you?" is invariably. "Fine, thank you." Learning what people usually say in the media world, they may learn other responses such as " I'm afraid I'm a bit under the weather" or "Never better, thanks" or "So far, so good, thanks" etc. In this case, the foreign language users would sound more like a human rather than a robot (Hobbs, 1996).

Guessing Word Meaning in Context:

One of the most important vocabulary skills is the ability to guess the meaning of new lexical items in a text. The need to look up each and every unfamiliar word might deter the students from learning the language altogether. It might ruin the joy of listening to an interesting TV program or reading a thrilling short story or a valuable article. On the other hand if the students are trained to make appropriate inferences, this could enhance their self concept and inspire self confidence which would motivate them to improve their linguistic competency. Guessing word meaning could be a scientific and systematic process that could improve the students' analytic and reasoning skills. The following aspects should be taken into consideration when trying to guess the meaning of an unfamiliar word:

- **Word Type:** verb, noun, adverb, adjective, etc.
- **Word Structure (Derivation):** root , prefix, suffix, etc.
- **Word Weight**: necessary for understanding the message or proposition, or otherwise.
- **Word Logical Context:** (e.g. Does the word fit in logically? For example, in [He used a heavy beetle to mash the potatoes.], the word beetle does not logically fit in as the name of an insect since the beetle here is used to smash, and the insect beetle is not that heavy.)
- **Word Clarified by *adjacent Sentence or Phrase*:** (e.g. the old man's voice was almost **inaudible**. *We couldn't hear what he was trying to say*."

Practical Examples of Word Guessing Activities:

The students could be asked to guess single words in sentences:

1. He's such a **scatterbrain**. He's always leaving his reading glasses behind.
2. The guests **wolfed** the sandwiches and started on the cakes.
3. This table **wobbles** because it has a shorter leg.
4. **Shards of** glass have been cemented into the top of the wall to stop people climbing over.
5. Because we ***lingered*** too long at the restaurant, we missed the beginning of the movie.
6. Even though she studied for hours, I ***flunked*** the test.
7. The door was ***ajar,*** so the dog got out of the house.

Listening and Speaking:

Learning through the media involves hours of listening to native speakers, and therefore, the learners should be prepared and honed to be good listeners. The learners here need some information about the English language phonetics and phonology. A good teacher would provide the students with the necessary sound system features that will help them discern what they hear and produce the same sounds. Here follows an example of some basic phonetic information the learners need to know.

The sounds of the English consonants are divided in "voiced" and "voiceless" depending on the vibration of the vocal cords in the former and no vibration in the latter types of letters. Here is a list of both types of letters:

Voiced Consonant	Examples	Voiceless Consonant	Examples
b	Boy - buy	P	Pen – part - stop
d	Day – do - dance	T	Ten- it - site
v	Very - voice	F	Fun – fife - different
g	Good - girl	K	King- book - hike
z	Zinc - zero	S	Sing – miss - see
ʒ	television -	ʃ	She – cash - wash
dʒ	Jump – germ	tʃ	Chair – catch - watch
ð	The – this – bathe /beɪð/	θ	Thank – both – bath - anthropology
l	Long – live - help		
r	Run – read -		
j	Yes – you – few /ˈjuː/		
w	Want – wash - we		
m	Man – Rome- some		
n	New – number - in		
ŋ	King – sing -		

Note: All the vowel sounds are voiced.

Why should we learn this voicing element ?

This voicing element has great impact on the spelling and pronunciation of words. When a verb ends in a voiced sound such as [describe], to change it into a noun we add the suffix ***–tion*** which has the /ʃ/ sound. The /ʃ/ sound is voiceless whereas the final letter in the verb is [b] which is voiced and could not mingle with the voiceless sound of the suffix. In this case, the verb final [b] changes into the voiceless [p] for pronunciation lucidity and the noun form becomes [descri**p**tion]

More examples show how this voicing element has its impact on word derivations. If we look into the two verbs [permit] and [divide], we realize that to maintain the voiceless nature of the final [t] of the first word, the suffix used to change it into a noun is [-ssion] which has the voiceless sound /ʃ/ = and the same strategy is applied to the second word to maintain its voiced nature. So, the suffix used is [-sion] which has the voiced sound /ʒ/ = /dɪ'vɪʒ.ən/

A very important voicing influence is seen when some words retain their final [e] while others lose it when a suffix beginning with a vowel letter is added. For example, in the word [age] the final [e] is omitted in [aging] whereas in the word [notice] the final [e] is omitted in [noticing] but retained in [noticeable]. In the first instance the [c] letter has the voiceless sound /s/ according to the RULE that the letter [c] has the voiceless sound /s/ if followed by [e] or [i] or [y] as in face, cinema and cycle respectively. Therefore, if the final [e] is omitted it will be followed by the letter [a] which makes the [c] give the /k/ sound, then it is not the word in question. This has set a standing rule according to which the final [e] in the following words is maintained:

(manageable, traceable, priceable, outrageous, courageous, forceable, damageable, sliceable, etc.) Such information would help the language learners to master the English spelling through understanding. In rote learning the effort is repeated whenever a new word is learnt but when there is a rule or regular pattern, the effort is minimized and the cognitive ability is maximized.

Final s and –ed pronunciations:

One of the very important influences of the "voiced", "voiceless" dichotomy is that the [-ed] suffix as past tense marker is pronounced according to the preceding consonant's voicing. For example, the past tense of the word [help] is [helpt] and the present third person verb is [helps] where the t and the s are voiceless in congruence with the voiceless [p]. On the other hand, in a word like [serve] has the past tense sound /sɜːvd] and the +s form /sɜːvz] where the final [d] and [z] are voiced like the [v] sound.

Misconception of English Spelling:

One of the drastic consequences of having ungrounded conceptions of some linguistic aspects is that the learners are given erratic information which may contribute to the their frustration and sense of helplessness. Here is an excerpt from a researcher's article that has been published world wide:

The letters that come closest to the concept of "silent" have a historical origin, like "k" in knowledge and "p" in psychology, for example (Tirumalesh, 1996).

Telling the learners that silent letters in words are ascribed to historical origin is equivalent to telling them "You have to learn them by heart and ask no questions." The learners' frustration could result from their inability to trace such phenomena back into their historical background or from their inability to ascribe all the silent letters to history which is not theirs. In fact, the example the writer gives conform with a certain orthographic rule which could be generalized and utilized in learning many words that have initial silent consonants. The rule is generally known as the "Initial Consonant Cluster Rule". It simply shows that:

- All consonants that come in initial positions accept vowel letters after them.
- Any cluster of three consonants at the beginning must begin with[s] letter.
- Some consonants accept vowel letters only after them such as: h, j, l, m, n, q, r, v, w, and x.
- Except for the letter [s] all the other consonants accept either [l] or [r].
- When a consonant is followed by a letter it does not accept, it falls silent, and the next consonant is pronounced. That is why in the word [know], the [k] accepts only [l or r] and falls silent because it is followed by neither. The same rings true for the word [psychology]
- Some consonants mingle to produce a new sound: (e.g. ph or gh = f, and th produce the sounds θ and ð, and sh = ʃ.)

- Some consonants mingle with other consonants to produce the vowel diphthong sound: like [g] in the word sign /saɪn/ but when more syllables are added and the vowel should be short, the [g] is no more silent : /ˈsɪg.nɪ.tʃəʳ/

Fourth: **Mnemonic Approaches**

It is absolutely helpful that the students should adopt some mnemonic strategies to retain the new vocabulary items. ACCORDING TO Merriam Webster Dictionary, mnemonics are techniques of improving memory. There are countless techniques the learners could apply to help themselves remember words, sentences, ideas or arguments. The best techniques are those invented by the learners themselves. The teacher's role in this respect is to make the students realize that there are such techniques, then encourage them to come up with their own. Here are some techniques the researcher has gleaned herself and from her students:

Memory Techniques Used in Learning a Foreign Language

When to Use It:	Technique:	Example:
For information involving key words	Using a familiar word as basis for memorizing the new word	Familiar word : tire New words: satire, retire, entire, Familiar word: one New words: phone, prone, money, stone, cone, etc.
For information involving key words	Finding a link between the target word and a perceptual image	Interface (face) shoulder (v.) as in shoulder the responsibility, and shoulder as part of the human body. Headline (human head)= on top Museum = mummy [2ms with se in between]even the se my refer to[see]
For information involving key words	Finding some resemblance between the foreign and the native word.	Siege (English) and siage (Arabic) Elixir (Eng.) Uxir (AR.) Magazine (Eng.) Makhazin (Ar.=warehouses implying variety) Saffron (Eng.) Zaffran (Ar.)
For information involving key words	Finding helping regularities in the target words' vowel-consonant structure	Imaginative : It has the regular vowel structure of : i-a-i-a-i-e monotony: o-o-o photograph : ph-----ph o-o
For information involving key Phrasal verbs	Trying to distinguish between a familiar phrasal verb and a new one	Look down vs. look down upon Sign in vs. sign out Pay somebody off vs. pay something off.
For remembering word combinations	Finding or creating sentences or phrases that rhyme with the target ones	Target: leave somebody high and dry. Created: with nobody to stand by.

One more personal example dates back to the researcher's experience as a secondary school student. She had to learn the long word "recalcitrant" Looking it up, it means ***:*** *(unwilling to obey orders or to do what should be done, or (of an animal) refusing to be controlled unwilling to obey orders or to do what should be done, or (of an animal) refusing to be controlled)* She thought of the first part of the word [rekal] as very close to the Arabic word [rakal] which means "kick" So, it may bear some resemblance to the hypothetical meaning of "kicking the rules" The word has ever been in her memory. These are examples which could only be expanded to include more ingenuous techniques. The end result desired is that the learners will build their vocabulary repertoire with utmost ease and optimal creative thinking. As Defined by Robert Harris (1998), creativity is:

" A simple definition is that creativity is the ability to imagine or invent something new. As we will see below, creativity is not the ability to create out of nothing (only God can do that), but the ability to generate

new ideas by combining, changing, or reapplying existing ideas. Some creative ideas are astonishing and brilliant, while others are just simple, good, practical ideas that no one seems to have thought of yet".

It should be pointed out here that creativity is not easy to develop or acquire and success in this respect hinges on the following criteria:

1. **Perseverance**: Knowledge should be put to hard work and perpetual practice. Initial failure should be surmounted and success should breed success.
2. **No Error Inhibitions**: Teachers should convince their students that "to err is human" and that humans learn through trial and error. Errors or mistakes could be very useful learning tools. Correcting one mistake may yield very valuable information about thousands of other linguistic products. For example, a mistake made in the use of a semantic aspect, could set up a rule to be applied for ever.

A sentence like ;" He sees his sister only once in a time." is not the native speakers' word that collocates with "once in a ---" but they usually use the collocation "once in a while, or once in a blue moon" The non-native learner is expected to use the native speakers' collocation in similar situations all the time afterwards.

3. **Nothing to be Taken for Granted**: In other words, creativity necessitates looking into the information provided in a new way and question its validity and acceptability. The students should be encouraged to come up with their interpretations or analyses of pre-stated facts, information or arguments. Their views should not be derided or condemned. Some students may have their own creative insights, and if such insights are made known to their peers, they could be inspirational and motivational. This also means that constructive criticism is apt to challenge the individual's mental powers to yield new ideas, beliefs, solutions, operational methodologies or at least improve the existent ones.
4. **Curiosity** or **Inquisitivism**: Students should be motivated to know everything about life and the world they are living in. Knowledge about the planet Mars is not required for traveling to it, however it is common knowledge that contributes to the individual's being cultured or knowledgeable. Curiosity could be unexpectedly invaluable as is the case with Isaac Newton who was curious to know why an apple falls down from the tree. His curiosity led to his greatest human discoveries about "universal gravitation, three laws of motion, and the basis of classical mechanics".

Since "inquisitive" is defined by Websters as: 1) given to inquiry or research; eager for knowledge; curious. 2. unduly curious; prying; the label of "Inquisitivism" has been used to describe this approach. The approach should stand on its own rather then become a branch of constructivism, because without this level of preparedness, all the other aspects of learning will not occur. Once the fear has been removed and an adult learner is stimulated to find out just what every button on the screen can do, then and only then, can other concepts and principles of learning be applied.

*(*http://www.quasar.ualberta.ca/nethowto/theory/learning_theory.htm*;* http://en.wikipedia.org/wiki/Informal_learning)

Dwayne Harapnuik , the writer of the above excerpt proceeds to provide the main fundamentals of **Inquisitivism:**

- Fear removal
- Stimulation of Inquisitiveness
- Getting started fast
- Using the system to learn the system
- Discovery learning
- Modules can be completed in any order
- Supporting error recognition and remediation
- Developing optimal training designs
- Forum for discussion and exploiting prior knowledge
- Real life assignments

Perhaps the most effective principle here is real knowledge assignments which would foster real life language acquisition and use.

5. **Finding Honey in Poison**: This simple means that creative people do not panic when confronted with difficulties or problems. On the contrary, they look more closely into the problem to find if there are challenges that are worth tackling. They could by virtue of their well designed schooling and training enjoy jousting for high mental achievement and take pride in solving the most intricate problems. Here they get a commendable self-confidence and complacency. In the course of time they would become valuable leaders and reliable social, economic or political figures who have got the skills necessary for successful management and problem solving.
6. **Practice What you have learnt:** Mere exposure to language is a passive process but use of the language items that have been learned is a productive one. According to the "media Literacy" approach, the audio language material the learners are exposed to are normally evanescent unless they are audiotaped. If and when the learners use what they have heard and practice it immediately in various situations it tends to be fixed in memory and become an integral part of the language acquired.

" Experience indicates that almost all real learning for performance is informal (The Institute for Research on Learning, 2000, Menlo Park), and the people from whom we learn informally are usually present in real time. We all need that kind of access to an expert who can answer our questions and with whom we can play with the learning, practice, make mistakes, and practice some more."

Conclusion:

With the advent of the Internet English communication has become an essential and direly needed target. The English language taught formally at schools seemed to fall short of fulfilling the desired purpose. The formal school English seemed to belong to a different world. This proposed research paper is meant to provide a pedagogical template that would facilitate second / foreign language learning through learning, and appropriately using contextual lexical items utilizing the latest technological advances in the field. Helping students to acquire effective vocabulary learning strategies in this respect is apt to make the entire process of foreign language learning successful. A useful strategy is to utilize available informal resources such as the TV, DVD, newspapers, the Internet, magazines, short stories, novels, etc. Learning lexical items from such resources guarantees their usability and validity. Moreover, this is apt to promote the communicative use of vocabulary. This paper is mainly a self study , evaluation and research which would, hopefully, be inspirational to both students and teachers. It is also an attempt at integrating the media with information to achieve educational excellence.

The educational approach described above can be expected to create an excellent generation of learners who would be great thinkers and problem solvers to the advantage of their own countries in the course of time. The world today is suffering from myriads of economic, social, and political problems which increase in profundity due to the fact that the people in power fear them and lose the ability to think of any possible solutions.

The removal of fear could successfully be accomplished in all walks in life as it is in education. Inquisitiveness may stimulate the desire and ability to discover, analyze, and find solutions or construct theories. It seems that time has eventually come to tie language teaching with the world global village requirement and link learning with functioning in such a worldly society.

Just as the language has tremendously evolved, so must our language teaching. The researcher believes that the mere notion of self-learning that results in self production and successful achievement based on exposure to real-life and authentic language use is apt to create generations of excellent educational standards and aptitudes. Getting involved in what is going on in the world is also apt to develop in the students a degree of awareness not only in the world events that would, in turn, relate them to the fast moving globe and motivate them to keep pace.

In brief, it is recommended here that for excellence of education in this Arab part of the world, there should be an inquiry based and learner centered educational policy which integrates the official classroom environment with the real life media world.

References:

Considine, D. (October, 2002). Putting the ME in MEdia literacy. *Middle Ground: The Magazine of Middle Level Education, 6,* 15-21.

Hobbs, R. (1996). Teaching media literacy. In E. Dennis and E. Pease (Eds.), Children and the media. New Brunswick: Transaction Press (pp. 103-111).

Luke, C. (May, 1999). Media and cultural studies in Australia. *Journal of Adolescent & Adult Literacy, 42,* 622-626.

About the Author

Born in Tunisia, Dr. Huda Buslama completed her primary and secondary studies in Sfax, her hometown. She then joined the Sorbonne University in Paris in 1979 where she obtained all her postgraduate degrees.

She holds a Ph.D. in Education, Linguistic Department, Sorbonne University, Paris, France 1987. Since then, she has been working with a number of different organizations in Education and Human Service domains. In addition to teaching in Universities, her work has focused on managing and delivering complex and large scale programs, which included building capacities to examine current educational reforms and operations, develop alternative structures, redesign processes and improve programs. She has also held positions of progressive responsibility in the not-for-profit sector, related to educational settings, where she has been responsible for the successful delivery and implementation of a number of large scale assessment programs sponsored by the Supreme Education Council of the State of Qatar. The programs within this portfolio include:

- The Qatar Comprehensive Education Assessment (**QCEA** Program), a national large scale assessment program designed to assess students in the Qatari Independent Schools in Grades 4 to 11 in four subjects areas; Arabic, English, Math, and Science.
- Program for International Student Assessment (**PISA**). PISA is an international large scale student assessment program that assesses 15 year old students from 57 countries.
- Progress in International Reading Literacy Study (**PIRLS**). PIRLS is an international comparative study of young students' reading literacy. PIRLS studies; the reading achievement and reading behaviors and attitudes of fourth-grade students.
- Trends in Math and Science Studies (TIMSS) - is an international assessment of the mathematics and science knowledge of fourth- and eighth-grade students around the world.

Most of Dr. Buslama's research and publications are chiefly focused on creative teaching, learning and assessment techniques and strategies.

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A Talent Development Framework for Nurturing Future Leaders in a Changing World

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Abstract
Provisions for gifted education should include authentic learning opportunities to guide students in using their talents constructively and responsibly, and to prepare them for their future roles in society and the workplace. This is particularly pertinent for 17-to-18-year-old gifted youth, given the often asynchronous nature of their affective development compared to the intellectual. Raffles Junior College is a premier pre-university institution in Singapore, attracting the brightest talents of the country as its students. This paper describes the college's framework for its Talent Development Programmes. The key thrust of these out-of-hours enrichment programmes is the provision of authentic learning opportunities that will effectively place students' educational experience in the context of real-world issues and careers. A whole-school approach to enrichment is adopted, with enrichment activities positioned as an extension of the core curriculum. Emphasis is placed on developing a global perspective and on collaboration with community partners like tertiary institutions, government agencies, non-governmental organizations and industry. The presentation will address curriculum design principles, resource deployment and implementation issues faced in developing programmes like the Raffles Bicultural Programmes for China, India and the Middle East, and the Raffles Public Policy Programme.

Introduction

Every year, RJC attracts the brightest talents of each national cohort as our students, including a large number of students from Singapore's national Gifted Education Programme.[20] That the College has succeeded in building a reputation for the highest levels of academic achievement in the country comes as no surprise, given the quality of the students it admits. However, it has often been noted that excellent academic results are not necessarily an accurate indicator of an individual's readiness for the workplace. Indeed, the asynchronous nature of gifted students' affective development compared to the intellectual continues to be a key focus area that the college is seeking to address.

The instruction received through the national curriculum, with its emphasis on the traditional disciplines of Mathematics, the Sciences and the Humanities, prepares students for the academic rigour of advanced study in these subjects. It may not, however, be sufficient to equip students with the skills needed for the demands of a changing and increasingly global world. Provisions for gifted education should include authentic learning opportunities to guide students in using their talents constructively and responsibly, and to prepare them for their roles as leaders in society and the workplace. This is especially pertinent given that many of our top students are awarded government scholarships aimed at grooming talent for public service – these students are our future thought leaders and policy-makers whose decisions will have a direct impact on the lives of many.

To address the above concerns, the college adopted the approach of designing enrichment electives to complement the core curriculum, giving students exposure to relevant issues and disciplines not normally encountered in the classroom. The key thrust of these enrichment programmes is the provision of authentic learning opportunities that will effectively place students' educational experience in the context of real-world issues and careers. These programmes aim to equip students with the knowledge and skills required to respond to the changing paradigms of the new world, and will also inculcate in students the dispositions and habits of mind that will lay the foundations for a meaningful and ethical engagement with the local and global community.

A Framework for Talent Development Programmes

While out-of-hours enrichment programmes were not new to the school, the tendency was for these programmes to be ad-hoc and run independently by the various departments – the Physics

[20] 1 in 5 of our students are from the Singapore Ministry of Education's Gifted Education Programme. These students form the top 1% of each national cohort, and are identified through a series of selection tests conducted at age 10 and 12.

teachers ran enrichment electives for Physics, the History Department conducted enrichment classes for History students etc.

An evaluation of the range and quality of the enrichment programmes offered revealed that what was lacking was a whole-school coordinated approach towards enrichment. A coordinated approach would also allow a more effective deployment of staff and physical resources, and encourage inter-disciplinary, cross-department collaboration. A framework for developing these programmes was needed to provide an overarching structure that will guide teachers in developing a comprehensive and meaningful range of programmes. The framework developed is shown in the diagram on the following page.

<table>
<tr><td colspan="3">Talent Development Programmes</td></tr>
<tr><td colspan="3">Aims of Programmes
The Talent Development Programmes seek to develop globally ready and socially responsible citizens, future thought leaders who will enhance the life of humanity through contributions in their chosen sphere of influence.</td></tr>
<tr><td colspan="3">Curriculum Design Principles
Provision of authentic learning experiences;
Inter-disciplinary approach anchored in a subject discipline;
Collaboration with external partners;
Developing a global perspective.</td></tr>
<tr><td>Humanities Enrichment

Raffles Asia Programme

Raffles Bicultural China Programme

Raffles Bicultural India Programme

Raffles Middle East Programme

Raffles Renaissance Programme

Humanities Outreach Programmes</td><td>Science Enrichment
Special Science Lecture Series
Electives@Raffles Research Labs

Raffles Research Attachment Programme

Overseas Science Programmes

RJC Physics Building Competition

Raffles Science Outreach Programmes</td><td>Student Development

Community Leaders' Programme

Raffles Public Policy Programme

Raffles Meet-the-People Attachment Programme

Ecological Literacy Programme

Foundations for Service Learning

International Service Learning Elective</td></tr>
<tr><td colspan="3">A Whole-school Approach through Staff and School Commitment</td></tr>
</table>

Figure 1: Framework for Talent Development Programmes.

Curriculum Design Principles

The aim of all Talent Development Programmes is to develop globally ready and socially responsible citizens, future thought leaders who will enhance the life of humanity through contributions in their chosen sphere of influence. While teachers are given autonomy to develop the various programmes, they must address four key focus areas. These form the guiding principles in the design of the curriculum.

(i) Provision of authentic learning experiences

The programmes must expose students to *current* real-world issues and challenges *relevant* in the context of the community that they live in. For instance, Singapore is a small nation, economically reliant on its ties with the rest of the world. China, India and the Middle East are fast emerging as key economic regions and potential partners for our country's sustained growth. However, there is little in the core academic curriculum that prepares students for effective engagement with their counterparts in these regions. Hence, three Bicultural Programmes (China, India and the Middle East) were mounted to equip students with working knowledge of the cultural, economic, political, and social structures of these diverse regions.

(ii) Inter-disciplinary approach anchored in a subject discipline

The programmes will be inter-disciplinary in nature while remaining anchored in a key subject discipline. Thus, the programmes are conducted under the auspices of individual departments to ensure ownership of the programmes, e.g. the Chinese Language Department takes charge of the Raffles Bicultural China Programme, the Humanities Department oversees the Raffles Asia Programme. This ensures ownership and the sustainability of these programmes. The programmes themselves, however, draw on different areas of knowledge while remaining anchored in a subject area. There is a conscious attempt to encourage cross-department and inter-disciplinary collaboration by providing a platform for interested teachers from various departments to work together. For instance, the Middle East Programme is helmed by a History teacher, who is assisted by an Economics teacher and a Physical Education teacher (with a degree in Political Science). The cross-department approach provides multiple perspectives and also allows students to appreciate that knowledge should not be compartmentalized but that what one learns in one domain can be linked to another.

(iii) Collaboration with external partners for extended learning opportunities

We recognise that teachers may not have the necessary expertise to provide the insights and perspectives needed for a truly authentic learning experience. The school needs to bring real-world knowledge into the classroom. We actively tap on the expertise of tertiary institutions, research institutes, government agencies, non-government organisations and industry, to provide extended learning opportunities for our students. For example, our teachers co-run selected modules of the Raffles Bicultural China Programme with the Singapore Chinese Institute of Business. The Bicultural India Programme features a spectrum of guest lecturers, from the Deputy High Commissioner of the India High Commission in Singapore, the India Correspondent of our main English newspaper, academics from the Institute of South Asian Studies, to an award-winning Indian playwright and a chef from a renowned Indian restaurant.

(iv) Developing a global perspective

The programmes aim to provide students an opportunity to develop a level of global understanding while rooting them within Singapore's culture and mindset. Many of these programmes comprise an experiential learning component to supplement the theory component, with educational trips to the regions studied and/or immersion programmes at overseas schools.

A brief description of the individual programmes is provided in Annex 1.

A Whole-school Approach

All the talent development programmes are under-girded by a strong school commitment to the programmes through a whole-school approach. This is necessary as these programmes will only succeed if teachers and students view them as a priority rather than yet another ad-hoc and short-term

enrichment programme. These programmes are thus positioned as an extension of the core curriculum, with common goals and objectives identified, allowing for different departments to take ownership while retaining a common purpose and direction. A whole-school approach also enables a coordinated implementation plan that takes into account the structures and resources needed at a systems-wide level.

To signal that these programmes are an integral part of the core curriculum, the school allotted time for these 'out-of-hours' enrichment programmes within curriculum time itself. The first two periods of each Monday's timetable were set aside as 'protected time' for these programmes to be carried out. Some activities continued to be conducted after school hours due to time and space constraints. Nevertheless, the one-and-a-half hour slot built into the school timetable was useful in enabling more students to attend the programmes as there were no longer clashes with the students' other extra-curricular activities. More significantly, the scheduling of these programmes sent a clear message to both students and staff that these programmes were an important part of the curriculum, and not just an optional extra.

In terms of staffing, teachers were identified, both for their experience as well as their interest, to spearhead these programmes. Their involvement in these programmes was factored into their overall workload, so that it was not perceived as an add-on burden but recognised as part of the teachers' overall assigned duties.

Where student participation is concerned, the college subscribes to the belief that our programmes should be learner-centred and interest-driven. Hence, while students are encouraged to take part in at least one programme, participation is not compulsory, and students have to choose to join them. For popular programmes with limited spaces, students compete for a place, through placement tests, personal statements or interviews. The general approach is to give students a range of choices, so that they can choose based on their individual strengths and interests.

Review and Evaluation

The framework has engendered a clearer sense of direction amongst staff as to the goals and objectives of the school's enrichment programmes. The identification of common curriculum design principles was useful in guiding teachers in terms of developing and growing the programmes. The whole-school approach has also succeeded in enhancing staff commitment to the programmes and increasing participation levels amongst students.

However, further tracking of student participation is required. It was observed that some students did not participate at all, while others signed up for multiple programmes, over-committing themselves and compromising the level of their participation in each. Other students expressed disappointment that they had to choose between programmes that were conducted concurrently, or that they were not able to get into a programme they were deeply interested in due to the limited places available.

Student feedback obtained from surveys and focus group discussions indicated that most students found the programmes beneficial in terms of providing an informed understanding and sparking interest in an area not explored in the core curriculum. To fully evaluate the success of the programmes, the college will need to track these students after graduation, to ascertain whether the benefits gained from the programmes extended to their tertiary studies and beyond.

Looking ahead, the college will undertake a thorough review of the enrichment programmes with the objective of widening and deepening the reach of these learning opportunities. Firstly, we intend to expand student places in each programme so that more students benefit. In addition, we will review each programme to study how selected modules can be developed beyond offering short-term general exploratory activities, or activities involving advanced instruction and process training (Renzulli's Type I and Type II enrichment activities[21]), to developing long-term, sustained opportunities where students assume the role of first-hand inquirers (Type III).

[21] Renzulli, J. S. (1977). *The enrichment triad model: A guide for developing defensible programs for the gifted and talented.* Mansfield Center, CT: Creative Learning Press.

Conclusion

We believe that enrichment programmes have a significant part to play in terms of providing high-end, advanced learning opportunities aimed at stretching the highly-able and widening their worldviews. While good and meaningful programmes require commitment on the school's part in terms of time and resources, they are well worth the effort. When properly planned and implemented, they provide students with real-world learning opportunities and fill in the gaps where the core curriculum fails to provide. These authentic learning experiences could serve as a starting point to help students to understand the demands of the real world and prepare them for their roles as future leaders of the nation.

About the Author

Reavley Munn Ye is Dean of Talent Development and Management at Raffles Junior College (Singapore). An educator with over 15 years of experience teaching young people aged 16 to 18, she currently oversees the design and implementation of provisions for gifted students in the college. Her work includes curriculum design and developing action research projects leading to innovative pedagogy and curricular practices. She also plays the role of school administrator, and is involved in translating pedagogical theories into workable programmes for students. Her interest lies in how schools can address implementation issues like resource deployment and establishing the systemic structures needed to carry out effective G&T programmes within a mainstream school.

Annex 1:

TALENT DEVELOPMENT PROGRAMMES OFFERED BY RAFFLES JUNIOR COLLEGE

Humanities Enrichment Programmes

a. *The Raffles Asia Programme*

The Raffles Asia Programme aims to provide students with a good knowledge of the geopolitics, development and culture of Asia (chiefly China, India and South-East Asia), and an insight into how the various social, economic and historical backgrounds of Asian countries impact the way politics is conducted today. Through the programme, students will also develop a greater sensitivity for, and deeper appreciation of, the different cultural heritage and religions of the region. In short, this programme will nurture students to become "bicultural and multicultural players who can engage in Asian economies." (Minister Mentor Lee Kuan Yew, International Conference on National Boundaries and Cultural Configurations, Nanyang Technological University, 23 June 2004)

An intellectually demanding programme, Raffles Asia Programme lists among the reading materials works by socio-political and moral philosophers such as Plato, Hobbes, Hume, Aristotle, Kant and J.S. Mill. Students are also expected to read books on the history of the region, e.g. Jonathan Spence (China), Paul Cohen (China), Benedict Anderson (Indonesia), Edmund Terence Gomez and K.S. Jomo (Malaysia).

Run on seminar-style forums conducted monthly, Raffles Asia Programme provides students with the opportunity to prepare and present policy papers to distinguished leaders and policymakers for debate and discussion. Guest speakers, who are expert practitioners in their field, are invited, and will guide our students to evaluate and analyse the issues discussed. The seminar papers are published to highlight the work completed by the students as well as provide them with the opportunity to build their student portfolio.

b. *The Raffles Bicultural Programme (China)*

The programme aims to enhance the Chinese language ability of our students as well as to raise their understanding of Chinese culture and the development of modern China in the recent century. Open to all interested students who would like to further their knowledge in both Chinese language and culture, this programme provides our students with access to the cultural heritage of their forebears, and a worldview that complements their perspective of the English-speaking world.

The Raffles Bicultural Programme (China) comprises three main components, namely, academic, enrichment and experiential components. Students may opt for one or more of the components. The academic component is an examinable component and refers to the Higher Chinese Language paper at A Level. The enrichment component offers the following:

Chinese philosophy;

- Aspects of Chinese culture, e.g. language and writing, religious beliefs, cultural beliefs and practices, thinking and philosophy, and inter-personal relationships;
- Chinese literature and performing arts, e.g. famous literary works such as The Water Margin, Romance of the Three Kingdoms, Tang and Sung poetry, modern literary works, Chinese folklore, Chinese opera, calligraphy and Chinese paintings;
- Political and economic development of modern China; and
- Sino-Singapore relations

The experiential component offers immersion programmes with schools and businesses in China, partnerships with the Chinese Departments of our local universities as well as renowned universities in China.

c. *The Raffles Bicultural Programme (India)*
The Raffles Bicultural Programme (India) is designed to develop in students of all races a deeper understanding of Indian history, culture and society and its relationship with the World, in particular with Singapore. The programme prepares students to be multi-cultural players of the future, equipped with the knowledge and skills needed to be actively engaged in the Indian economy.

The programme focuses on four broad themes – Glimpses of India, Opportunities and Challenges, Politics and Governance, and India and the World. It is conducted via lectures, seminars, symposiums and dialogue sessions, and will culminate in a practicum for students to apply the knowledge they have acquired through the course of the programme. The practicum component includes an overseas trip to India (New Delhi, Jaipur, Agra and Mumbai), field studies and attachments at industries and educational institutions both locally and in India.

d. *The Raffles Middle East Programme (RMEP)*
RMEP aims to equip students with an understanding of the regional politics and history of the Middle East and its dealings with the international community, taking into consideration the economic significance and diverse make-up of the region. It provides students with a sound understanding of Singapore-Middle East relations so that they will be equipped to engage with the region which has taken a significant step towards globalisation and increased interaction.

RMEP introduces students to the Middle East by looking at differing classifications of the region and the changing definitional dispositions as well as the culture and civilisations of the region through language. Basic conversational Arabic will be taught and students will learn about the historical development, the opportunities and challenges of the Middle East and the impact of the region on the world. The programme will provide students with an experiential learning module comprising two elective components: an overseas immersion programme and a programme to host Middle Eastern students. Interested students may also take up MFA internships at the Middle East desk in Singapore and missions overseas.

e. *The Raffles Renaissance Programme*
The Raffles Renaissance Programme aims to expose students to centuries of intellectual thought through classic writings and works. Modelled after the Great Books Programme, it aims to start a 'conversation' between Western and Asian civilizations through the study of classic texts. The programme gives students the space to discuss the important distinction between being a human being and being a member of society, and helps them reflect on the foundations of what they believe in and why they do so.

Students will read and discuss books such as Plato's *The Republic*, Machiavelli's *The Prince*, Ibn Khaldun's *The Muqaddimah*, Lao Tzu's *Tao De Jing* and *The Bhagavad Gita.* Academics from the universities are also invited to deliver lectures and share their perspectives on these great books with the students.

Science Enrichment Programmes
In the area of Mathematics and the Sciences, RJC's approach is to actively seek collaborative opportunities with local and overseas tertiary institutions and research institutes to enable students to engage in authentic learning through research projects, advanced electives, internships and attachments, giving students early and sustained exposure to science research work. In 2007, 597 students participated in such programmes. The following are some of our key programmes:

a. *Pull-out training classes for Olympiad and other international competitions.* Outstanding students are selected to represent the college and Singapore in the Olympiads and other international competitions. These students are pulled out of their classes for specialized training to prepare them for these national and international events. In 2007, over 160 students were identified for the Olympiad training programmes for Biology, Physics and Chemistry. RJC students were also well-represented at competitions like SSEF (Singapore Science Engineering Fair), the Taiwan Science Fair and ISEF (Intel International Science Engineering Fair).

b. *Raffles Research Attachment Programme*
The college believes that research is a critical part of the pedagogy for highly-able students. As such, we actively seek opportunities for our students to participate in attachment programmes at universities and research institutes. The following are examples of some of our partner institutions:

- Institute of Molecular and Cell Biology
- Photonics Research Centre (PhRC), Nanyang Tech University
- School of Mechanical and Aerospace Engineering, Nanyang Tech University
- Institute of Bioengineering & Nanotechnology (IBN)
- Genome Institute of Singapore (GIS)
- Bioinformatics Institute (BII)
- National Neuroscience Institute (NNI)
- Junior Talent Development Programme (JTDP), Faculty of Engineering, National University of Singapore

c. *Electives@Raffles Research Labs*
Complementing the Raffles Research Attachment Programme is the Research@Raffles Programme. RJC has a suite of 5 specialized research laboratories to support the following niche areas: Life Sciences, Materials Engineering, Photonics, Chemical Instrumentation and Analysis, and Communications. The RJC research electives are short courses on specialized topics in science offered by the research laboratories. In total, 20 electives were offered in 2007. Students benefited from electives like Introduction to Diffraction, Fourier Optics and Image Processing, Introduction to Computer Networking and DNA Polymorphisms, DNA Barcoding of Bukit Timah Forest species, Marine Ecology at Sentosa which were developed and conducted either by our teachers or with the help of external partners.

d. *Overseas Summer School Programmes*
These programmes provide students with the opportunity to interact with participants from other countries besides, attending lectures conducted by academic staff at prestigious universities and carrying out projects under their tutelage. Our students benefited from the Science Summer School programmes at the University of Cambridge (UK), MIT's (USA) Centre for Excellence in Education Summer Programme and University of Western Australia. In 2007, 76 students were identified for these overseas programmes.

e. *Special Science Lecture Series*
The RJC Distinguished Visitors' Lectures and the Raffles Sterling Lectures provide opportunities for students to listen to and interact with scientists from renowned local and overseas institutions who speak on their fields of expertise. Past speakers have included Nobel Laureates. In addition, the Raffles Science Lecture Series, conducted by invited local and foreign (mainly UK) lecturers from tertiary institutions, focuses on a different theme of interest each year. Activities such as essay competitions are also held so that students may apply their scientific knowledge in a creative way. The theme for the lecture series in 2007 was 'Functional & Smart Materials for the Future', with lectures conducted by guest speakers from Nanyang Technological University.

f. RJC Inter-class Physics Building Competition and Chemistry Week

To provide opportunities for science students to work in groups and apply science principles in constructing models, the RJC Science Department organizes annual Physics building competitions for all JC1 Physics Students. The models built include bridges, towers, cranes and land yachts. In addition, an entire week in the term calendar was also devoted to Chemistry-related activities, comprising Chemistry Quizzes and interesting Chemistry facts.

g. RJC Science Camp

To provide leadership opportunities for RJC students in the field of science, the annual RJC Science Camp is conducted during the school holidays for secondary school students. Our students help to plan the camp and serve as group leaders or guides to the secondary school students.

h. Raffles Science Outreach Programmes

To provide opportunities for students to apply their science knowledge to reach out to students outside the college, RJC organises a few science outreach programmes, namely, the Raffles Eureka Quiz (an annual mathematics and science quiz organised for secondary school students), The RJC Toy Inventor's Challenge and the Cluster Life Science Sharing Sessions.

Student Development Programmes

a. Raffles Public Policy Programme

The Raffles Public Policy Programme is an annual internship programme for high ability students interested in public administration and policy-making. In 2007, 30 students participated in the programme. They were attached to ministries and statutory boards during the November/December school holidays. The programme also includes a structured theoretical and academic study programme on policy-making before students are attached to the ministries. Major local, regional and international policy themes are addressed during seminar discussions with distinguished speakers, giving students insight into the varied perspectives of government, non-government organisations (NGOs), academia and businesses on public policy formulation.

b. Raffles Meet-the-People Session (MPS) Attachment Programme

The programme aims to nurture active citizens and socially responsible leaders of the future. Comprising 2 seminar sessions, 1 visit to Parliament and a 6-week attachment to a Member of Parliament during his/her Meet-the-People Session, the programme exposes students to the real-world problems and issues facing their fellow citizens in an authentic setting.

c. Raffles Ecological Literacy Programme

This programme enables students to learn about, understand and care for our Earth, and to empower students to take responsibility for action in issues of morality, social justice and environmental advocacy. It involves classroom sharing, visits to local parks, 2 day trips and 2 overnight trips.

d. International Service-Learning Elective (ISLE)

The ISLE prepares youth for a deeper engagement with local communities in Singapore and overseas communities in the ASEAN region, China and India. Both the local and overseas communities' needs will be identified and students will be actively engaged in performing a service project for a specific community. 131 students took part in this programme in 2007.

As part of the preparation for the overseas service project, the learning journey begins in Singapore with participants looking at

- Why overseas service learning projects?
- Reciprocity and Learning Journey
- Cultural Diversity; Social, Cultural and Environmental Awareness and Ethics
- Programme Design and Development
- Critical reflection of local and regional issues.

e. *Community Leaders Programme (CLP)*
This programme is designed for outstanding student leaders who have the attributes and passion to be community advocates. In addition to attending a 2-day Foundations of Service Learning and Service Learning Facilitation Skills programme, participants will take part in a 3-day camp. The CLP focuses on:

- Deeper analysis of community issues
- Civil Society
- Responsible and Effective Advocacy

(A.13)

Khaled Albaker, Excellence in Higher Education in Bahrain: An exploratory study of the reasons behind pursuing accreditation: This paper sheds the light on the pursuit of excellence in higher education in Bahrain. It focuses on the experience of the College of Arts in Manama University during the planning and introduction stages of joining external accreditation body. This paper address four main questions related to the rationale for the endeavour to join the external accreditation body, the college ability to maintain its cultural specifications and characteristics during the process, the vision of what is expected after being accredited, and finally how can the college make the most out of this experience. A qualitative approach has been adopted using semi-structured interviews to answer research questions. The findings stressed the importance of achieving excellence to survive local competition and being internationally recognised. In addition, members of the college demonstrated high levels of cultural awareness toward externally imported quality standards. Finally, excellence culture should be sustained by spreading the vision amongst lecturers.

(A.14)

Affective Education for the Highly-able: An Integrated Approach

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Abstract
This paper showcases the programming structures aimed at meeting the affective needs of highly-able students at Raffles Junior College in Singapore. A central theme is affective education integrated in the core curriculum, focussing on the moral, ethical and social development of the individual through authentic learning experiences. The approach is to provide a comprehensive range of Student Development Programmes as well as Student Services. The Student Development Programme seeks to develop students as individuals and to nurture them to be good citizens, conscious of their responsibilities to family, society and the nation. Students undergo programmes related to Character and Citizenship Education, Physical Education, Co-curricular Activities, Community Education and Service Learning, and Leadership Development. Through these programmes, we develop their personal effectiveness, inter-personal effectiveness and responsibility to the community. Student Services consist of pre-emptive and interventionist measures and provide students with the support needed for them to excel while at college as well as equip them with the knowledge and skills necessary for successful transition to tertiary education and the world of work. Professional psychological counselling is provided to meet their socio-emotional needs while the one-stop Student Services Centre provides education counselling, career guidance and scholarships guidance to support students' aspirations for the future.

Introduction

Raffles Junior College is a premier educational institution in Singapore which offers a two-year education for kids aged 17 to 18, leading to the General Cambridge Education 'A' Level certificate. It attracts students from top secondary schools who have distinguished themselves in the national examinations at the 'O' Levels and students with exceptional talents in other fields such as sports, music, etc. 1 in 5 of our students are from the Singapore Ministry of Education's Gifted Education Program - a Program for the top 1% of the cohort, in which students are identified through a series of selection tests conducted at ages 10 and 12.

Given the exceptional calibre of these students, comprehensive non-academic programs under one of two domains – "student development" and "student services", are designed to address the affective needs of our students. Student development programmes in our college are designed to nurture sound individuals and good citizens conscious of their responsibility to family, society and the nation, as the basis for their eventual development into leaders. Hence the main affective dimensions our programs seek to develop are personal effectiveness, inter-personal effectiveness and responsibility to the community.

Personal effectiveness refers to the development of the person, such as self-management, self concept and esteem, while inter-personal effectiveness refers to social skills of relating to others in a person's immediate circle of interaction. Together, these two dimensions comprise the foundation of a student's socio-emotional well-being and are therefore designed as part of the formal non-academic curriculum. Responsibility to the community builds on inter-personal effectiveness and refers to the student's appreciation of his/her responsibility to the community, society and nation. It is especially necessary to address this aspect in highly-able students, especially in the context of our college, where many of these students will eventually assume positions of responsibility in the community.

The other domain of "student services" provides supporting services through engaging relevant stakeholders and external professionals for students' holistic well-being. These services are both pre-emptive and interventionist in nature.

This paper will highlight the range of non-academic programs under each domain and the role they play in students' affective education, in the context of a top junior college like RJC in a small country limited in human resources.

Overview of affective education in RJC

Our programs to develop students as confident, well-adjusted individuals fall under either the "student development" or "student services" domains. An overview of the range of relevant programmes and services provided for students is presented in Table 1.

Table 1: Overview of student development programs and student services at RJC.

Student development programmes	Student services
• Character and citizenship education	• Emotional counselling
• Physical education	• Educational guidance
• Co-curricular activities	• Career guidance
• Community education and service learning	• Scholarship guidance
• Leadership development	• Health awareness

Student development programmes

The student development department drives value education within the college and aims to nurture students into individuals of sound character. Values are transmitted to students through both experiential and intellectual engagement offered by a range of programmes. No less significant is the additional learning and social platform which these programs provide for students beyond the four walls of the classroom, enhancing students' cognitive exposure as well as socio-emotional well-being as they establish informal support groups within different social circles. For highly motivated students like ours, achievement in these non-academic areas also provides them with a further avenue for positive self-image and esteem.

Student development programmes span five areas: character and citizenship education, physical education, co-curricular activities, community education & service learning, and leadership development. Character education is part of the formal curriculum and is mostly conducted through formal civics lessons, during which explicit conveyance of personal values and life skills occur. Civics lessons also provide the pastoral platform for civics tutors to interact with their students. These opportunities are important as civics tutors are often the first to intervene, or alert the need for professional intervention in counselling cases. Citizenship education raises awareness of kids' larger responsibility to the nation and other important national values. Explicit citizenship education occurs mostly through the same civics platform, and is also effectively infused in subject teaching, where relevant.

Like character education, physical education is part of the formal curriculum and aims to develop social relations through team sports. More importantly though, physical education is part of the formal curriculum in all Singapore schools due to its emphasis on students' physical well-being and role in providing a holistic educational experience. More pertinent to affective education is co-curricular activities, which enhance students' social and achievement experiences with a platform beyond the academic classroom. They are not part of the formal curriculum, but complement the curriculum as a counter-weight to academic pursuit, hence its label "co-curricular". Co-curricular activities are fundamental to a balanced education and all students are expected to participate in at least one such activity. Appendix A presents the full list of co-curricular activities offered by our college.

Moving beyond the personal and inter-personal domains, community education and service learning requires students to appreciate their relation to the larger community and aims to nurture a spirit of active citizenry and civic responsibility in them. Students are strongly encouraged to initiate community service projects which are meaningful and can meet the real needs of the community. In particular, the service learning approach leads students to analyze genuine community needs in their design of service, and to appreciate the relationship between themselves and the community from a different perspective.

The Raffles schools[1] believe that it is important for every student to be a person of character first, before he/she can become a responsible individual, an active citizen and an effective leader. Building on the basic affective dimensions of previous programmes, leadership development programmes provide leadership education through theory discourses, and opportunities for our students through the students' council, leadership in co-curricular activities and in class. Our leadership development is based on "The Leadership Challenge" model developed by Jim Kouzes and Barry Posner, and our college actively re-iterates the five key leadership practices to student leaders in their relations to their teams – modelling the way, inspiring a shared vision, challenging the process, enabling others to act and encouraging the heart.[2]

Personal effectiveness, inter-personal effective and responsibility to the community

Character and citizenship education, physical education and co-curricular activities are considered fundamental building blocks for the development of a sound well-adjusted individual. Yet it can be argued that community education and leadership development programmes are particularly important in the affective education of highly-able students in the context of a small country like Singapore where human resources are very limited. With a preponderant share of the country's top students in our college, most of these students will assume positions of leadership, be it in the private or public sector, in the future. The challenge is to provide affective education which sensitizes them to the needs of different communities and heightens their self-awareness in relating to different groups so that they are equipped to make positive contributions to the people around them.

Hence in integrating these programmes with the academic curriculum, our formal affective curriculum - character and citizenship education and physical education, covers all three aspects of personal effectiveness, inter-personal effectiveness and responsibility to the community, but with primary emphasis on personal effectiveness. They are designed as part of the formal curriculum with allocated teaching time. Other than co-curricular activities, other programmes are designed as a menu of optional programmes from which students make their choice, if they so desire. Table 2 is a comprehensive presentation of the range of relevant student development programmes and the *primary* affective aspects they seek to develop.

All students in our college will in effect undergo affective education in all three areas with the formal curriculum and co-curricular activities. The range of additional optional programs provides choice for our highly-able and motivated students to undergo other experiences based on his/her talent or interest.

Table 2: Student development programmes and the affective aspects they address.

	Programmes	Personal effectiveness	Inter-personal effectiveness	Responsibility to the community
1	**Formal curriculum**			
	Character & citizenship education	●	●	●
	Physical education	●	●	
2	**Co-curricular activities**		●	●
3	**Optional programmes**			
	Community education & service learning		●	●
	Leadership development	●	●	

Student Services

The student services department provides support services, both pre-emptive and interventionist, for the socio-emotional well-being of our students. In this regard, it works through three main levels –

[1] The Raffles schools comprise Raffles Junior College and its two affiliated secondary schools, Raffles Institution and Raffles Girls' Secondary School.

[2] Jim Kouzes and Barry Posner, *The Leadership Challenge*, 4th ed., Jossey-Bass, 2007.

direct student engagement, engagement of parents and stakeholders, and provision of professional counselling and guidance services.

Pre-emptive action is taken through opening communication channels with external stakeholders for the students' pre-RJC records and profiles, and to understand students' family backgrounds. These actions aim to establish a supportive home environment for students and enhance the college's understanding of the student as an individual at the onset. They help the college to provide timely intervention, and are useful starting points in the event that professional intervention is required. In addition, professional guidance services are provided by our one-stop student services centre to support the post-JC aspirations of the students.

Table 3 provides an overview of the support services provided by the department, their main principles and their role in students' socio-emotional well-being. Our college's pro-active approach in focusing on pre-emptive measures is reflected here. Indeed, more attention is now paid to pre-emptive measures in college efforts with the recent establishment of an academic support committee which provides early academic and pastoral support for students who under-perform in internal examinations.

Table 3: Support services and their role in students' socio-emotional well-being.

Services	Pre-emptive	Interventionist	Others
Direct student services			
Student seminars on issues of sexuality, cyber wellness, etc.	●		
Helping foreign students to adjust through mentorship, social outings, etc.	●		
Engagement of stakeholders			
Parent seminars conducted by professionals on communicating with teenagers, etc.	●		
Meet-the-parents sessions with teachers.	●		
Communication with external parties for student profiles.	●	●	
Professional services			
Professional psychological counselling by in-house psychologist.		●	
Education counselling by in-house education counsellor.			●
Career and scholarships guidance.			●

Conclusion

Student development programmes and student services come together as the basis of our integrated approach to addressing our students' affective needs. The former provides value education and platforms for social interaction and non-academic achievement, developing our students' personal effectiveness, inter-personal effectiveness and responsibility to the community.

The last aspect, we believe, is important though not fundamental, in an educational institution which accepts the top students of the cohort. Student services provide the supporting programmes, both pre-emptive and interventionist, by tapping on stakeholders and professionals, to ensure students' holistic well-being. Some programmes are integrated with the core academic curriculum, where necessary, so that our students' experience an education which is balanced, well-rounded and able to address their various needs.

Appendix A
List of Co-curricular Activities offered in Raffles Junior College

Sports & Games

Archery	Gymnastics	Squash
Badminton	Hockey	Swimming
Basketball	Judo	Table Tennis
Chess/Bridge	Netball	Tennis
Canoeing	Outdoor Activities Club	Tenpin Bowling
Cricket	Rugby	Track & Field
Cross Country	Sailing	Ultimate Frisbee
Fencing	Shooting	Volleyball
Floorball	Soccer/Ladies' Soccer	Water Polo
	Softball	Wushu

Clubs & Societies

Art Club	Entrepreneur's Network	Mathematics Society	Audio-Visual Unit
Film Club	Cybergaming & Design	French Connection	Alchemy Club
Japanese Club	Chess-International	Electronics Club	Raffles One Earth
Chinese Chess	Photographic Society	Astronomy Club	Raffles Interact
Gavel Club	Media Resource & Library	Biological Science Society	Indian Cultural Society
Raffles Debaters	History & Strategic Affairs Society	Raffles Economics & Current Affairs Society	Chinese Language, Drama and Cultural Society
	Red Cross Humanitarian Network	Computer Science Society	Malay Language, Drama and Cultural Society

Musical Groups

Chamber Ensemble	Jazz Club	Raffles Symphonic Band
Chinese Dance	Lion Dance	Raffles Dance
Chinese Orchestra	Piano Ensemble	Raffles Players
Harmonica Club	Raffles Chorale	Raffles Rock
Indian Dance	Raffles Guitar Ensemble	

Publications	**Partnership CCAs**
Raffles Press	Boon Lay Youth Club
Writers' Guild	

External CCA's

Boy Scouts / Girl Guides	National Police Cadet Corps
Boys Brigade / Girls Brigade	St John Ambulance Brigade
Triathlon	Red Cross
Golf	Singapore National Youth Orchestra
National Cadet Corps	Singapore National Chinese Youth Orchestra
	Youth Flying Club

Excellence in Environmental Engineering Education: The Experience of the German Jordanian University

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Abstract
Management of environmental resources to protect human and the system that support life is one of the biggest challenges facing modern societies. This is especially true for Jordan, where the fragile environmental resources started witnessing higher rates of degradation during the recent years. By recognizing this fact, and to meet the current and the future environmental challenges, German Jordanian University (GJU) decided to offer a unique program in Environmental Engineering and Management. Being the first of its kind in the region, the program couples the engineering and management with applied education from the first year.
This paper presents the basic components of the Environmental Engineering program offered at GJU and its focus on the applied practical side. It highlights the drivers of excellence in the program and how it differs in contents from other national universities. The program study plan in the fourth year includes 12 credit hours that the students will undertake them at a German university. Furthermore, about 20 weeks of practical training will be spent at appropriate working place in Germany. Therefore, the study plan includes intensive courses in German language to prepare the student for studying and practicing in Germany. The paper also highlights some of the challenges that are facing the program, such as the low enrollment level, the difference in the educational systems between Jordan and Germany, and how GJU managed to go around such obstacles.

Keywords: Environmental Engineering Education, Excellence, German Jordanian University, Curricula

Introduction

In response to continuous increased pressure of the mankind on environment and to meet the changes in environmental requirements, Environmental Engineering Education has and will continue to evolve for a long time into the future. Traditionally, environmental engineering viewed as a branch of civil engineering that focused on water sanitation (Alha et al, 2000).

During the last decades, major changes have occurred in the profession of Environmental Engineering. (Smith and Biswas, 2002). Today, environmental engineering expanded to include all aspects of the human and natural environment, such as water and wastewater management, air quality, solid and hazardous waste management noise and light pollution, and radioactive waste management (Alha et al, 2000).

The American Academy of Environmental Engineers defines environmental engineering as "the application of engineering principles to the management of the environment for the protection of human health, for the protection of nature's beneficial ecosystems, and for environment related enhancement of the quality of human life". Environmental Engineering is different from the classical engineering discipline because it is multidisciplinary in nature, covering broad range of topics from engineering, science, economics, humanities, etc. It is not enough to take existing engineering curricula and add on environmental units, and then call it environmental engineering, which has been a common approach adopted by many engineering programs. (Nguyen and Pudlowski, 2005).

Jordan is an arid to semi arid country with a total area of 92,000 km^2. In 2005 the population was approximately 5.5 million. Due to the increase in population, rapid urbanization and low rainfall (90% of the country area receives about 200 mm annual rainfall) the country fragile environmental resources started witnessing higher rates of degradation which poses a heavy burden on the national economy. In a recent study that conducted by the Mediterranean Environmental Technical Assistant Program (METAP) of the world Bank, it has been estimated that IN 2000 the annual estimated cost of

environmental degradation at the national level in Jordan was about US$ 228 millions/year. This accounts for 2.8 of the GDP of Jordan as shown in Table 1.

Table 1: Overall Estimated Cost of Environmental Degradation in Jordan in 2000*

Environmental Category	US$/year (millions)	JD/year (millions)	Percentage of GDP
Water	100	71	1.2%
Air	64	46	0.8%
Land	50	35	0.6%
Waste	14	10	0.2%
Costal zones	..	..	..
Sub-total	**228**	**162**	**2.8%**
Global Environment	81	57	1.0%
Total	**309**	**219**	**3.8%**

* METAP, 2000

Realizing the above facts, the German Jordanian University established a stand alone and first of its kind Environmental Engineering and Management program. The objective of the present paper is to introduce the components of the program and how it differs from the traditional environmental engineering programs offered by other Jordanian universities. The paper also touches on the challenges facing the program sustainability and how GJU managed to face such challenges. Finally, recommendations to control monitor the program outcome are suggested.

Structure of Environmental Engineering Curriculum at GJU

The Environmental Engineering and Management Program at GJU is aiming to provide the local and the regional markets with specialists in the field of environmental technology and management. Unlike the other Environmental Engineering programs at the Jordanian universities, where the program is part of traditional Civil or Chemical Engineering education programs, the GJU program is a separate degree program.

The program is designed in collaboration with German partner universities to provide a unique opportunity for the students to gain knowledge in the profession of Environmental Engineering by integrating the sustainable development philosophy into the principles of water and wastewater management and treatment, solid and hazardous waste management, remediation technologies, environmental impacts, environmental auditing and risk assessment and management.

In order to prepare environmental engineers for the complex and challenging environmental issues posed by the rapid development in Jordan, GJU works to provide them with tools and skills that will enable them to deal with the environmental problems the country faces. In general curricula are based on a solid foundation of mathematics, natural sciences, engineering science and engineering design with the incorporation the concept of sustainable management.

Table 2 presents the breakdown of the program requirements. It can be observed that the number of credit hours is 173, which is greater than any other environmental engineering program in Jordan. For example, the requirements of environmental engineering stream at the Civil Engineering Department are 166 and 159 at Muta University and Jordan University of Science and Technology, respectively. Since environmental engineers need to be socially aware, sensitive and skilled communicators who can integrate all stakeholders in the decision making process, the environmental engineering curricula at GJU includes courses on soft skills and intercultural communications. This will enhance the graduate capabilities to work in multi-disciplinary teams of engineers and other disciplines, scientists, economists, sociologists and computer scientists, which is the case when working to solve environmental problems.

In addition to design courses that enables the students to design various unit operation systems needed in water, wastewater and solid waste treatment, the curricula covers environmental management issues, such as environmental impact assessment, environmental auditing and risk assessment and management.

Table 2: Breakdown of Environmental Engineering Program Requirements at GJU.

Classification of Requirements	Number of Credit Hours	Percentage
University Requirements	34	19.7
School Requirements	44	25.4
Program Requirements	89	51.4
Technical Electives	6	3.5
Total Credit Hours	**173**	**100**
Contact Hours	**281**	

Through the partnership with German universities, GJU capitalizing on the best of both educational systems of Jordan and Germany. This partnership enabled GJU to design a modern curriculum that is focusing on integrated approaches by moving up of the pipe rather than adopting end -of- pipe technologies in solving environmental problems. In other words, following proactive rather than reactive approach to prevent environmental problem before it is created.

To lay the foundation of qualitative, quantitative and analytical skills, the program study plan includes the best of engineering courses. The knowledge gained in theoretical courses should be supplemented with hands-on water, wastewater, solid waste and air quality laboratory experiences. Therefore, the study plan includes several laboratory courses during which the students will develop their ability and skills to measure and monitor different types of pollutants and evaluate removal efficiencies of such pollutants by applying appropriate treatment technologies.

One of the main components of the program is the practical training. In order to enrich the practical capabilities of the students, at the end of each year during summer, they have to spend about 120 hrs of basic environmental practical training outside the university at appropriate organization (company, consulting firm or authority). In addition, after finishing the third year, the students must spend the fourth year in Germany. The first semester will be at a German university where they will take courses equivalent to 12 credit hours. After passing the courses, the students will spend the second semester in practical training at one of the industries that are dealing with environmental issues. To prepare them for this year, the students in the first three years are taking intensive German language courses. The courses are taught by German instructors who are part of the GJU staff.

In the fifth year the students have to start working on their graduation projects. Each group of students (4-5 students) will be assigned a supervisor who will work closely with them to select a topic for their graduation project and start working on it. The topics may cover either engineering design of unit operations for water, wastewater, or solid and hazardous waste treatment or it may cover topics in environmental management such as environmental impact assessment or environmental auditing for certain activities. The students will have the possibility to work individually or in tandem, depending on the nature of the project.

Challenges

Despite the fact that the environmental engineering program at GJU had a strong start, however, there are certain challenges that are facing the program and may affect its sustainability. One major challenge is the identity of environmental engineering as a profession. Yet, most employers from both public and private do not realize the existence of such field of engineering. This can be noticed by the advertisements for job vacancies related to environment. Despite the job responsibilities announced are fairly of the environmental engineers, the required qualifications announced are usually to hold degrees in chemical engineering, chemistry or biology. To overcome this issue, GJU invited representatives of the employers and local communities to join its board of trustees and schools board.

Another challenge is the low enrolment level of students. In the first year of the program only 11 students were enrolled. As a result GJU initiated a strong marketing campaign in schools to raise the awareness among the school students about the profession of environmental engineering. GJU is working currently on organizing a promotion workshop in which both public and private sector organization and firms will participate to identify the prospects of jobs for environmental engineers in some of mega project that will be implemented in Jordan in the near future, such as the Disi water conveyor and the Red-Dead Sea conveyor.

Conclusions and Recommendations

Environmental engineering is a rapidly developing field of engineering. Environmental engineers of the future must be able to apply analytical and problem solving skills to understand the complex environmental systems, and to be able to apply strategies to protect the environment.

In Jordan, environmental systems are witnessing a rapid rate of degradation. Realizing this fact GJU established first of its kind program in Jordan which couples environmental engineering with management. The program curricula were prepared in collaboration with German partner universities. The curricula were based on the proactive rather than reactive philosophy in dealing with environmental issues.

To create a well recognized identity of the environmental engineering as a profession, GJU should work with all other concerned parties such as the Jordanian Engineers Association and other professional bodies to establish an organization to represent environmental engineers and promote their profession.

References

Alha k., Holliger C., Larsen B.S, Purcell P. and Rauch W. (2000). Environmental Engineering Education, Summary Report of The First European Seminar, Zurich, Switzerland, 22-24 August, 1999.

Atkins M. D. and Novak J. T.(2002) Background Document to The Workshop on The Future of The Environmental Engineering Profession, Ontario, Canada, 9-10 August, 2002.

Goran I. Broman, Sophi H. Byggeth and Karl-Henrik R.(2002) Integrating Environmental Aspects in Engineering Education, *International Journal of Engineering*, V. *18*, No. 6, pp 717-724.

METAP (2002) Regional Project on Environmental Degradation in Egypt, Yemenn, Iran, Algeria, Tunisia, and Jordan.

Nguyen D. Q. and Pudlowski Z. J. (2005) Environmental Engineering Education in the Era of Globalization, *Global Journal of Engineering Education*, 9 pp59-68

Smith D. W. and Biswas N. (2002) Environmental Engineering Education in Canada, *Journal of Environmental Engineering and Science*, 28, pp 1-7.

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(A.16)

Metacognition, learning styles and distance learning

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Abstract

Our proposal in this work was to establish the relation between the concepts of metacognition and learning styles in a distance learning system.

The "*modern* and *technological*" distance learning becomes an instrument of pedagogical renewal. The source's exploration of information and communication technologies introduces a new form to learn. The mediation of education invites the student to be more autonomous, more responsible and to take a more active role in the construction of his knowledge.

The challenge to learn at distance requires motivation, planning and capacity to analyze and to apply the new information. The studies of Rogers (1985) also point to the benefits that adults can get in the learning, when becoming responsible for it, meaning they define their goals; they establish the successive stages, infuse one certain rhythm and evaluate the learning.

The metacognition takes to a cognitive modification in the way student adapt the cognitive activity to the task's requirements, to the environment conditions, to their own personal situation looking for to adopt strategies of resolution of the "problem" that promote success.

It is in the context of the personal metaknowledge that it can be insert the defined learning styles as a trend to approach cognitive tasks through the preferential use of a strategy or a set of strategies.

Keywords: Metcognition, learning strategies, learning context.

The concept of metacognition

Learning demands, between other aspects, that the student gives a functional meaning to his apprenticeships. It is necessary that he takes conscience of its structure, of its importance and, especially, of its usefulness.

Flavell, from his works, especially in the area of the memory, refers it for the first time to this concept. Flavell (1976) believes that the metacognition is defined as the knowledge that a person has about her own knowledge.

From the point of view of Grangeat (1999), the metacognition is a mental process that consists, for who learns, in preparing "*knowledge about the way that himself builds his own knowledge*" (p.13). Doly (1999) sees the metacognition like a awareness from what the students does and that leads "*being successful*" to be "*understanding*". This is essentially to exist transfer of knowledge. It makes possible the reuse of knowledge, previously acquired in a certain situation, in new situations. Bazin & Girerd (1999) add what "*is understanding it is done what can be done that is learned to do new things*" (p.63)

Still for Doly the metacognition, *(...) situates the student in an epistemological relation with knowledge making of him a builder and not a consumer of knowledge, what gives an autonomy regarding the self progress and, consequently, to the apprenticeships. At the same time, it secures the survival of the culture guaranteeing its transmission and its renovation"* (p.20).

Keeping on quoting the same author we can notice that this one, from the revision of the concept of metacognition, points to two sides, in the metacognition: The knowledge about the cognition and the products of the cognition and the competences metacognitives. While the first ones refer to "*metaknowledge about the products and the cognitive processes*" that are reflected on the knowledge, as about the way it works on a resolution of a problem. The second ones define the "*processual of the metacognition*" aspect and are concerned to the processes through which student practise the control or self-regulation of the activity when they solve a problem.

The metacognition definition includes not only the awareness of students' processes but also the intentional control and conscious of the same ones (Brave et al., 1989). Doly (*op. cit.*) summarizes the interest of the metacognition in the process of learning, in this way:

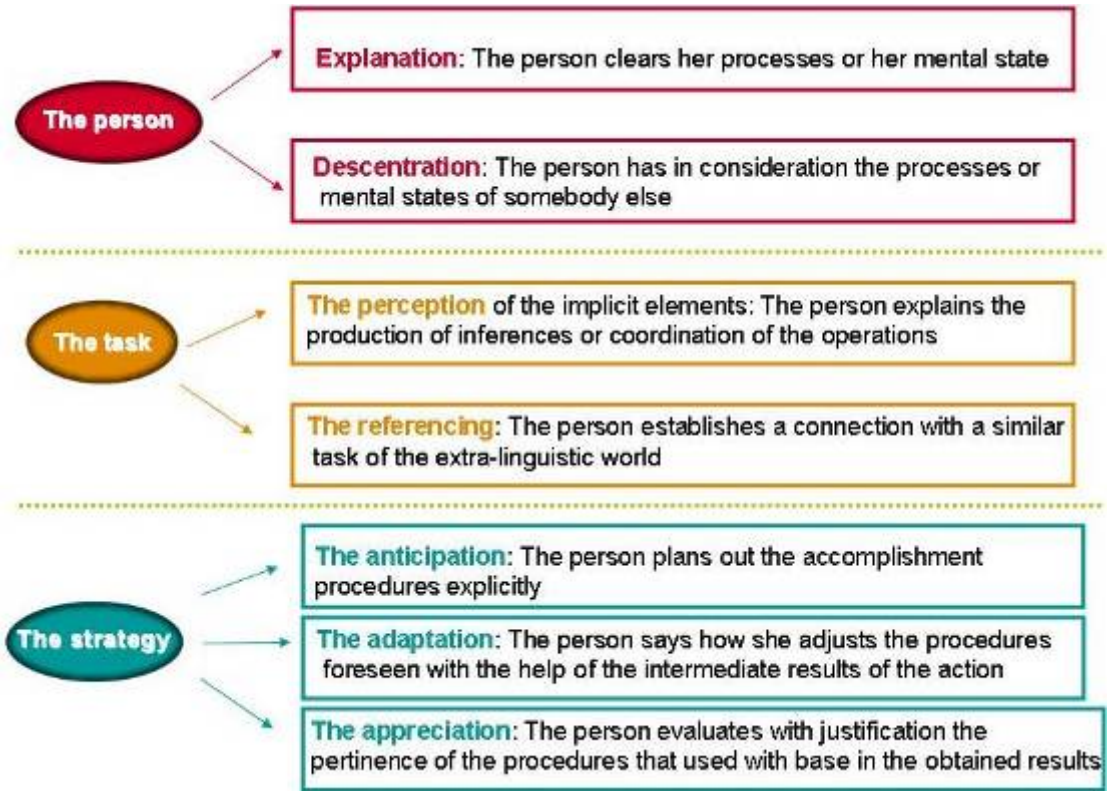
Table 1: Summary of the interest of the metacognition.

So that it serves the metacognition?
✖ to construct knowledge and abilities with more chance of success
✖ to learn strategies of resolution of problems that favour the success, the transference and also the auto-regulation.
✖ to be more autonomous in the management of the tasks and the learning (to be auto-regulated and to know get helped).
✖ to develop a motivation to learn and to construct a self-concept as a student.

(adapted of Doly, 1999, p.29)

It was previously that the metacognition is an interior reflection of the person and, as such, it becomes inaccessible to the observer. For this reason and taking as reference that any mental activity needs to be inferred, this one either runs away from rule. This inference can be from what it is said of it, or from what is made. Grangeat (1999) aims seven pointers that translate the activity metacognitive and that enclose the three characteristics of the metaknowledge: *the person* (characteristic of who learns); *the knowledge about the abilities* (the possibilities and limitations while a cognitive being), *the task* (the knowledge about how the nature of the task influences the performance); and *the strategies* (activities of learning: the knowledge about the distinguishing value of alternative strategies to improve the performance) - Table 2.

Table 2: Seven pointers to infer the metacognition.



(adapted of Grangeat, 1999, p.98)

For Mayor, Suengas & Marqués (1995) the metacognition is, "*a particular type of activity (of cognitive activity or of human being activity)"* (p.75) whose main components are the activity properly said the person and the context. In what concerns the activity, in the point of view of these authors, it structures at three moments:

1) Interpretation of the stimulation;
2) Transformation and processing; and
3) Planning and execution of the answer.

And is composed by the variables: a) the task, b) strategies and c) attention and effort.

Continuing the idea of the authors, all the activity is of a person that a structure possesses and an experience that condition this same activity. Those are had as variables of the person that are connected with the previous knowledge, the capacities and will to act - through, for example, of beliefs, attitudes and motivations.

A person's activity *"is not produced in the vacuum but in a specific context"* (p.77) where it can be found the variable that are concerned with the materials, the situation, that includes the organization of the stimulations of physical space and social space, as well as the relations between people and the socio cultural context. The development of self-learning is fixed with the necessity, each time higher in a world where the mutations occur in a vertiginous rhythm, of giving people the adequate "instruments": capacity and attitudes favourable to facilitate the continuous learning that will have to develop throughout life. Berbaum (1992), relates that the learning capacity is not only in the construction of answers is, also, in the capacity of improving the construction of the same ones. *"It is this capacity of improvement of the answer given to a situation that must be evaluated. This capacity assumes a goal-knowledge. (...) Knowing to learn"* (p.87). The development of the capacity of learning, according to this author, is something that can be made and for this the conscience taken, on the student's, the way of learning, is a crucial point in this process. The idea of Berbaum seems to us clear not only points out the awareness of the process, as well its use as a starting point for the student better adjusted process to his necessities. The student has the capacities to auto generate the proper cognitive process. The metacognitive activity includes three stages: the process, description of the cognitive activities; the judgment, of the activities evaluating of the relevancy, adequacy and decision, modification or not, the "*successive and necessary adjustments*". Knowing that these authors face the mental activity as a cycle, the dynamics of inter-influence of these three components can be represented in the following way:

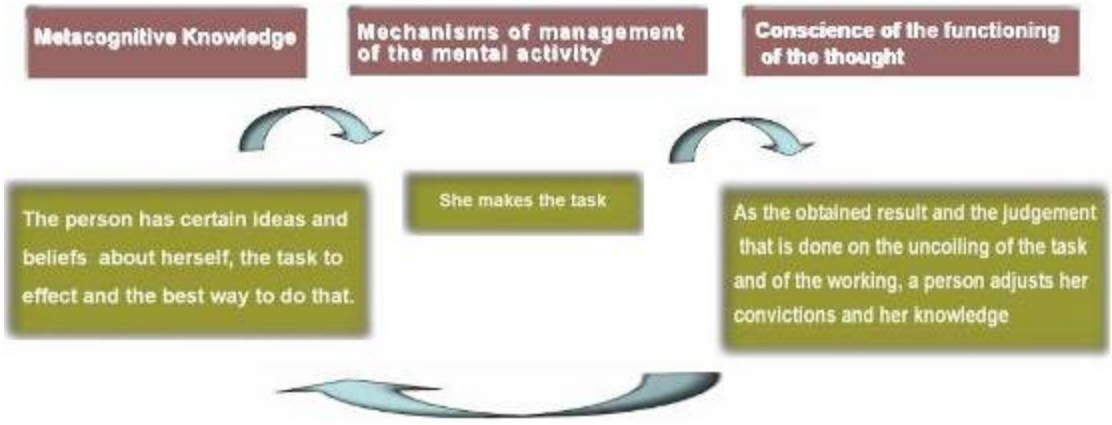


Figure 1: Cycle of the metacognitive activity.
(LaFortune & St.-Pierre, 1996, p.29)

This capacity of self management of the proper cognitive processes leads to complete the notion of good student or of competent student proposed by Leclercq and Denis (*op.cit*.). We are now able to say that a competent student feels responsible for his own learning and is active in the process. He knows how to plan the learning from the analysis of the necessities and how to manage the process, with sight to his own goals. For this he knows to distinguish which the pedagogical types of intellectual operations he needs to use, to choose the methods and materials that he needs and that are

more adjusted to the learning style, and, finally, knows to take decisions and to do questions that make possible his advance and evaluate the evolutions.

The concept of learning styles

Learning formal contents are a very complex phenomenon. This complexity is not only because of the nature of the contents, but also because of the system where this knowledge is given and, not less important, because the intrinsic factors to the students. The learning situation appeals not only to the learning context but also to the person as a whole. To learn more than a change on the behaviour is an alteration of the meaning that is given to the proper experience. The learning process is extreme important and to understand the way as students appropriate the knowledge is one of the keys for the educative development. Learning is, without doubt, one of the most complex human phenomenon, because the amount and the diversity of the variable and of the interaction in game. The research in education has been demonstrating that different people have different ways and rhythms to learn. These typical ways to realize and to process the new information are what, in literature, is known for learning styles. The psychologists, who investigate these individual differences defined learning styles as a trend to approach cognitive tasks through the preferential use of a strategy or a set of strategies (Riding & Rayner, 1998), that is, "*the adoption, usual and distinct, of a model to acquire knowledge*" (McLoughlin, 1999, p.222). Numerous experimental studies demonstrate that the students learn better if there are used the correct methods. It is meant by correct methods, the ones that are more in accordance with the style of people's learning. So, what are learning styles? These are the result of cognitive, affective, physiological and cultural characteristics, which indicate, in a relatively stable way, as a student realizes, interacts and answers to the learning environment. In other words, the learning styles define the usual way or the characteristic way that a student has to answer to the learning tasks. The learning environment understands the subjects, the way of teaching, the materials of support to that education, the framing where that activity goes on. The learning styles affect the ways students are and act in different life's plans. They affect, not only the way people learn, but, also, as the way they act in group, participate in activities, relate with the others, decide problems and work (Kolb & Smith, 1996).

However, the concept of learning style is not consensual. There are different definitions and understanding of the same in agreement with the aspects that are had as primordial. The learning styles were and are still the focus of innumerable studies and, therefore, we can find different ways to approach the same concept, with the same goal. Knowing better the way as each one off us assumes knowledge. As an answer to the existence of a vast panoply of this concept's boarding some clarifying models had been considered (Rayner & Riding, 1997; Sadler-Smith, 1997; Claxton & Murrell, 1998; O'Connor, 1998; McLoughlin, 1999). The existence of so much different proposals made to come up the necessity to reorganize these models in function of the factors that the different chains more emphasized. Grigorenko and Sternberg (1995) consider three big and distinct perspectives of the concept of style in psychology.

Table 3: Different perspectives of style in psychology.

Perspective centered in …	Approach
Cognition	The development of this perspective had the apogee in the 40's with the development of the psychology experimental works, for example, the inquiries that have been made with sight to understand the individual differences in the level of the cognition of and the perception.
Learning	The second type of perspective that involves the theories that are connected to the learning styles, emerged in the 70's, with an educative intervention concern. This type of investigation was directed for subjects related with the process and the environments that explained the individual differences in educative contexts. So, four dimensions converge: Approach to learning; Information Processing; Environmental and Instrumental Preferences and, finally, Models of Social Interaction.
Personality	Here it is tried to describe how different dimensions of the personality influence the way as we board the acquisition and the integration of the information.

Cognition, learning and personality are the three vectors that, in agreement with this proposal, help to understand what is the role of the individual differences between students. Curry (1983) considers another way to put together the different theories about the notion of learning style knowing that this is a multidimensional concept. This classification is based on the hypothesis of existing different degrees of stability; this means that there are parameters more hardly modified than others. So, he it describes three big groups, that are found in three levels or layers, in accordance with the degree of higher or minor stability or difficulty of being modified, whose metaphor points, according to him, to an "*onion*". Following this model, the most superficial layer which contains the most observable and less stable styles, in the measurement's level, corresponds to a group called *Environmental and Instrumental Preferences*. It says respect to the individual choices relative to the learning environment. For example, the brightness of the room, the level of surrounding noise makes part of them preferences. These are the least stable characteristics that are submitted to influences of the context. The model of Dunn & Dunn is example of this first level. In the intermediate level we find the group of the *Information Processing Styles*. Curry believes that the measurement of these groups of styles presents a bigger stability than the previous one, but it still can be changeable by the learning strategies. The tonic is placed in the corresponding characteristics to the boarding, in terms of ways, that people make to assimilate the information. As examples of this group we have the model of Kolb and of the Honey & Mumford. For example, the person that has an active style likes to learn through the accomplishment of concrete experiences. The highest stability in this level has to be with the fact of the influence of the environment being more reduced. The fluctuations have to be with the choices of the strategies. Finally, in the most internal level there are the *Cognitive Personality Styles*, the describers of the personality (Curry, 1991) that are defined as an individual boarding, to adapt and to assimilate information, that doesn't interact directly with the environment, but it is underlined and relatively permanent in the dimension of the personality. This level also says respect to the characteristics of assimilation of the information but in function of the personality's traces as they are measured in the model of Myers-Briggs. Its expression is made in an indirect way evidencing when the individual behaviour is observed through some instances of learning.

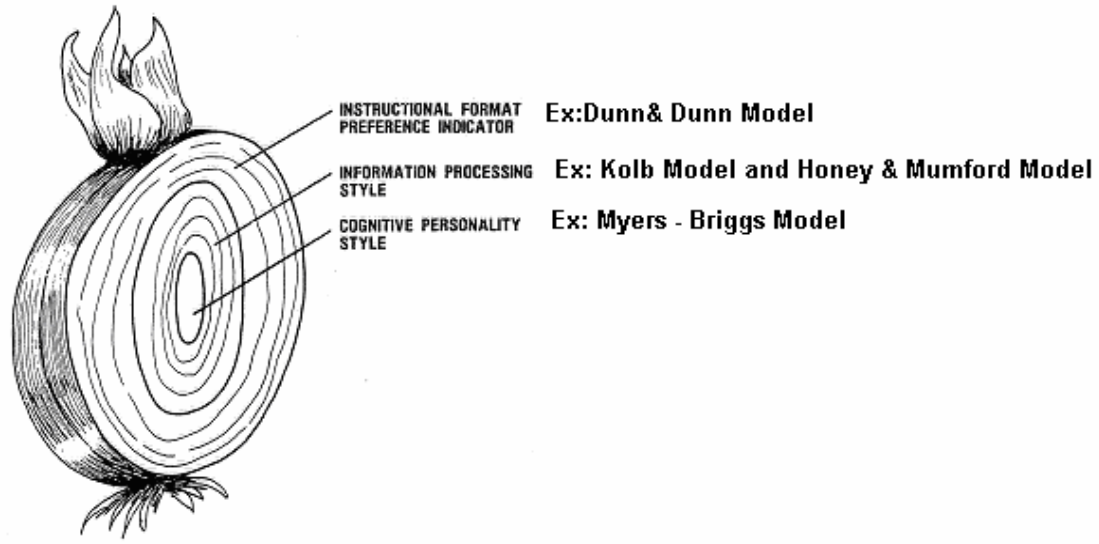


Figure 2: Curry groups.
(adapted from Curry, 1991)

These models, although all the previously differences pointed are similar in the fact that they all accent the importance of the identification and of the reasons that provoke the individual differences in the learning process. Relatively to the origin of the learning styles the literature points to two approaches: The first one postulates the learning styles like an inalterable, unchangeable characteristic and presupposes an origin psycho-physiologic, neurological and innate. The second approach says that

the learning style is a characteristic essentially acquired, based in the experience and therefore it allows alterations and evolutions.

It isn't enough to only recognize that there are different ways to learn, nor that all people, in the same situation, learn in a different way. So, it is necessary to go further and to create the conditions so that all can have access to knowledge. In the elaboration and transmission of the educational materials process, we find several intervenient that are placed at different moments of this complex chain. In Figure 3 are summarized the different intervenient in this process.

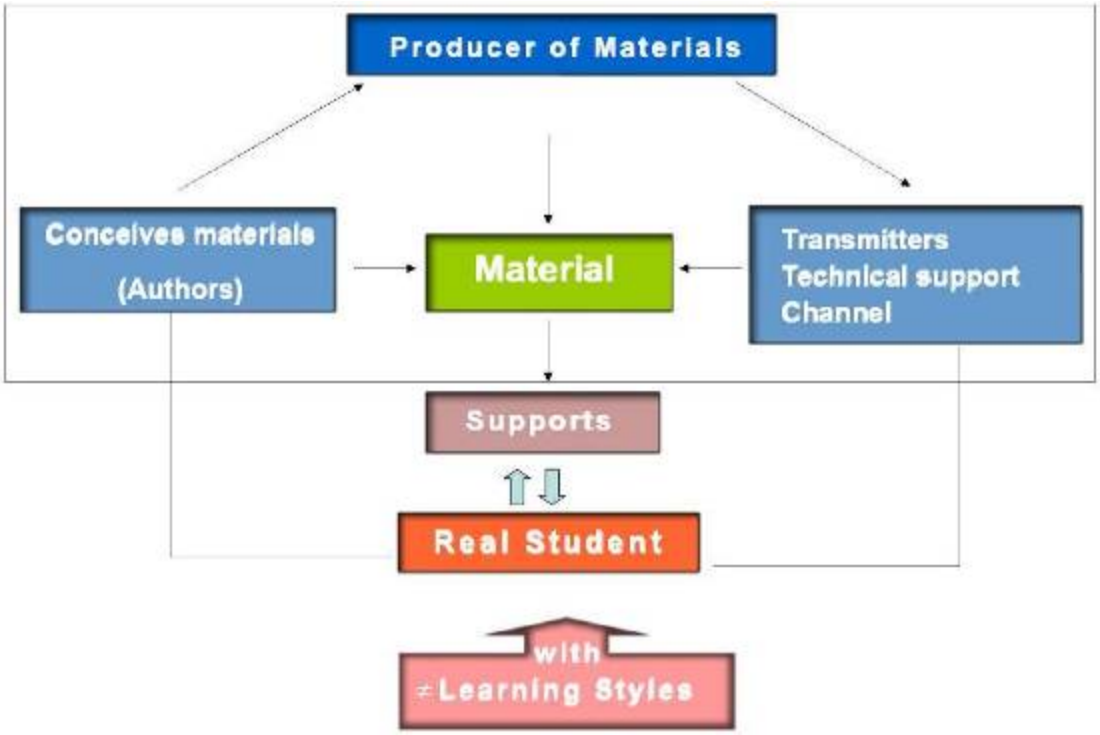


Figure 3: Chain of the process.

If we stop now in this scheme, we will be able to say that it is exactly in the level who conceives materials and who transmits that a bigger knowledge of the students' different ways to operate plays a primordial role, using, for such, different ways, of exposition ideas, and of variety of transmission of knowledge channels. The knowledge of the learning styles must be faced as an adequacy form, of the system of education, of the proper materials, to the students, with who it has to deal with and it must never be used as a way to segregate the same ones.

Distance Learning

Our society is object of a complex process of transformation that has implications in several aspects of the life of people. The challenges that come up during our existence make us rethink the way we put ourselves in this society where the information and the knowledge's are heavier and heavier. The awareness of this reality makes people have more necessity of trying to know more and more because this increase of knowledge can mean better and bigger personal and professional opportunities, bigger capacity of dialog with the rest and with the world that surrounds us. The necessity of having knowledge and the appropriate competences to the dialog and to the countless challenges, of a professional point, which come across daily becomes a primordial aspect in our lives.

However, this necessity of constant update, sometimes, is not conjugated with our life style, in a personal and professional point of view. As the necessities as the constraints to exceed them are too many. It is in this direction that distance learning plays a prominence role. It allows that people acquire new formation, improve their performances, and acquire new abilities that allow themselves to adjust more to their necessities and to the society's challenges. The chance to face new challenges without the need of leaving their work, of dislocating to a determined place, with hours previously

established or following a rhythm in a way that is not the most adjusted for each one of them appears. For its flexible character, distance learning allows to free people of them space and time is constraints and to adapt it more to the rhythm and to the style of each student, providing learning agreement with his constraints.

It is in this direction that, each time, distance learning earns more sense in the lifelong learning, allowing to conciliate some aspects of peoples' life, as them professional, familiar, social life. Other factors were and are in the base of the appearance and the development of Distance Learning. In this direction, the social political development of our societies, the high prices of the traditional systems of education, the development of Educational Sciences and the transformations of the technologies gave and still give their contribute for the implementation and reinforcement of this system of education. Distance Learning, as we conceive it today, had already made a long walk. Since the origins of century XIX, with education through correspondence, until nowadays it was a long walk that we have been done. All the alterations had as intention the search for better conditions to teach and to learn. Among them we detach the contribute deriving of the increasing development of the information and communication technologies. The integration of these new systems came to exceed the practical necessities of the human being communication and the process of teaching-learning that been feeling in the more traditional models of distance learning. In accordance with Aretio (2002) there is difficulty in finding just one definition of distance learning, that it is universally accepted. However, there are some characteristics that make it a particular system. Among them we detach, as already were said, the no existence of time and space constraints, the physical separation between professor and student, an independent and flexible learning.

Table 4: Elements that define the distance education.

1	Physical separation between professor and student during the educative process.
2	The use of *multimedia* material as mediator of the pedagogical and didactic speech and support of the contents.
3	Existence of diversified channels between professor and student
4	Separation of the professor and the student in the space and/or the time.
5	Voluntary and individualized control of the learning by the student, in accordance with his own rhythm and his own capacities.
6	The student does not need to dislocate to a specific place to dedicate himself to the learning tasks.
7	The student is not conditioned to a rigid schedule, being able to learn when he can and wants to.
8	The student in distance education keeps with the institution a bilateral communication using the available medias.

Because its characteristics and the way of structuralizing the education, the necessity to rethink the concept of learning and the way of equating it, leading to the search of a new pedagogical paradigm, that was more adjusted and that respond to the existing necessities appeared. Allied to this methodological alteration, an alteration of mentalities and roles, of the intervenients in the process, as what it says respect to the practical professors, comes up where new functions and responsibilities are attributed. To these, now, more than to transmit knowledge is requested to them that they guide the students in them passage of learning, fomenting them capacities of self-learning, of autonomy, of *learn to learn*. Distance Learning seats in a mediated didactic dialogue between the professor and the students, where physical spaces aren't shared and the time could not be the same. In this scene the students learns in an independent way. The students in distance learning, generally, are older, are more motivated and are more autonomous comparatively to the students in the face-to-face system education. The methodologies in the distance education are supported in a learning model that estimates the existence of adult students that have a level of maturity and of motivation high enough that allow them to become involved in a self-learning process. In this direction distance learning bets and should be guided to allow to student the exercise of his autonomy, which implies, among others aspects, individualized interactions and a high self-discipline.

The resource to distance learning implies, of the student, the development of capacities of self management of their formation's project. These capacities correspond to the development of the metacognitives activities. So, a competent student feels responsible for his own learning and has, in the process, an active role. He knows to design the learning, from the analysis of the necessities, and to

manage the process, with sight of reaching his goals. For this he knows to distinguish which types of intellectual operations he needs to use, to choose the necessary methods and pedagogical materials and that are more adjusted to his learning style and, finally, knows to make decisions and to do questions that make possible to advance and to evaluate his evolutions. The development of these metacognitives activities is, each time, of more extreme relevance; to not only reach the success in the academic life, as well in the professional life. The found alterations are not only placed to the level of the student. These come up in the way to design, to structuralize and to transmit the knowledge, therefore, because of the characteristics of distance learning and of the way to structuralize education, the necessity to rethink the concept of learning and the way of equating appeared. All these alterations implied a search of a new pedagogical paradigm, that was more adjusted and of these answers to the existing necessities.

Allied to this methodological alteration, an alteration of mentalities and roles appears, of the intervenients in the process, like in what it says respect to the teaching, where are attributed new functions and responsibilities to them. To these, now, more than to transmit knowledge is requested to them that they guide the students in their process of learning, stimulating their capacities of self learning, of autonomy, to *learn to learn*. The professor still has the motivator, leader of the groups and the interactions, appraiser of learning's and resources, creator of these same resources, functions.

Synthesis

The notions of learning styles and metacognition that were previously described both share the idea that the focus should be in the process and no so much in the product.

The effectiveness of the learning depends on factors of various order between them are detached the acquisition of cognitive strategies and of metacognitives strategies that to make possible the student to design and to monitor their own performance leading to an awareness of the processes that are used to learn, as well as, the making of decisions adjusted on the strategies to use in the execution of each task, his evaluation and consequent adequacies, case it is necessary. So, a metacognitive perspective of the learning presents some advantages. In personal terms, it promotes the development of the strategy of cognitive self-control that allows the student to have a more active role in the construction of his knowledge. The prominence that it is given to the personal role in the evaluation and in the cognitive control, that is, the way as each one acts on their own processes of learning, can be in the base of the individual differences in the academic proceeds. In a virtual environment, with the characteristics that were previously described, where the teaching - learning process develops at distance, it is fundamental that the student knows himself, as such, and that how he can make to improve his performance. So, the stimulation of the metacognition, on the part of the professor in a virtual environment, must be made through the multiplication of open situations of investigation that allows several ways for its resolution, several approaches that contemplate a various options and where the students can choose in agreement with the way of working that guarantees more success to them.

References

Aretio, L.G. (2002). *La Educación a Distancia – De la teoría a la práctica.* Barcelona: Ariel Educación.

Barberá, E. & Badia, A. (2004). *Educar com aulas virtuales – Orientaciones para la innovación en el proceso de enseñanza y aprendizaje*. Madrid : António Machado Libros.

Berbaum, J. (1992). *Desenvolver a capacidade de aprendizagem.* Lisboa: Edições Escola Superior de Educação João de Deus.

Claxton,C.S. & Murrel,P.H.,(1998). Learning Styles. Available at http://www.ntlf.com/html/lib/bib/88dig.htm [20 September December 2007].

Curry,L., (1983). An organization of learning styles theory and constructs. ERIC *Document* 235 185.

Curry,L., (1991).Patterns of learning style across selected medical specialties. in *Educational Psychology,*vol.11,nº3 e 4, 247-277.

Doly, A.-M., (1999). Metacognição e mediação na escola. in *A Metacognição, um apoio ao trabalho dos alunos* (tradução). Porto: Porto Editora, pp.17-59.

Flavell, J.H., (1976). Metacognitive aspects of problem solving. In L.B. Resnick (Ed.), The nature of intelligence (pp.231-235). Hillsdale, N.Y.:Lawrence Erlbaum Associates.
Goulão, M.F. (2000). O ensino a distância e a formação de adultos. *Revista Galego-Portuguesa de Psicoloxia e Educación*, vol.6, nº4, Coruña 657-665.
Goulão, M. F. (2002). 'Open and Distance Learning – Cognition and Affectivity'. Ph.D. diss., Universidade Aberta.
Goulão, M. F., (2004). Ensino a Distância: Do papel aos *bites*. [CD-Rom] *Actas do V Congresso Virtual Educa*, Barcelona, 16-18 June.
Goulão, M. F., (2006). Ensino a Distância, Educação e Sociedade. [CD-Rom] *Actas Congresso Universidad2006*, Havana, 13-17 de February 2006.
Goulão, M., (2007). The Distance Learning and the Technologies: - Vision of a group of students. In Lionarakis, A. (Eds). Proceedings of *4th International Conference in open and Distance Learning*, Athens, Greece, 23-25 November 2007. pp.56-65.
Grangeat, M. (coord.) (1999) *A Metacognição, um apoio ao trabalho dos alunos* (tradução), Porto Editora: Porto.
Grigorenke,E.L. & Sternbberg,R.J. (1995).Thinking Styles. In D. Saklofske & M. Zeidner (Eds.), *International Handbook of Personality and Intelligence* (pp.205-230). Plenum Press: New York.
Kolb,D. A.& Smith,D.,(1996).*User's guide for the learning-style inventory: A manual for teachers and trainers*. Boston: TRG Hay Group.
Lafortune, L.& Saint-Pierre,L (1996). *A afectividade e a Metacognição na sala de aula.* Lisboa: Instituto Piaget Ed.
Leclercq, D. & Denis,B., (1995). Autoformation & Hypermédias: Qu'est-ce qu'un bon auto-apprenant?. In *Pratiques d'autoformation et d'aide à l'autoformation*, Proceeding of Deuxième colloque européen sur l'autoformation, USTL / CUEEP, pp.155 – 161.
Mayor, J., Suengas,A & Marqués,J.G. 1995 *Estrategias metacognitivas – aprender a aprender y aprender a pensar*, Madrid, Editorial Sínteses, S.A.
McLoughlin, C. (1999). The implications of the research literature on learning styles for the design of instructional material. In *Australian Journal of Educational Technology* 1999, 15(3), 222-241**.**
O'Connor,T.1998.Using Learning Styles to Adapt Tecchnology for Higher Education. Available at http://web.indstate.edu/ctl/styles/learning.html#LSHE [20 September December 2007]
Rayner,S. & Riding, R.(1997). "Toward a categorisation of cognitive styles and learning styles", in *Educational Psychology* vol.17, nº1 e 2, pp.5-27.
Rogers,C.R., (1985). *Tornar-se pessoa*. Lisboa: Moraes Editores.
Sadler-Smith,E. (1997). "Learning Style': frameworks and instruments", vol.17,nº1 e 2, pp.51-63.
Valente, M.O. *et al.* (1987). O desenvolvimento da capacidade de pensar através do currículo escolar: Utilização de estratégias metacognitivas. In *Cadernos de Consulta Psicológica***,** 5, pp. 69-79.

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(A.17)

Popularization of Mathematics: between Actual Trends and Necessity

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Abstract
This paper deals with popularization of an innovative process in mathematics education in Slovakia. This is a process that incites stimulating discussions in this field by using new modern methods, IC technologies and e-learning with the view of student´s needs. Part of the paper is devoted to the special projects implemented at the Pedagogical Faculty of Catholic University in Ružomberok that lays emphasis on lifelong education and the inevitable cooperation between the university and teachers of primary and secondary schools.

Introduction

It has been nearly 20 years after the „velvet revolution“ in Slovakia and in spite of that contemporary school system is very similar to the period before the revolution. The children are educated at the same manner like their parents were once educated. The school graduate is rather a man facile, obedient, disciplined, dependent on the teacher who guides him and tells him what to do than a man who should be convenient for market ambient – creative, autonomous, spontaneous and able to state his opinion in the discussion. Thanks to the quantity of obligatory curriculum which is often overlapping mental pupil's capacity, the development of pupil's creativity, critical thinking, team-work but also the need of scientific discussion in the class are moved to periphery. Now, the pupils are rather led to memorizing of their knowledge instead of systematic development of pupils´ abilities to search, find out and effectively apply the relevant information in practice or another school subjects. The international comparative studies TIMSS and PISA show the actual deficiency of these pupils´ abilities in Slovak school system. We can state that contemporary way of school system functioning is not very suitable. The curriculum is full of the encyclopaedian facts which do not offer the great occasion for development of mentioned abilities. Diligent and creative pedagogues must also contest against this conceptual phenomenon.

This reflection touches also the domain of the teaching of mathematics at primary and secondary schools in Slovakia. According to our opinion, the contemporary teaching of mathematics is **transmissive** and it tempts the pupils to learning by reproducing their knowledge and by imitating the solving techniques of their teachers. According to [1] and [2], actual state of teaching is laden with the considerable degree of the formalism which does not lead the pupils to develop their abstract thinking. Antipole of the transmissive teaching is represented by the **constructive** teaching which gives the pupil the opportunity for autonomous discovering, formulation of problem solutions and free discussion about these solutions. The aim of the innovative process in the field of mathematics teaching is to support the constructive principle and to present the mathematics as a useful discipline which does not agitate the fear in the pupils. According to Lengyelfalusy [6]: „The principal objective of the mathematics teaching is a happy man.“

Slovak school system, and in the concrete case, the total conception of the mathematics teaching, needs a reform which could evolve a positive attitude to the mathematics and which could reverse the descending interest in study of mathematics. What can we imagine by this reform? Are those new methods, new textbooks, new job sheets, innovated or reduced curriculum, high mathematical software or IC technology? Of course, all these means are essential in the field of the implementation of innovative approach to the mathematics teaching. But sometimes we forget the new trends of non-material character which have the roots in the new regard at mathematics and in the new comprehension of the relationship between teacher and his disciple. These changes should be manifested not only in the elimination of the formalism from the mathematics teaching but also they should help the pupil to take a fancy to the mathematics and to enjoy the lessons of mathematics.

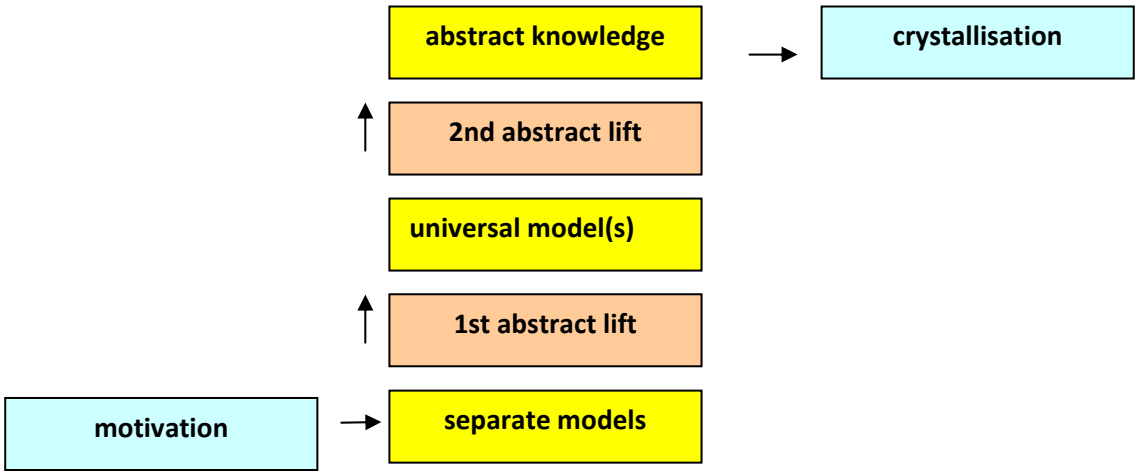
Innovating process and popularization of mathematics in Slovak school system

the mathematics education is not purposeless. The mathematics is the science which in real life has various important applications inevitable for the development of another scientific and technical disciplines. The process planted into the long term horizon must respect the pupils´ mental abilities

oriented at the discovering and the cognition of mathematical notion and its application to the practice. Following aspects participate in this innovative process:
a) Acceleration of abstract thinking by the separate and universal models,
b) New conceptions in the school mathematics teaching.

a) Acceleration of abstract thinking by the separate and universal models

On the basis of experiences from pedagogical practice, the pupils are not able to understand mathematical notions without utilization of convenient separate and universal models. Separate models obtained from various situations from the real life are generalized by the aid of universal model. This model is essential for the gaining knowledge process of pupil during the transmission from the abstraction to the discovering of knowledge. According to Hejny [3] this model of gaining knowledge process is based on five following stages. It starts with motivation and its core is two mental lifts: The first one leads from concrete knowledge to universal knowledge and the second one to abstract knowledge. The permanent part of gaining knowledge is crystallisation, i.e. inserting new knowledge into the structure. The whole process can be described by a scheme.



- **Motivation**

We see *motivation* as a tension which appears in a person‘s mind as a result of the discrepancy between the existing and desired states. The motivation for gaining knowledge stems from the discrepancy between “I do not know” and “I need to know”, or “I cannot do that” and “I want to be able to do that”, sometimes from other needs and discrepancies, too.

A pupil has a strong need to get to know things around him. Pupils are curious. They ask questions about everything which is within their perception. A stimulating environment enhances a pupils´ curiosity. However, school is often not a stimulating environment and it can inhibit curiosity rather than encourage it.

- **Separate models**

Models of new pieces of knowledge are accumulating in the mind gradually and have a long-term perspective. For instance, the concepts of fraction, negative number, straight line, congruency or limit develop over many years on a preparatory level. For more complex knowledge, the stage of separate models can be divided into these four sub-stages:

1. The first concrete experience that is the first model appears which the source of the new knowledge is.
2. A gradual coming together of other separate models which have been isolated so far.
3. Some models begin to refer to each other and create groups and separate themselves from others. The feeling develops that these models are in some sense „the same“.
4. Determining the core of the „sameness“, or perhaps it is better to say the correspondence between any two models. The models create a community.

The above sub-stages can be useful for us when we investigate how a new idea gradually develops in a pupil's mind. It often happens that a new sub-stage, not given here, appears and that one of those presented does not appear at all. For instance, one pre-schooler understood the idea of three-digit numbers via money. He repeatedly looked at and rearranged a hundred-crown note, a twenty-crown note and a crown and created 120 crowns and 121 crowns. Each time, he placed money on the table and said the corresponding number. Via this game, he constructed the idea of a three-digit number with the help of two (not only one) models.

- **Universal model**

In the scheme of the process of gaining knowledge, the universal model is placed over the separate models which points to its greater universality. The universal model is created from the community of its separate models and has two basic relationships to this community:
1) It denotes both *the core of this community* and the core of the relationships between individual models.
2) It is an *example* for all its separate model.

The first relationship denotes the construction of the universal model, the second denotes the way of the model works.

A nice example can be found in a textbook on solving equations by an Islamic mathematician *Músá al-Chvárizmí* written in the 9th century. The following three quadratic equations are solved in detail.

$$x^2 + 10x = 39, \quad x^2 + 21 = 10x, \quad x^2 = 3x + 4 \quad (*)$$

Negative numbers were not known at that time, therefore, the equation $x^2 + px + q = 0$ for p and q bigger than 0, had no root. To solve this quadratic equation was meaningful only if at least one of the numbers p, q was negative. There are three such cases and they are represented by equations (*). The solution of each equation (*) is an example for the given class and the whole triad of solutions is then the universal model of the process of solution of the quadratic equation. A mathematician who learnt how to solve equations (*) was able to solve any quadratic equation. He proceeded on the basis of analogy, i.e. he used the similarity of the process of solution of the given equation and the corresponding type equation from (*).

The universal model can have the form of a direction, procedure, formula, diagram, graph, word, sign, hint.

- **Abstract knowledge**

The scheme of the process of gaining knowledge has three floors. On the ground floor, there is motivation and separate models, on the first floor, there are universal models, and on the second, top floor there are abstract knowledge and crystallisation. Climbing up the floors gives:
separate models → universal model(s) → abstract knowledge.

For example, the pupils in primary school have the ability to calculate the additions without their fingers or abacus. They are in the stage of abstract knowledge.

- **Crystallisation**

After its entrance into the cognitive structure, a new piece of knowledge begins to look for relationships with the existing knowledge. When it discovers disharmonies, the need arises to remove them: To adapt new knowledge to the previous knowledge and at the same time, to change the previous knowledge according to the new knowledge. This stage is imprecise in two aspects: First, it suggests an image that crystallisation only begins when the abstract knowledge has been constructed. Then it supposes that the only thing which was added to the cognitive structure and which takes part in the process of crystallisation is the abstract piece of knowledge. Neither is true.

Permanent development of knowledge is a typical sign of the quality of non-formal knowledge. A mutual discussion among students helps crystallisation profoundly. The deeper the knowledge, the more such a discussion is needed. It is usually not finished and the same topic is discussed repeatedly whenever a student discovers a new idea.

Illustration (the gaining knowledge process): The story of five-year-old Anka illustrates five stages of the process of gaining knowledge.

Anka likes counting with her grandmother. She often persuades her to count together.	**Motivation**
During the last month, she had counted several times „2 and 3“ using dolls, candies, apples, buttons, chairs, etc.	**Separate models**
The grandmother gave the girl a difficult problem: „There are 2 strawberries in a bowl and 3 strawberries in a basket. How many strawberries are there altogether? “The girl did not see the strawberries, the bowl and the basket were covered with napkins.	**Challenge for the first abstract lift, for generalisation**
Anka counted with the help of fingers. She placed 2 fingers to the bowl and 3 fingers to the basket and counted them. She said: „Five strawberries. “	**Discovery of a universal model**
The grandmother praised the girl and uncovered the strawberries.	**Motivation for the second lift**
Anka brightened: “It will be five each time. Two and three is always five.”	**Discovery of abstract knowledge**
The girl‘s discovery will affect the whole area of her arithmetical knowledge. It will accelerate other analogical discoveries.	**Crystallisation**

This illustration suggests the main ideas within the process of gaining knowledge. A person first understands several concrete examples and then finds more general and abstract piece of knowledge.

b) New conceptions in the school mathematics teaching

The notion of the conception of teaching means realignment between the processual and formal faces of teaching. There are several considerable conceptions of the 20th century which have not been profoundly implemented into the Slovak school system yet. Naturally we can not follow only one of these conceptions but it is important to alternate single elements of several conceptions during educational process. There is no guide how to alternate these conceptions during the school year. The teacher has to know his pupils, their interests, the level of pupils´ knowledge, the objectives of mathematics studies, etc. Among the most known conceptions of the 20th century we can remark these ones: Programmed learning, Differential learning, Problem-based learning, Project-based learning, Alternative forms of learning, etc.

Information and communication technologies (ICT) and its integration into learning process is also the new great challenge in didactics of mathematics. ICT (various mathematical softwares, internet, interactive programs, e-learning, applets) represents a real phenomenon of the third millenium and many teachers, software developers and researchers meet this challenge. In the present there are many schools, which did not wait for a "command from the authority", but they choose difficult innovative process and overcome obstacles in connection with the implementation of ICT into the mathematics education. There is a multiplicity of new approaches and of various tools at all school levels. Very important element attached to the consideration about the suitability and effectiveness of ICT is their quality [7]. According to the opinion of several specialists in the field of informatization [8] and didactics of mathematics, the conveniable ICT, software, program should accomplish some basic criterias: expertness, correctness, high didactic quality, interactivity, motivation value, containing methodical instructions, aesthetical attraction. Teachers´ opinions about the utilization of the ICT and didactic software are different. These opinions are often liable to insufficient special didactic preparation for the utilization ICT which is a warning for pedagogical faculties preparing future teachers.

The teacher, his personality and the manner of his teaching play very important role during the realization of the learning conceptions. But the teacher should realise that every pupil has his own

capacity. Pupil is not able to get everything even if the teacher utilizes modern conceptions and methods. We have already signalised the school curriculum full of the encyclopaedical knowledge in connection with all school subjects not only with the mathematics. It is not possible for a pupil to absorb all knowledge therefore the teacher must consider to choose essential, useful and effective information. It is not easy task.

We can take an example from the 2nd level of primary school and secondary school (age of pupils/students: 10-18 years). It is not possible for a pupil to acquire, to understand and to apply all information from mathematical textbooks on 2873 pages (and we did not include exercise-books and various additional mathematical texts).

The first aim of mathematics education is to support the contextual thinking in a pupil. The pupil needs to understand a principle, fundamentals, continuity of the required knowledge and the possibilities of its application in real life. There are some reserves in this domain of mathematics teaching in Slovak primary and secondary school. The Faculty of Pedagogy of the Catholic University in Ružomberok helps to eliminate these reserves and obstacles via the various projects oriented at the teacher and his lifelong learning.

Projects implemented at the Faculty of Pedagogy of the Catholic University in Ružomberok supporting the popularization of mathematics

The Faculty of Pedagogy of the Catholic University of Ružomberok is profiled as a teachers' faculty that prepares teachers and educators for pre-school facilities, primary and secondary schools, elementary schools of art and conservatories. The Faculty of Pedagogy has signed agreements on cooperation with several foreign universities. On the basis of these international agreements a certain number of students and pedagogues mobilities has already been carried out between the universities and a narrow cooperation has been established in the field of projects, education, science and art. Thanks to this fact, many Slovak and foreign experts held the lectures at the Faculty with the aim of popularization of mathematics.

At the Faculty of Pedagogy of the Catholic University in Ružomberok a conference with international attendance *Mathematics at School Today and Tomorrow (Matematika v škole dnes a zajtra)* has been held annually since 2000. This year we organize its 9th year. Equally the Faculty is involved in the intensive international (namely Czech, Slovakia, Germany, Poland, Great Britain) cooperation in the field of theory of teaching of mathematics. These activities are aimed at technical cooperation and exchange of mutual experience of not only experts but also teachers of primary and secondary schools. Presently, in such way, during conferences and seminars, in which the teachers participate regularly, their further education is carried out. These activities are efficiently supported by two projects of European Social Fund (ESF) that have been realized at the Department of Mathematics:

Modernization and innovation of mathematics and informatics teaching with the regard for future teachers and for lifelong education (innovative project, ESF n^{o} 11230220094**)**

This project was created for the purpose to raise the level and to improve the quality of lifelong education.

Principal aims of the project:

- to offer the complementary, continuous and lifelong education for the teachers of primary and secondary school;
- to participate at the process of humanization of education via implementation of the innovative approaches and modern trends into mathematics teaching.

Particular and specific aims of the project:

- development of the teachers´ skills in the field of the utilization of IC technologies;
- implementation of special mathematical softwares (Cabri Geometre, Derive, MathLab, Mathematica, Cinderella, etc.) into the mathematics teaching;
- offer of the complementary formation for the teachers with an insufficient qualification.

Target group:

- teachers of mathematics and informatics at primary and secondary school;

- graduates of pedagogical studies (who have some difficulties to find the place as a teacher and who would like to increase their teaching abilities);
- teachers with an insufficient qualification;
- students of pedagogical faculties – future teachers of mathematics.

Even if the utilization of the ICT in the mathematics teaching is very important, it is not necessary to overestimate it. In our opinion, when the teacher utilizes a computer, it does not yet mean that his teaching and methods are modern and effective. In many cases, the utilization of the modern technologies could make teacher's effort and whole educational process more effective, more interesting, and more motivating. On the other side, if the ICT are implemented to the educational process inconveniently, it can devalue teaching process and teacher's purposes. We should obey a simple and simultaneously natural thesis: *Utilization of ICT in teaching process represents only the means how to accomplish the established didactic objective; it is not the objective itself.*

Before the realization of the project we have effectuated a little research at primary and secondary schools to find out the interests of teachers in our ideas. Following these results we proposed following modular seminars:

Module A – *Stochastics and combinatorics in the school mathematics (2005 – 2006);*
Module B – *Mathematical analysis in the school mathematics (2005 – 2006);*
Module C – *Informatics (2005 – 2006);*
Module D – *Mathematics at the 1st and the 2nd level of primary school (2005 – 2006);*
Module E – *Utilization of ICT in the mathematics teaching (2005 – 2007).*

The teacher could choose one or more of these modules and participate in the modular seminars. After the seminars, teachers had an opportunity to practice the new knowledge required during the seminars with their pupils or students and elaborate the final report including their own experiences. In terms of this report and its review, the teachers obtain the certificate recognized by the Ministry of Education of Slovak Republic. This project has educated about 500 teachers during 2005-2007.

All seminars fees (lecturers´ awards, didactic material and tools, accommodation and alimentation fees for lecturers and participants, travelling costs) were financed by the European Social Fund. The seminars were organized mostly in agreeable mountainous surrounding close to the town of Ružomberok where the Catholic University is settled.

This atmosphere was very favourable to make new relationships among the teachers and the lecturers. The lectures presented by university teachers, not only from Slovakia but also from abroad, were signated by professional quality and they offered the teachers worth experiences, new reviews and approaches in connection with the mathematics teaching.

After the finishing of this project we continue the idea of lifelong education by organizing similar and new activities supporting the popularization of mathematics and innovative process in mathematics teaching via the second project implemented at our Department of Mathematics. This project is also financed by the European Social Fund and entitled **Further and lifelong learning for teachers of mathematics, physics, informatics, creative art and biology (innovative project,** ESF n^{o} 11230220297**)**. The title of this project indicates that several departments of the Faculty of Pedagogy participate in the project. The principal aim of this project is to raise the area and quality of

lifelong education for teachers via the programs, seminars, workshops and conferences organized by departments of mathematics, physics, informatics, creative art and biology.

Conclusions

As mentioned above, we tried to review some basic pillars of innovative process in mathematics teaching in Slovakia in which the Catholic University in Ružomberok would also participate. The mentioned problems should mirror in the professional preparation of future teachers of mathematics. The ambition of these innovative approaches is to activate pupils and their interests for mathematics and to let them discover the beauty and magic of this difficult but interesting discipline.

References

[1] Fulier, J., Šedivý, O.: Positions and humanization in teaching mathematics. Constantine the Philosopher University in Nitra, Nitra 2004.

[2] Report on the state and standard of education and training in schools and school institutions in the Slovak Republic in school year 2006/2007. SSI, Bratislava 2007.

[3] Hejný, M.: General philosophie of the course EMTISM – Empowering Mathematics Teachers for the Improvement of School Mathematics. Comenius course, Prague 2002.

[4] Petlák, E.: General Didactics. IRIS, Bratislava 1997.

[5] Lengyelfalusy, T.: The principal objective of the mathematics teaching is a happy man. In: Proceeding of the 3rd mathematical workshop with international participation (CD ROM). FAST VUT, Brno 2004.

[6] Országhová, D.: The Effect of information and communication technologies to the innovation and modernization process of the mathematics teaching and study methodology. INTERNATIONAL SCIENTIFIC DAYS 2006, Faculty of Economic and Management SAU in Nitra 2006.

[7] Černák, I., Rojček, M.: Innovation Methods of Solution and Modern Approach Realization of the Virtual Department. In: Proceeding of international conference Innovative Process in the e-learning, University of Economy, Bratislava 2008, ISBN 978-80-225-2510-7.

[8] Černák, I., Mašek, E.: Fundamentals in Electronic Education (university textbook). Faculty of Pedagogy of the Catholic University, Ružomberok 2007, ISBN: 978-80-8084-171-3.

About the Author

Mária Lalinská is the pedagogue of mathematics and French language at Pedagogical Faculty of Catholic University in Ruzomberok in Slovakia. Actually, she continues her formation by Ph.D. studies in the field of didactics of mathematics and theory of mathematic education. She devotes her studies to the utilization of IC technologies, especially utilization of graphic calculators in the teaching of mathematical analyses at school. Maria Lalinska is also the member of the faculty department which is coordinating several projects of scientific and educational character.

(A.18)

Elozor Shneider; Olga Gladkikh, Developing a quality assurance process for automatic assessment design system: Assessment is an essential element in the development of high quality education programs. Despite a wide range of existing forms of assessment questions, the evaluation of different levels of cognitive thinking is often under presented in commonly used question sets, and underestimated in assessment design. Achieving fair mark allocation is an associated problem because similar marks are often given to the questions that require involvement at different cognitive levels. This may lead to a higher award to the students who demonstrate good short term memory rather than a deep comprehension of a subject and the ability to employ such cognitive processes as Apply, Analyse, and Synthesise. For instance, gifted students are often disadvantaged when assessment questions gravitate towards memory skills rather than higher levels of cognitive thinking. This research aims to significantly improve and simplify designing fair testing tools through creating an intelligent information system capable of generating the required types of test, tailored to the level of the learners group. The questioning strategy employed in the system is based on our modification of Bloom's taxonomy of cognitive thinking. Based on this strategy, we have built generic questioning templates and suggest an algorithm of testing the assessment question sets to assure their quality. Implementation of the algorithm requires development of the cognitive metrics rating the relative difficulty of questions at different cognitive levels. Correct cognitive metrics will help to ensure fairness of assessment and stimulate the development of higher levels of cognitive thinking, thus promoting excellence in education.

(A.19)

Issues of Excellence in Professional Art Education: A Taiwanese Case of Art Freshmen's Core Class

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Abstract
In the overall plan of the Department of Art at the National Taipei University of Education, freshmen's core classes aims to help students' transition from high school to college. The present author designed and executed one such core classes called "People, Context and Art" (fall of 2006 and fall of 2007). Using theories of "multicultural and cross-cultural art education for socio-cultural awareness", "anthropology as cultural critique", "teaching for understanding", and "art thinking", the curriculum was designed to help the students see art in socio-cultural context. Five learning phases were planned in the semester-long class. Students were to (1) develop sensitivity toward the multiple roles arts played in different contexts through watching anthropological or documentary films; (2) form groups to assume teacher's role in helping fellow students notice the messages embedded in the films; (3) compare and contrast what was learned in the film with the everyday facts in own culture; (4) create short films in groups to perform own understanding of the interplay of "human, context and art"; (5) present the films for peer and expert review in a small film festival. The present author will report the process of planning, implementation and group reflection of this curriculum. In addition, one of the films will be shown in the presentation.

Keywords: Excellence in education, professional art education, multicultural and cross-cultural art education, cultural critique, teaching for understanding, art thinking, curriculum design, educational case, educational action record.

My rationale behind the curriculum design, based on my understanding of what my students preparation prior to their entry into our Department, including:

- A lackluster general art education punctuated by Japanese pop art;
- Semi-academic approach toward art (if graduated from one of the gifted art programs);
- A government-steered taste toward Classical/Impressionist Art;
- Grew up in a world of TV, movies, games and internet;
- Grew up with a deep-seated and robust indigenous art tradition;
- Grew up in a group-oriented, standard-upholding cultural environment; and
- Grew up in an era that marked by a xenophobic atmosphere.

My evaluation and goal-setting of the learning need of my students:

- The students needed to *expand* their perspectives about the possibilities of art;
- The students needed to be more *aware* of the relationship between art, its context and people--which included the students themselves; and
- The students needed to *own* their art-making process rather than believing in some sort of standard of route and aesthetics.

Triple goals:

1. Socio-cultural awareness;
2. Expansion of perspective; and
3. Ownership of art-creation process.

The theoretical underpinning of my teaching plan:

- Multicultural and cross-cultural art education for socio-cultural awareness: McFee & Degge (1977);
- Anthropology as cultural critique: Spindler (1974) and Marcus & Fischer (1986), and
- Teaching for understanding and Art as a thinking process: Project Zero (Perkins, 1994; Veenema, Hetland & Chalfen, 1997; Wiske, 1998).

Challenges and solutions: How to introduce cross-cultural experience within the confine of the classroom?

Utilize the information assimilation power of the human visual perception. Construct the class around different anthropological/documentary films.

How to select and present the anthropological/ documentary films to achieve the goal of this class?

The following principles of selection were adopted:

1. Each film needed to exhibit at least one particular phenomenon or meaning of art of a particular cultural group;
2. The films need to contain messages of cultural challenge or a degree of disturbance to the students;
3. Include different kinds of art; and
4. Together, the films need to cover a wide variety of peoples in the world.

As a result, 10 films were selected. Take the fall 2007 class as an example, the topics and films chosen included were:

1. Art's transformation with economy: Mexican copper ware craft;
2. Art that interpreted cultural norms: Photography of human figure arts of Ghana;
3. Art that transmits cultural identity: Indian minority group's scroll painting;
4. Art as embedded in life: Yanomamo arts;
5. Artist and his/her works: Modern artists of USA;
6. Public art as a means of social work: A Philadelphia community-revival case;
7. Art that serves political and social ends: China's Cultural Revolution;
8. Architecture as media of religion: A Japanese art museum's construction;
9. Art as therapy: Music of Taiwanese Aborigines; and
10. Art as social critique: Taiwanese rice farmer's view about WTO.

How to induce reflection and higher level thinking without curbing the development of individuality?

Socio-cultural awareness and expansion of perspective

For midterm assessment, each student group was asked to adopt an anthropological/documentary film. Each group was asked to play the role of an instructor by transform their initial understanding about the film into a teaching plan. Each group was then to conduct a 90 minutes presentation to help fellow students understand the film. Finally, each group was asked to connect, compare and contrast the depicted cultural practices exhibited in the film against our own culture.

Socio-cultural awareness, expansion of perspective, ownership of art-creation process

For end-of-term assessment, each group was to make a short film which illustrated their take on the theme of "People, Context and Art" using things and happenings around them. Team members stayed the same as the previous midterm project. Since students knew that they need to do this project early on, they had abundant time to discuss, think, reflect and revise their film. Subject matter, type and genre of the film were open to each group's choice. All that the students needed to do was to dig into themselves and life around them. No technical instructions were provided. Students were encouraged to make their own decision, using any kind of hardware and software. By so doing, it was hoped that students' worries concerning their technical competency could be put to rest. Ideally, originality and depth of interpretation regarding the shared theme were emphasized thereby giving ownership of art-creation to the students.

How to encourage good performance but prevent learning fatigue or within-group communications problem?

To help the students with their mid-term project, each group was allowed at least two appointments with me to discuss their understanding of the particular film they adopted. They could also discuss with me the approaches they were to take during their teaching role play

.

Organize a small film festival. Enticing awards were given according to outside reviewers' as well as classmates' decisions. Relatives and old high schoolmates were invited to view the film.
Every group could keep their film a secret until the film festival, thus created an atmosphere of excitement and quiet competition.

Example of student film:

Title: Celebrate
Students: Liao, Cheng-Yao; Chang, Chi-Yuan; Tu, Ying-Yu; Chang, Chia-Hui; Chu, Chia-Chi
Length: 10' 00"
Production idea written by the group, selected and translated from the festival's handbook: "In the busy streets, we ask the passers-by for receipts and plastic bottles. We were not very successful. People thought we were salesmen or saleswomen. Some of them provided what we wanted after listening to our explanation f our intent. We took what we got and turned it into a Christmas tree. A celebration thus began."

Interpretation of the production idea according to the group: Materialism, represented by receipts and plastic bottles, is rampant in this world. In this season of Christmas, instead of buying presents, we are to transform materialism into something warmer and more sincere.

Students' responses

Recently, I asked all the students to answer a small anonymous questionnaire. Two questions were posed. One was how they remembered the content of the class, one was what did they think they learned. The answers were compared with the responses collected in a Focus Group interview. The result was quite consistent.

Four months to a year later, most of the students could recount the major points of the classes. They claimed that the class expanded and changed their views about art. The many possibilities of art became real and exciting. Watching a film for many times and gaining deeper understanding and empathy each time was rewarding. Cultural comparison between "us" and "them" was inspirational. Doing the open-ended project motivated them. The film festival appeared to leave a stronger then expected impression in the students' memory. Many said they were flattered by the event and were moved when first saw the films made by their classmates.

However, around 1/5 of students said that at first they did not appreciate the anthropological/documentary films due to boredom. Such condition did not change until one of two things happened: first, when they themselves had had to go on stage to teach; second, when they gradually overcome the slow tempo, unrehearsed scenes and lack of plots of the films. A few of the students claimed that they had problem waking up in the class until they were faced with the challenge of making a movie. One interesting comment was that if the anthropological/documentary films can be so bad then they had nothing to worry about their own film production-- they couldn't do any worse.

One surprise response surfaced in the group interview. The 2006 students felt that the films produced by the 2007 students were somewhat shallow. After some discussion, one student from the 2007 class thought that he didn't realize as such until then. He thought this was due to the viewing of two films made by the students of 2006 in the first class. He and his classmates enjoyed the laughs exhibited in one of the films. He hypothesized that, while not all films were comic, the experience left such strong impression that perhaps resulted in altering the direction of their production later. I too did not realize this until then.

Self-assessment and notes for the future

Socio-cultural awareness, expansion of perspective and ownership of art-creation process are the triple goals of this class. I believe that the class filled the learning need that was not often touched upon in Taiwanese education. While generally pleased with the educational outcome, there are several technical points that needed attention, including:

1. Raising friendliness of films can lower learning barrier;
2. Ample time is vital when higher level learning is in order;
3. Team-work provides security and support for Taiwanese art freshmen;

4. Openness can encourage the students to go back to the basics of art-making. Yet such result may be possible if the students are new to the learning context. The second time around may not have the same result;
5. Students' awareness of their own cognitive change helps to steer them ahead; and
6. Focus group method should be used in the end of the class. It can be helpful to pull the focus back on the triple goals, rather than the film, the Festival or the projects.

Issues of excellence in professional art education

1. *Socio-cultural awareness, expansion of perspective, ownership of art-creation process* can be benchmarks of professional art education;
2. Excellence in professional art education may affect the excellence of the filed.

References

Marcus, G. E. & Fischer, M. M. (1986). *Anthropology as cultural critique: An experimental moment in the human sciences*. Chicago: University of Chicago Press.

McFee, J. K. & Degge, R. (1977). *Art, culture and environment: A catalyst for teaching*. Dubuque, IW: Kendall/ Hunt Publishing.

Spindler, G. D. (1974). *Educational and cultural process: Toward an anthropology of education*. NY: Holt, Rinehart and Winston.

Perkins, D. N. (1994). *The intelligent eye: Learning to think by looking at art*. Los Angeles, CA: The J. Paul Getty Trust.

Veenema, S., Hetland, L. & Chalfen, K. (1997). *The Project Zero classroom: New approaches to thinking and understanding*.

Wiske, M. S. (Ed.) (1998). *Teaching for understanding: Linking research with practice*. San Francisco, CA: Jossey-Bass.

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Prof. Dr. Ju-I Yuan working at the Department of Art, National Taipei University of Education. She got her MFA and Ph.D. from University of Oregon, Eugene, Oregon. She is strongly involved in: TSSCI and THCI Research Journal: *Research in Arts Education*; Public Service Website: Global Network of Arts Education, http://gnae.ntue.edu.tw; Public Service Monthly Art; and Educational Forum: Art Mice. She was a visiting scholar in (1990-1991): Leiden University, the Netherlands, Institute of Sinology, and in (1998-1999): Harvard University, School of Education. In addition, she was Associate Researcher (2003) at the National Taiwan University, Center of East Asian Civilization, and Associate Researcher (2004) at Harvard University, Yen-Ching Institute. In 2006, she was invited as a keynote speaker at the Asian Bo-Au Forum, Art Education sub-Forum in Beijing.

(A.20)

Maureen Jordan-Steen, Mathematics inclination in pre-service teachers: Prenatal hormones have been shown to influence individual characteristics. The ratio of the lengths of the index finger and ring finger (2D:4D) is an indicator of prenatal testosterone exposure. This study examines the possibility that prenatal hormones, as measured by the 2D:4D finger length ratio, may influence female pre-service teaching students' mathematics inclination, as indicated by their choice of major and minor concentrations. Also studied was the possible effect of the number of older brothers on this mathematics inclination. The results point to a statistically significant link between the right 2D:4D ratio and the choice of a mathematics major or minor in female pre-service education students. However, the link between the number of older brothers and the choice of mathematics major or minor was found to be inconclusive.

(A.21)

Theresa A. Lewis, Beyond the Classrooms: Service Learning and Teacher Training Programs: As educators who "train the next generation of teachers," we believe we have a social responsibility to educate future teachers who are academically prepared in their content areas, able to address diversity by honoring students' cultural heritages, and willing to assume responsibilities for growth and development in local communities. A primary aim of the literacy programs is to develop proficiency in providing assessment and instruction in literacy while maximizing literacy skills in all children. While the original design of the graduate courses in literacy was not intended to "consciously" reach out to local communities and provide educational services to them, in reality that is what has evolved with these masters' programs. Once the programs were introduced to nearby school districts, schools realized the impact of this approach on their students and now, they vie to have our courses offered at their sites. Additionally, k–12 students can receive multiple years of services in the area of literacy. With these goals in mind, this presentation seeks to: examine how one college addresses merging teacher training course objectives with the needs of local communities and students and invite conference participants to examine their own teacher preparation courses and construct plans to design similar course curricula that includes working with local community schools and organizations. Characteristics of the presentation will include overviews of current curricula which hold courses at local schools and descriptions of how teachers in training contribute to students in need of tutoring in academic areas. After results of observations involving four different courses are shared, participant discussion will include: what works well with this teaching approach on a graduate level; how can other professionals apply this methodology in their own community settings. Preliminary key findings of this methodology include: students in local community schools benefit from professionals addressing their academic needs; teachers in training benefit from this "hands on" method of teaching critical techniques in specific areas because they experience the results of immediate application of these learned techniques and receive instant feedback from their professors every week after these tutoring sessions.

About the Author

Theresa A. Lewis is the Coordinator of Graduate Education at Mount Saint Mary College and has responsibility for more than 500 graduate education students pursuing masters' degrees in adolescence, childhood, literacy and special education. She also teaches graduate level courses in curriculum planning for both childhood and adolescence and supervises student teachers in their field experiences. Dr. Lewis has worked in higher education for the past 27 years, serving as dean and assistant dean in higher education institutions within New York and New Jersey, director of continuing education programs and advisement, and as education faculty in several colleges. She has also served as Coordinator of the AEGIS Doctoral Program at Teachers College/Columbia University where students pursue degrees in adult and higher education.

Other educational experiences include principal of a K – 8 school of 500 children in New York City, instructor in GED and Civil Service preparation programs, staff development trainer for physicians' assistants in Harlem Hospital, and adjunct education faculty in a number of colleges.

Dr. Lewis earned an Ed.D. in Higher & Adult Education from Teachers College/Columbia University; a MS in Education and Professional Diploma in Administration/Supervision from Fordham University; a BS in Education from St. Thomas Aquinas College. Terry also holds certifications in Administration/ Supervision and School District Superintendent in New York State; N – 6 teaching certification; and Adult Education Instructor – Literacy.

She has presented at over fourteen national and international conferences including International Interdisciplinary Congress' on Women (Australia, 1996) and (Norway, 1999); AAACE and ACHE conferences; Non-Traditional and Inter-disciplinary Conferences. Her special areas of interest have focused on life history methodology and women in higher education – their career development.

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(A.22)

Anna Hui; Sing Lau; Toby Tong, What Makes Creative Teaching Possible among Primary and Secondary School Teachers in Hong Kong: The purpose of the present study was on examining the effect of different personal and social factors on the creative teaching style of school teachers. A total of 498 primary and secondary school teachers in Hong Kong were included. In addition to the measure of creative teaching style, the teachers were asked to provide their perception of some immediate factors that might be related to students' creativity orientation (such as students' creative family environment, creative learning environment in the classroom), some distal factors that might be related to their own creative teaching orientation (such as the creative work environment in school), and some global and personal factors that might be facilitative to their creative teaching practice (such as hindrance to creativity education, practice of creative education in general, personal involvement in creative activities). Results showed that the factors measured accounted for 29% of teachers' creative teaching style, with the most significant ones being the creative learning environment in the classroom, creative work environment in school, hindrance to creativity education, and personal involvement in creative activities. Further analysis revealed significant differences between the two groups of teachers, with the factors accounted for greater variance among the primary than secondary school teachers (i.e., 34% vs 23%). Moreover, among the primary school teachers, a wider scope of significant factors related to their creative teaching style was found that included creative work environment in school, creative learning environment in the classroom, hindrance to creativity education and personal involvement in creative activities, whereas among the secondary school teachers, the most significant factors included only creative learning environment in the classroom and hindrance to creativity education. The implication based on these differences in the significance of these sorts of factors in relating to the promotion of creative teaching in general and creative teaching in primary and secondary school levels was discussed.

(A.23)

Iman Osta, Math Curricula vs. Critical Thinking: Catalyst or Obstacle? Most currently used curricula of mathematics claim an emphasis on the development in students of critical and independent thinking. Yet, they set a rigid sequence of topics assumed to be suitable for all students of the same age at a certain grade level. There is a general feeling that the goals of developing problem solving skills and critical thinking are not achieved in the practice of math teaching. Despite some calls for differentiating education to cater for gifted and talented students, teachers focus most of the time on procedural knowledge and cognitively rigid algorithms to guide students to solve lists of similar exercises using the same method. In most of the cases, creative solutions given by students who don't conform to the previously set algorithms are either oppressed or ignored. This paper presents a case study aiming to conduct a micro-analysis of the thinking strategies used by a Lebanese grade 6 student (12 years old), for solving a problem that is usually taught in grade 7 and involves the use of first-degree equations, prior to any formal instruction in algebra. The regular solution of the problem requires representing it by an equation in which the unknown appears in both sides of the *equal* sign, which makes it impossible to solve using only arithmetic calculations. The student worked on the problem in a clinical interview setting. She was observed and interviewed about her attempts to solve the given problem. The session was audiotaped and analyzed. The purpose was to identify the "conceptual combinations" mobilized by the student to solve the non-routine problem, as well as the cognitive processes that lead her to the solution, such as "analogical transfer" and "restructuring". The analysis attempted to detect the emergence of algebraic thinking and/or algebraic procedures, based on the student's prior arithmetic knowledge. Basically, the student has "re-invented" algebra, if we borrow Kamii's expression.

About the Author

- Iman Osta, Associate Professor of Mathematics and Computer Education, Department of Education, Lebanese American University.
- Doctorate in Didactique des Mathématiques et de l'Informatique from Université Joseph Fourier, Grenoble, France. She has taught at the American University of Beirut (AUB) from 1990 till 1999
- Teaching at the Lebanese American University (LAU) since 1999
- Participated in many international, regional and local conferences.
- Has many local, regional and international publications on spatial visualization, geometry teaching and learning, prealgebraic processes, ICT in education, curricular studies in mathematics and/or in computer technology.
- Participated in the development of the Lebanese national curriculum and textbooks for computer education at both the intermediate and secondary levels.
- Participated in the evaluation and revision of the Lebanese mathematics curriculum.
- Participated in setting the system for student learning assessment and evaluation in the new Lebanese curricula, and chaired the National Evaluation Committee for mathematics.
- Since 1990, conducted many workshops for teachers : Problem solving, Critical thinking, Connecting math to life, Connections math-art, Assessment in math, Dynamic Geometry Software (DGS), Spreadsheets in the teaching of mathematics, Calcuators in math teaching and learning, Meaningful learning of math, Motivation in math classes, and others.

(A.24)

Educational Directions in the Hexahedral Paradigm of Creativity

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Abstract
The author has proposed a hexahedral paradigm as base of creativity manifestation (kazemi, 2007). The author concludes a phenomenon with affective and cognitive nature; he names this phenomenon in Persian, "Hayajan-e-Andisheh" (Emotion of Thought). Emotion of Thought involves "Poyaei" and "Bitabi" (in Persian). According to author, in next century, creativity development relates to connection between emotion and thought. On this paradigm; the author suggests an educational pattern that includes three levels. A - Level comprises promoting individual readiness, utilization of environmental resources, attitude development, enhancing the utilization of experiences, conducting physical activity and movement education, and development of special thinking. B-Level consists of encouraging the Poyaei and programming for counseling interventions for Bitabi. C-Level depends on age and gender differences among gifted and talented adolescents.

Keywords: activity, affection, attitude, counseling, creativity, development, Poyaei, education, emotion of thought, environment, experience, identification, movement, personality, Bitabi, thinking.

The author has presented a comprehensive design for creative personality that consists fourteen categories (e.g., total motivation, openness to experience, emotional sensitivity) (Kazemi, 1997b) According to author, reviewing of the literature indicates that there is a "hexahedral paradigm" for creativity. Seemingly, this paradigm we consider as a new base for creativity identification and development (Kazemi, a, b, c & d).This "hexahedral paradigm" comprises individual readiness, resource orientation, attitude, utilization of experiences, active mobility, and special thinking. As far as the author concludes a phenomenon with affective and cognitive nature, he names this phenomenon in Persian, "Hayajan-e-Andisheh" (Emotion of Thought). Emotion of Thought involves "Poyaei" and "Bitabi" (in Persian) that mean *Poyaei* and *Bitabi*. There are also six components for any eras. " Poyaei " involves motion and movement desire, curiosity, feeling of extra ordinary power, great thought, humor and easily expression of emotions, and tendency for experience. " Bitabi " involves agitation, captivity, somatic expressions of thinking, misgiving, twirling of thought and loneliness sense.
Overall, it can be concluded that in next century, firstly understanding of creativity depends on comprehension of relationship between emotion and thinking (especially developmental-emotional examination of creativity), secondly creativity identification concerned with emotional nature of creativity , and finally creativity development relates to connection between affection and cognition (in other words, emotion and thought).

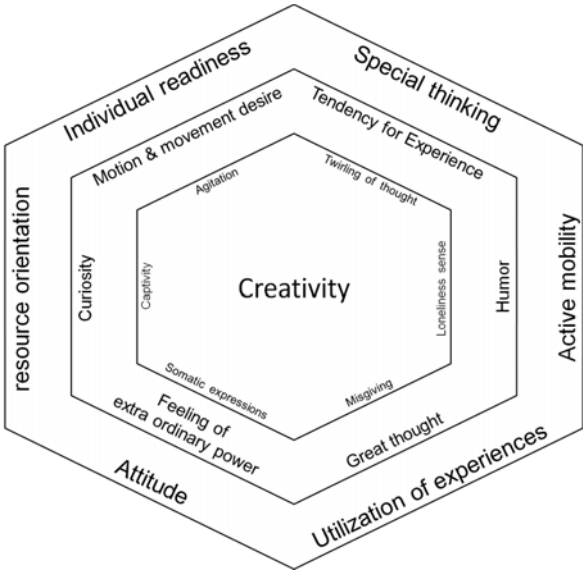

Figure 1: The hexahedral paradigm of creative personality (Kazemi, 2007a).

First, the common directions:

(1) Promoting individual readiness

Individual readiness refers to high ability (bio-psych readiness, high intelligence, and aptitude) and self- initiate (self-readiness, individuality, and internal incubation).

High ability Bouchard & Hur (1998) discuss that there is a connection between genetics and personality. Heritability of the continuum of introversion (as a creative personality trait) was 60%.The creativity is a whole brain process related to Walas' four process stages of creativity and the four quadrants of the Whole-Brain Model (Herrmann, 1991). In addition, Dacey (1989) discusses basic concepts of creativity included brain physiology. Seemingly, the creative personalities are more sensitive (Bachtold & Werner 1973). Lang & Ryba (1976*) **also indicate*** that there is higher sensory acuity across sensory modalities in creative persons. Goldsmith (1984) also found that the KAI correlated positively with the sensation seeking. Besides, Parnes (1971) discusses sensitivity characterize the thought process of highly actualized individuals (as a creative trait). On the other hand, there is connection between high intelligence and creativity (e.g., Saltford,1981; Kazemi,1992;Maker,1993; Runco,1993; Sternberg & Lubart, 1993; Hunsaker & Callahan,1995;Hoffman, 1995; Galbraith & Wentzel,2001;Naglieri & Kaufman,2001). In the vast majority of cases have been showed that linkage creativity and aptitude (e.g., Merrifield et al., 1964; Smith, 1970; Jensen, 1973; Gordon, 1989; Webster, 1990; Kazemi, 1997c; Clapham, 2004).

Self- initiate. It is widely accepted that creativity relates to self. Creativity and self-actualization have long been associated together (Bruhn et al., 1969; Ekval, 1972; Conti & Amabile, 1999; Runco, 1999b). Besides, Parnes (1971) discusses the three S's -sensitivity, synergy and serendipity- characterize the thought process of highly actualized individuals. The various coping behaviors used in facing new problems is especially pertinent to self-actualized persons and mental health.

The evidences show creativity and innovation relate to self-image (Smilansky & Halberstadt, 1986), self- concept (Schempp & Cheffers, 1982;Kazemi,1998), self-esteem (Keller & Holland,1978; Keller,1984;Helson,1999), self-determination (Sheldon,1995b) and self-sufficient (Bachtold & Werner, 1973). Therefore, Sternberg (1988) presents "Mental self government" as a theory of how things fit, and as support to the idea of matching style to task (person-environment fit). Creative processes may be seen as initiating from a general drive toward self-organization through the reduction of chaos (Sternberg &Tardif, 1989).

The evidences also show that problem solving and invention relate to field independence (Smilansky & Halberstadt, 1986). OHara & Sternberg (1999) also emphasize field independence. Similarity, Runco (1999a) indicates that the exceptional talents depend on independence and creativity. In addition, Feist (1999) discusses the relationship between autonomous behavior (autonomy and independence) and creative personality traits. He also explains the other related personality traits such as self-confidence, arrogance, and solitude. Likewise, the findings indicated that the committed artists demonstrated autonomy (Dudek & Royer, 1991). It is seemingly autonomous behavior requires uniqueness. Therefore, Skinner (1996) discusses that uniqueness seeking may be a result of innovativeness rather than a personality characteristic. Consequently, Tucker (1991) concentrates on assertiveness and Huitt (1992) discusses relationship between problem solving and decision-making. Furthermore, teachers identify Students' mannerism such as individuality as important indicators of creative students (Westby & Dawson, 1995).

On the other hand, the creativity requires being task-focused (Sternberg & Tardif, 1989).thus, Maddi et al (1982) emphasize upon internal orientation as factor in creativity. According to" the activation personality theory", the extent and unusualness of fantasy production will be greater in persons having both a high customary level of activation and an internal orientation than it will in persons having only one or neither of these characteristics. In the same way, Bachtold (1980) discusses that introversion and high powers of attentiveness are specific trademarks of the creative personality. Equally, Miller (1992) emphasizes upon the introspection. Besides, Stohs (1991) found inner focused personality. It seems that internal orientation involves a period of incubation. As a result, Guilford (1979) overviewed and discussed incubation as a part of creative problem solving and cognitive thinking styles. In addition, Simonton (1999) discusses relationship between creativity and unconscious incubation. Thus, McClelland (1987) suggests characteristics of successful entrepreneurs include initiative.

(2) Utilization of environmental resources

Utilization of environmental resources refers to making use of persons or things that means achieving a person-environment fit. In general, Creativity relates to family, educational, ecological, cultural, and socio-economic conditions (MacKinnon, 1975; Khire, 1979; Amabile & Gryskiewicz, 1988; Amabile, 1988; Dacey, 1989; Runco & Albert, 1990; Meyer, 1991; Bull et al., 1995; Kazemi, 1994, 1996; Amabile, 1997; Powers, 1998; Dunbar, 1999; Cramond, 2001; Fonseca, 2002; Md-Yunus, 2007).

As self-determination theory describes, the relatedness need desire have been identified as being essential for social development and personal well-being (Ryan & Deci, 2000).In addition, Mudd (1986) reviewed the KAI literature produced between 1976 and 1986. He emphasizes on the environment-styles fit. Moreover, extraverts scored higher on tests measuring verbal flexibility, fluency, and originality (White, 1968). Besides, the author discusses the influences of economic advantages on creativity (Kazemi, 1996)

Instead, Jurcovç & Zelina (1993) explored climate, which may act as barrier to becoming more creative. Besides, Bachtold & Werner (1973) found that creative female authors and artists were more aloof than the general population. Feist (1999) also discusses related personality traits to creativity such as non-conformity, associability, and antisociability. In addition, Sheldon (1999) discusses how external constraints and interpersonal climate can promote conformity, thus influencing creativity in a negative way. Sheldon (1995a) also found those personal goals could create a poor working environment and promote feelings of conflict within the group. In addition, James (1995) investigated the effect that conflict has on an individual's creativity. He found that goal conflict had a positive effect on creativity when task orientation matched up with individual orientation. Thus, the teachers define a creative personality as undesirable (Dettmer, 1981). Above all, Hinton (1971) showed the relationship between certain personality variables and resistance to the effects of frustration on creativity; and there are the combined effects of personality and emotional stress on creative productivity. He collected initially under neutral circumstances and again with a high amount of environmental frustration. Certain personality factors, which are not of primary importance in the determination of creative potential, are definitely important in their interaction with environmental variables, and that these have a significant effect on the determination of creative productivity.

On the other hand, Puccio & Chimento (2001) suggest a social bias wherein attributing creativity to personality traits and innovation is a valued cultural status; further, that innovators successfully promote themselves as highly creative. Nemiro (1997) also investigated the creative process of actors by examining different aspects of an actor's life. He found social influences that affected an actor's creativity. Results indicated that certain social influences (trust, freedom, respect) enhanced an actor's creativity while other influences (distrust, poor direction) inhibited performance. The individualistic advertising cultures differ in creative personalities, creative process, and use and type of agency philosophy compared to collective cultures (Ewing et al., 2001). The personalized 'space' can demonstrate creativity in the workplace (York, 2000). Besides, the author discusses disadvantages of the formal education for creativity and taking advantage of the creative peer environment (Kazemi, 1994). In addition, Helson" studied the literary works and personalities of women authors. She found non-neurotic relationships with parents. Then in a longitudinal study of these women (over the course of 25 years), she obtained family satisfaction and self esteem effect motivation, (Helson, 1973, 1999). Some evidences emphasize on the effect of group (Street, 1974).Similarly; some evidences focus on the synergy (Parnes, 1971; Kurtzberg & Amabile, 2001). Further, Smith & Knight (1959) showed personalized feedback improved group problem solving efficiency and under certain conditions improved self-insight. Results of researches indicate that the larger the group (up to 12), the larger total productivity in terms of quantity, quality-originality of answers and new categories. As group size increased per person, contribution tended to lessen (Renzulli et al., 1974).

(3) Attitude development

Attitude refers to cognition (and intuition), idea, and affection (motivation and emotion). Davis (1999) discusses the barriers to creativity and creative attitudes.

Cognition and intuition

The author discusses cognitive origins of creativity that inclusive attention, perception and thinking (Kazemi, 1994). The knowledge base contributes to the development of the creative person

(Stein, 1983; Feldhusen, 1995; Sternberg & Lubart, 1995)**.** However, knowledge can be a double-edged sword (Sternberg & Lubart, 1993). Feldhusen (1995) also describes the metacognitive processing necessary for creativity to be recognized. On the other hand, the authors emphasizes upon the intuition (Sternberg & Tardif, 1989; Miller, 1992). Besides, Sternberg & Lubart (1995) suggest that the creative person relies upon intuition to guide behaviors. Moreover, Goldsmith (1985) found that intuitive would have a positive correlation with sensation seeking. Hence, Bouchard & Hur (1998) found heritability of sensing/intuition was 40%. As Dudek & Royer (1991) state committed artists demonstrate inspiration. The author emphasizes that developing visual skills and insight can underlie discovering truths about exist and promoting creativity (kazemi, 1996).

Idea

Creative individual's believes include try to think of new ideas, and commonly try to add ideas to existing idea (Masten, 1989) idea finding (Renner, & Renner, 1971), ideational fluency (Isakson, 1977) negative correlation with the dogmatism (Goldsmith, 1984) paranormal belief (Thalbourne, 2000) and masculinity attitudes in among women authors (Helson,1973)**.** Treffinger (2004) proposed courage to explore ideas. A creative person moves into generating ideas or being divergent, and then ends with a convergence on a practical path or idea in which he/she develops a plan of action (Carson, 1999). Meadow & Parnes (1959) examined if adhering to the brainstorming principle would result in significant increments of quality and quantity of ideas. Results suggest that the course produced significant increments on the two measures of idea quantity and three of the five measures of idea quality.

Affection

Russ (1999) examined the relationship between affect and creativity through a review of the current thinking in the field**.** She states an integrative model of affect and creativity, which links cognitive abilities, affective processes, and global personality traits.

Motivation

Results of researches indicate a relationship between motivation and creativity (Halpin & Halpin, 1973; Hurst et al., 1991; Sternberg & Lubart, 1993, 1995; Mehr & Shaver, 1996; Gedo, 1997).

The creative motivation includes innovative orientation (Keller & Holland, 1978), questioning, curiosity (Walberg et al., 1979), preference for complexity (Renner & Renner, 1971; Nicholls, 1972), motivation for uniqueness (Skinner, 1996), and aesthetics need desire (Miller, 1992).

The creative people need to discover (Kawenski, 1991), clarity (Keller & Holland, 1978), and spontaneity in a performance (Nemiro, 1997), and enjoy the process of creation and innovation (Torrance, 1972; Keller & Holland, 1978; Goldsmith, 1984; Csikszentmihalyi, 1996).

The creative person is presenting an intrinsic motivation or intrinsic task commitment (Nicholls 1972; Sternberg & Tardif, 1989; Csikszentmihalyi, 1990; Amabile, 1997; Stafford, 1998; Conti & Amabile, 1999; Feist, 1999). Hence, Graves, et al (1967) suggests a Motivation Index is as a predictor of supportive value to the creativity score and Torrance (1971) suggests, “Creative Motivation Scale “is valid for its purpose as brief and coarse screening devices for identifying creative individuals.

Emotion

Creativity relates to emotional (sensitivity, involvement, and stress), humor, personal conflict, inner freedom, openness, and full expression.

Levy (1983) suggests that right hemisphere processes add emotional and humorous overtones important for understanding the full meaning of oral and written communication. The two hemispheres differ in their perceptual roles but both sides are involved in the creation and appreciation of art and music. According to Herr (1981), guided imagery engages the right brain processes such as imagination, emotion, creative, and intuitive activities. It has been suggested that relationship between humor and creativity. Ziv (1984) discussed relationship between humor and creativity, in terms of personality and the creation of humor, as well as the role of humor in divergent thinking and problem solving. The fact that humor can produce intense emotional reactions demonstrates how sensitive the individual is to the fundamental meanings of humor (Levine & Redlich, 1955, 1960; Burma, 1946). In addition, Van hook & Tegano (2002) suggest that freedom of expression maybe as an important personality trait in the identification and nurturance of creative potential and problem solving in young

children. Moreover, Parnes (1971) offers that a creative person posses full expression. On the other hand, Radford (2004) argues when the creative act challenges the boundaries of sense, a higher level of emotional consonance takes place. The authors emphasize on experiencing deep emotions (Sternberg & Tardif, 1989). In addition, Spotts (1972) states the "hot" divergent cognitive style was a freer, more impulsive response to stimuli involving more emotion. According to Bachtold (1980), the emotional sensitivity is a specific trademark of the creative personality. Likewise, Helson's findings indicate a correlation exists between creativity and emotional involvement (Helson, 1973).Hinton (1971) also showed the relationship between certain personality variables and resistance to the effects of frustration on creativity; and there are the combined effects of personality and emotional stress on creative productivity. Besides, Walker et al (1995) found that the creative group would score higher on the neurotic and depressive factors. In addition, Richards & Kinney (1990) attempted to make connections between creativity and bipolar mood disorders. They suggest that mood states may enhance ones creativity. Hence, the problem-solving therapy (PST) may contribute to a greater degree than problem-focused therapy (PFT), toward a significant decrease in depression (Nezu 1986). Furthermore, Schubert (1977) discusses the relationship between boredom and creativity, through intelligence, thrill-seeking personalities, identity diffusion, and the pressure and awareness for creativity. Sternberg & Tardif (1989) state the processes involved in creation requires tension. Nemiro (1997) investigated the creative process of actors by examining three different aspects of an actor's life. A tension foften arose between an actor's personal and character identity. The actor achieved balance between their personal and character identities by developing an objective 'third' eye to monitor the tension. Similarly, Hinton (1971) reminds the combined effects of personality and emotional stress on creative productivity. Likewise, Smith & Carlsson (1987) discuss the ability of creative individuals to use stress and anxiety as a motivational driving factor of their creativity. Above all, the investigators found emotional overexcitability (OE) that seemed to be related to creative personality characteristics (Schiever, 1985). Moreover, Diamond (1996) insists the central role of repressed anger and rage in violence and psychopathology connect to creativity. He ascertains that constructiveness and destructiveness have the same source in personality/human potential. Further, Redfearn & Storr (1992) assert that all energy is potentially explosive as well as potentially creative. They offer an historical background of personal conflict in effort to encourage a creative outcome. Gelade (1997) also revealed that commercial creative have considerably higher levels of neuroticism. In review of creativity and disease, Sandblom (1997) discusses the relationship between illness and creativity: illness affects literature, art, and music. He also goes into the psychological side with a look at neuroses, psychosomatic disorder, and mental diseases. Therefore, Bachtold's study (1980) supports the relationship of psychoticism and creativity.

On the contrary, People with low levels of anxiety scored higher in creative thinking than those with high levels (White, 1968). For this reason, Parnes (1971) offers that a creative person must be have psychologically healthy. A person realizes higher potential for feeling, inner freedom, openness, full expression, and sensitivity. Therefore, it is not surprising that Csikszentmihalyi (1996) lists 10 pairs of opposite traits that creative people possess.

(4) Enhancing the utilization of experiences

Curious individuals need to experience their curiosity. Furthermore, utilization of experiences involves openness to experience, sensation seeking, tolerance to ambiguity, and risk taking.

Child (1965) found that Variables of art background correlates with esthetic judgment and preference. The authors emphasize on being open to new experiences (Sternberg & Tardif, 1989). Gelade (1997) conducted a study to determine the personality of the commercial creative. The results revealed that commercially creative people had considerably higher levels of openness to experience than the non-creative did. Similarly, the committed artists demonstrate ability to experiment (Dudek Royer, 1991). Likewise, Knox & Glover (1978) present a study of the effects of preschool experience on creativity among 60 black and 60 white first grade boys and girls in a rural area. Goldsmith (1985) obtained that intuitive would have a positive correlation with sensation seeking. In addition, Yuk & Cramond (2006) present a Program for Enlightened and Productive Creativity (PEPC). The PEPC describes stages through which a student is guided to solve a problem using increasingly complex observation, inquiry, and experimentation. Moreover, measures of creativity, openness to experience, and sensation seeking intercorrelate among female and male college students. Male creativity

correlated most strongly with openness to theoretical and aesthetic experiences and creative thoughts. For females, creativity, openness to inner experiences, and sensation seeking moderately intercorrelate (Schaeffer et al 1976). Above all, Sandblom (1997) discusses how the theme of art depends on experience and one cannot create from nothing.

On the other hands, Keller (1984) found high performance in research and development organization concentrate with a tolerance for ambiguity. It is agreed upon, as important to creative giftedness is tolerance of ambiguity (Sternberg & Lubart, 1993; Kazemi, 1997b).

Experience often involves risk taking (Sternberg & Tardif, 1989; Sternberg & Lubart, 1993), which relates to special type of personality. Goldsmith (1984) found Kirton Adaption-Innovation Inventory (KAI) correlated positively with the risk taking.

(5) Conducting physical activity and movement education

Active mobility refers to movement, motor, physical skills, impulsiveness, hard work, high activation, and perseverance.

Niaz et al (2000) found that the mobility-fixity dimension was the most consistent predictor of academic performance with creativity scores. Niaz et al (1991) also indicated that the most mobile students performed best on creativity tests. Moreover, Bloomberg (1971) suggests that horizontal mobility may be essential in creativity.

Some of the evidences show that as increase positive attitude toward human movement and motor skill enhance creative thinking. Encouraging children to participate in meaningful decision making will increase positive attitudes toward human movement, enhance creative thinking and self concept, and improve motor skills (Schempp & Cheffers, 1982). It has been suggested that relationship between movement and creativity (Dodds, 1978; Gowan, 1978; Ludowise, 1985; Brockmeyer, 1987; Lucky, 1990). Ewing et al (1975) indicated correlation between perceived movement and Creative Thinking. It would appear that improving creativity often caused by movement, motor skills, or hard work. Zachopoulou et al (2006) showed that physical education promotes preschool children's creativity in the early years**.** Physical education lessons in order to provide children with opportunities to develop their creative thinking using movement elements, motor skills, and movement exploration. The children improved their creative fluency and imagination. Besides, Waelsch (1994) discussed the notion that adversity and hard work might assist a person in achieving acts of creativity. She insisted other people who have had similar experiences where adversity nurtured their creativity.

Cramond (1994b) describes the similarities between the behavioral manifestations of ADHD and creativity, some speculations about their common etiology, and some illustrative case studies. In addition, Cramond (1994a) examined the incidence of ADHD among individuals who are highly creative .Besides, Cramond (1995) examines the fact that the defining characteristics of ADHD are also key descriptors in biographies of highly creative individuals.

It seems that high activation and perseverance are specific trademarks of the creative person (Sternberg & Tardif, 1989). Bachtold (1980) examined the biographies of women who were eminent in the arts and sciences. Specific trademarks of the creative personality were high activity levels and perseverance. Stokes (1999) obtained in her empirical study to link perseverance with effective creative behavior. Therefore, teachers as important indicators of creative students identify students' mannerisms such as spontaneity and impulsiveness (Westby & Dawson, 1995). Consequently, Maddi et al (1982) emphasize upon high activation and internal orientation as factors in creativity. Hence, Torrance has provided "Thinking Creatively in Action and Movement scale."

On the other hand, some investigators concentrate on "motor creativity"(Philipp, 1969; Lubin & Sherrill, 1977; Lubin, 1979; Lubin & Sherrill; 1980).The motor creativity is often due to creative movement. Wang (2003) investigated the effects of a creative movement program on the motor creativity of Taiwanese preschool children using Torrance's Thinking Creatively in Action and Movement scale. Results indicated that the experimental group had significantly higher levels of motor creativity than did the control group, suggesting that the creative movement program was essential to the development of the total child.

(6) Development of special thinking

Special thinking consists firstly problem examination, secondly internal freedom to cognitive style and imagination, thirdly inner verbal spontaneity, fourthly divergent thinking, and finally ability to regress more deeply and a greater facility to return to secondary process thought with ease.

The author discusses the relationship between problem examination and creativity. Creating and developing of the "problemology" is unavoidable for promoting creativity (Kazemi, 1996). In addition, Reiter-Palmon, et al. (1998) investigated whether problem construction plays a role in how individuals interpret ill-defined, ambiguous problems in a way that fits their personality. Results suggest a positive relationship between problem construction ability and fit of the solution to personality type.

Parnes (1971) offers that a creative person posses inner freedom and openness. Treffinger (2004) proposed openness and courage to explore ideas. The innovation correlates negatively with the dogmatism (Goldsmith1984). Forisha (1978, 1983) studied and reviewed the research in creativity, imagery, cognitive styles and their inter relationship. She concludes that imagery and creativity are interrelated with other personality factors and that the relationship between creativity and imagery is central to some subjects and not to others. In addition, relationship between scientific field and imagery has been emphasized (Roe, 1951; kazemi, 1996).

Gough (1976) focuses on word association. In addition, the author emphasizes on word fluency, verbal capacity, and writing skill. According to the author, the "problemology" relates to word conceptualization (Kazemi, 1995, 1996). Renner & Renner (1971) found that creativity-training programs increase verbal fluency and flexibility should influence a person's cognitive style preferences toward complexity. Thurston & Runco (1999) focuses on the importance of flexibility in four areas. Flexibility as a cognitive processes described using divergent thinking models. Flexibility in insight problems shows the importance of not having mental blocks in problem solving. Flexibility in personality theories shows how important it is to flex in being a productive citizen, which leads to the fourth area- the importance of flexibility and human development.

Thinking styles is included one of resources that support creativity (Gautschi, 2001).The investigators emphasize upon relationship between divergent thinking and creativity (White, 1968; Nicholls, 1972; Ziv, 1984; Davis, 1989; Kabanoff & Bottger, 1991; Kazemi, 1994, 1997c; Thurston & Runco, 1999; Carson, 1999). It is seemingly that the convergent thinking, abstraction, and deduction jointly can lead to creative thinking (kazemi, 1994). The special thinking involves mannerisms such as spontaneity. Furthermore, the teachers identify spontaneity as important indicator of creative students (Westby & Dawson, 1995).Creative actors place an enormous value on spontaneity in performance (Nemiro, 1997). Treffinger (2004) proposed listening to one's inner voice. As the author describes it, there is an inner verbal spontaneity.

A creative person moves into generating ideas ,digging into ideas or being divergent, and then ends with a convergence on a practical path or idea in which he/she develops a plan of action (Carson, 1999; Treffinger, 2004). Furthermore, Dudek suggests that mature artists have a greater ability to produce a better creative product because of the greater ability to regress more deeply and a greater facility to return to secondary process thought with ease (Dudek & Chamberland-Bouhadana, 1984). Similarly, Sternberg & Lubart (1995) present the creative process from the perspective of the creative person who develops unusual or initially misunderstood solutions to problems. The creative processes involve an active search for gaps in knowledge, problem finding, consciously attempting to break through the existing boundaries and limitations in one s field (Sternberg & Tardif, 1989).

Integration of the educational directions

Wallace (1979) describes underlying mental processes are common to all people in spite of individual differences in capability, intelligence, attitude, and motivation. When these processes are combined to form a single, observable entity, they can be interpreted as a universal action pattern of the mind. Educators, psychotherapists, and other individuals interested in facilitating learning can better understand and work with this universal action pattern if they plot behavioral manifestations of mental activity on a flow diagram. The diagram should represent all categories of information, which compose the experience of the mind during mental or physical action. When people understand the

action pattern, they can create experiences and achieve chosen goals within limits such as time, awareness, ability, and, in the case of groups, cooperative agreement. In addition, individuals can use the action pattern as a checklist of ingredients of an intended experience and can point out areas of capability and uncertainty. When the action pattern is set in motion, it can indicate smooth flow signals including understanding, opportunity, self-responsibility, and satisfaction. It can also indicate obstruction signals including uncertainty, anxiety, anger, confusion, and vulnerability. Wallace concludes that people will develop more efficient energy movement patterns if they interpret their motivations and actions in light of their universal action patterns.

Integration of individual readiness, resource orientation, attitude, and thinking

Scipio (1971) discusses divergent thinking as complex function of interacting dimensions of extraversion-introversion and neuroticism-stability. According to investment theory approach, it is overly emphasized on aspects of creativity such as intelligence, knowledge, thinking style, personality, motivation, and environment (Sternberg & Lubart, 1992). It would seem that creativity is integrated by self, motivation and thinking (Kazemi, 1997a). Besides, Parnes (1971) discusses a person who is creative is also psychologically healthy: when a person realizes higher potential for feeling, inner freedom, openness, and full expression. He emphasizes upon the three S's -sensitivity, synergy and serendipity- characterize the thought process of highly actualized individuals. The various coping behaviors used in facing new problems is especially pertinent to self-actualized persons and mental health. The humanistic approach, generally explains creative behavior relating to a person's endeavors to become self-actualized (Woodman, 1981).Then, Smith & Knight (1959) showed personalized feedback improved group problem solving efficiency and under certain conditions improved self-insight. Therefore, Sternberg (1988) presents "Mental self government" as a theory of how things fit, and as support to the idea of matching style to task (person-environment fit).

On the other hand, according to self-determination, those people who are high on the creativity are also high on self-determination. The creative's parents also were autonomy supportive. Creative persons tend to strive for more self-determined reasons (Sheldon, 1995b).Helson (1999) discusses source of motivation seems to arise from personal variables, and is significant to creative performance. Things like family satisfaction and self esteem effect motivation, which in turn affects creative behavior. Moreover, according to Amabile's componential model of creativity, three major components contribute to creativity (skills specific to the task, general or cross-domain creativity relevant skills, and task motivation). All three components contribute to creative performance, and that multiple measures of creativity taken from same person should show positive correlations (Conti et al., 1996). One of the specific components of incubation examined is the role of personal motivation to solve a problem (Guilford, 1979).The period of incubation is likely to be one of emotional discomfort. The thinker worries that perhaps the idea will never come, or that it will not be the correct idea, that even if it does come it will be too late (Sternberg & Lubart, 1993). In addition, Magyari-Beck (1988) presents a theoretical view of personal creativity, which describes it as a process that balances a tension between innovation and conservation.

Guilford (1979) also, overviewed and discussed incubation as a part of creative problem solving and cognitive thinking styles. The psychoanalytic approach usually describes creativity as stemming from the unconscious or the preconscious (Woodman, 1981).Moreover, according to attribution approach, creativity exists as a phenomenon. The personal attribution biases affect perception of what is/is not creative. It is suggested that freedom from biases may allow creative progress to flourish (Heinzen, 1995; Simonton, 1995).

Integration of individual readiness, attitude, active mobility, and resource orientation

Schubert (1977) discusses the relationship between boredom and creativity, through intelligence, thrill-seeking personalities, identity diffusion, conformity, unprogrammed activities, and the pressure and awareness for creativity. According to "the activation personality theory," the extent and unusualness of fantasy production will be greater in persons having both a high customary level of activation and an internal orientation than it will in persons having only one or neither of these characteristics. The distance traversed and number of objects handled in an unfamiliar environment will be greater in persons having both a high customary level of activation and an external orientation than it will in persons having only one or neither of these characteristics (Maddi et al., 1982).

Integration of individual readiness, attitude, active mobility, and utilization of experiences

Waelsch (1994) discussed the notion that adversity and hard work might assist a person in achieving acts of creativity. She insisted other people who have had similar experiences where adversity nurtured their creativity.

The author discusses the integration of experience, activity, and sensation seeking (especially the sight) (kazemi, 1996). Goldsmith (1985) found that intuitive would have a positive correlation with sensation seeking. Yau (1991) also suggests that once internalized self-esteem, the person can take risks, and attempt the new and different, and in other words, attempt acts of creativity. Besides, Osaze (1980) examines the use of specific personality inventory tests measuring memory, motivation, creativity, and emotion as a link between course material and the students' personal experiences.

Integration of utilization of experiences, thinking, and resource orientation

The economic advantages and favoring conditions develop the creativity by the learning experiences and environmental involvement (kazemi, 1996). In addition, Ferch et al (2006) present an approach to developing creativity through meaningful learning relationships that involve art, literature, dialogue, and experience. They present a model of creative teaching, Person-to-Person Learning, that includes a 3-stage process: (a) constructing the creative space, (b) engaging the learning theme, and (c) thematic closure.

According to the GAM/DP theory of creativity, promoting of creativity relates to firstly, elements of GAM, which focuses on the person, are defined and explained individually followed by a description of how they come together to form the challenged personality ,and secondly , the DP part of the theory, which focuses on society (or environment) (Therivel , 1999). Besides, Conway et al (1992) describe Person-Environment (P- E) Fit Theory. Findings indicate a relationship between level, desire of control, and stress. According to "the psycho economic theory," a high creativity group would be one whose members have diverse backgrounds and whose level of experience vary from novice to expert. Individuals with extensive experience have a tendency to exhibit "mental inflexibility" which could tend to negative influence their ability to be creative (Rubenson & Runco, 1995).

Integration of attitude, active mobility, and thinking

Carson (1999) describes that creative person start by examining the problem, then as a unit they move into generating ideas or being divergent, and then end with a convergence on a practical path or idea in which they develop a plan of action. They must remain distant from their problem and examine the issues from all perspectives.

Second, the special directions:

On his long experiences, the author made an instrument. Analyzing the instrument indicated that there is an integrative paradigm that involves affective and cognitive domains. As far as the author concludes, he names this phenomenon in Persian, "Hayajan-e-Andisheh" (Emotion of Thought). Emotion of Thought involves "Poyaei" and "Bitabi" (in Persian) There are also six components for any eras.

Generally, thinking relates to emotion. Lagattuta et al (1997, 2001) found that even 3-year-olds demonstrated knowledge about connections between past events and present emotions. In addition, 4 and 6 years-olds understand the influence of mental activity on emotions. In addition, Gratton (2001) proposes one way of partly meeting them: the application of critical thinking skills to beliefs responsible for emotions.

On the other hands, kuo & Paschal (1974) explore the relationship between emotional disturbance in children and the creative thinking factors suggested by the Torrance Tests of Creative Thinking. Findings suggest that emotionally disturbed children do not use their creative energy to produce a large number of ideas with words. Besides, Elder (1997) states that we must be understand the relationships between the cognitive function and the affective dimension. Developing critical-thinking skills relates to this understanding. In this regard, Cole & Sarnoff (1980) emphasize the balance between thought and emotion is important for personal effectiveness as well as for creative productivity. Therefore, Vernon (1989) presents a comprehensive curriculum to help youngsters learn positive mental health concepts that contains activities are grouped into five topic areas: (1) self-acceptance; (2) feelings; (3) beliefs and behavior; (4) problem solving and decision-making; and (5) interpersonal relationships.

According to "hexahedral paradigm," the creativity relates to individual readiness, resource orientation, attitude, utilization of experiences, active mobility, and special thinking. "Emotion of thought" gradually integrates the factors .Therefore, emotion of thought is seventh factor to create

creativity. In other words, creation of the creativity depends on emotion of thought.

(1) Encouraging the Poyaei

"Poyaei" involves motion and movement desire, curiosity, feeling of extra ordinary power, great thought, humor and easily expression of emotions, and tendency for experience.

Promotion motion and movement desire

It means adventurously emotive and thrill motion desire.

Encouraging curiosity

It refers to: (1) stimulating any ambiguous problem to exploration, (2) pertinacity for adventure risk taking, and (3) inconvenience curiosity thinking.

Giving confidence feeling of extra ordinary power-Supporting great thought

It means thinking about a significant and original action for truth discovery conjugate to express emotion easily.

Preparing conditions for humor and easily expression of emotions-Encouraging tendency for Experience

It means sensible disquiet for experiencing information and knowledge.

(2) Programming for counseling interventions for Bitabi

"Bitabi" involves agitation, captivity, somatic expressions of thinking, misgiving, twirling of thought and loneliness sense

Agitation refers to erosive agitation, continuous worry, body tremor, and less activity.

Captivity refers to continuous mental involvement, to be worry about of problem solving, and inner rigorous speech.

Somatic expressions of thinking mean thirst and hunger sense, headache, heartthrob, and thirsty sense in mouth.

Misgiving means forgetfulness, amazement, and exhaustion.

Twirling of thought (and body tremor)

Loneliness sense refers to worrying, uneasiness, and feeling of pressure for activity.

Third, the high especial directions:

The author studied relationship between "Emotion of Thought" and creativity among male and female gifted and talented. Emotion of Thought Test (E.T.T.) and the Verbal Torrance Tests of Creative Thinking (TTCT) were administered to 144 gifted and talented students (72 male and 72 female, in grades 6-8). Significant differences were found between males and females in two scales of E.T.T. (Poyaei and Bitabi).The results indicated that male and female creativity was positively correlated with "Poyaei." Besides, for females, significant negative correlation was found between creativity and "Bitabi." Data indicated significant correlations of female creativity with five domains of "Poyaei" and four domains of "Bitabi." Results suggest significant correlations of male creativity with four domains of "Poyaei." However, no significant relationship between creativity and "Bitabi" was found for males. The findings strongly supported the connection between creative thinking and "Emotion of Thought." It is seemed that correlation between **"E**motion of Thought" and creativity depends on age and gender differences. (Kazemi, 2007a&b, in press)

According to these findings, the author proposes the next recommendations for the development of creativity among gifted and talented adolescents:

	Female	Male
6 grade	1) Encouraging curiosity and experience. 2) Giving confidence for feeling of extra ordinary power. 3) Programming for counseling and therapeutic interventions for loneliness sense and misgiving.	1) Promoting motion and movement. 2) Preparing conditions for humor and easily expression of emotions.
7 grade	1) Encouraging experience.	1) Giving confidence for feeling of

	2) Giving confidence for feeling of extra ordinary power. 3) Promoting motion and movement. 4) programming for counseling and therapeutic interventions for loneliness sense and misgiving.	extra ordinary power. 2) Promoting motion and movement.
8 grade	1) Encouraging experience. 2) Giving confidence for feeling of extra ordinary power. 3) Preparing conditions for humor and easily expression of emotions. 4) Promoting motion and movement. 5) Supporting great thought. 6) Programming for counseling and therapeutic interventions for misgiving and captivity.	1) Encouraging experience. 2) Giving confidence for feeling of extra ordinary power.

References

Amabile, Teresa M. (1988). From individual creativity to organizational innovation. In Kjell Gronhaug [Kjell Grnhaug]; Geir Kaufmann (Eds.), *Innovation: A cross-disciplinary perspective* (pp. 136-166). Oslo, Norway: Norwegian University Press.

Amabile, Teresa M. (1997). Entrepreneurial creativity through motivational synergy. *Journal of Creative Behavior*, *31* (1), pp. 18-26.

Amabile, Teresa M.; Gryskiewicz, Stanley S. (1988). Creative resources in the R&D laboratory: How environment and personality affect innovation. In Robert L. Kuhn (Ed.), *Handbook for creative and innovative managers* (pp. 501-524). New York: McGraw-Hill Book Company.

Bachtold, Louise M. (1980). Psychoticism and creativity. *Journal of Creative Behavior*, *14* (4), pp. 242-248.

Bachtold, Louise M.; Werner, E. (1973). Personality characteristics of creative woman. *Perceptual and Motor Skills*, *36*, pp. 311-319.

Bloomberg, Morton. (1971). Creativity as Related to Field Independence and Mobility. *Journal of Genetic Psychology*, *118*, 1, 3-12.

Bouchard, Thomas, Jr.; Hur, Yoon-Mi. (1998). Genetic and environmental influences on the continuous scales of the Myers-Briggs Type Indicator: An analysis of twins reared apart. *Journal of Personality*, *66*(2), pp. 135-149.

Brockmeyer, Gretchen A. (1987). Creativity in Movement. *Journal of Teaching in Physical Education*, v*6* n3 p310-19.

Bruhn, John G.; Bunce, Harvey, III; Greaser, Robert C. (1969). A comparison of 'real' vs.'ideal' self with a self-actualization inventory. *Journal of Psychology*, *53*(3), pp. 159-164.

Bull, Kay S.; Montgomery, Diane; Baloche, Lynda. (1995). Teaching creativity at the college level: A synthesis of curricular components perceived as important by instructors. *Creativity Research Journal*, *8*(1), pp. 83-89.

Burma, John H. (1946).Humor as a technique in race conflict. *American Sociological Review*, 11, pp.710-715.

Carson, David K. (1999). Counseling. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*: Vol. 1 A - H (pp. 395-402). San Diego, CA: Academic Press.

Child, Irvin L. (1965). Personality correlates of esthetic judgment in college students. *Journal of Personality*, 33, pp. 476-511.

Clapham, Maria M. (2004). The Convergent Validity of the Torrance Tests of Creative Thinking and Creativity Interest Inventories Educational and Psychological Measurement, v64 n5 p828-841.

Cole, Henry P.; Sarnoff, David. (1980). Creativity and Counseling. *Personnel and Guidance Journal*, v*59* n3 p140-46.

Conti, Regina; Coon, Heather; Amabile, Teresa M. (1996). Evidence to support the componential model of creativity: Secondary analysis of the three studies. *Creativity Research Journal*, *9*(4), pp. 385-389.

Conti, Regina; Amabile, Theresa. (1999). Motivation/Drive. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*: Vol. 2 I - Z, Indexes (pp. 251-259). San Diego, CA: Academic Press.

Conway, Terry L.; Vickers, Ross R.; French, John R. P., Jr. (1992). An application of person-environment fit theory: Perceived verses desired control. *Journal of Social Issues*, *48*(2), pp. 95-107.

Cramond, Bonnie (1994a). The Relationship between Attention-Deficit Hyperactivity Disorder and Creativity.

Cramond, Bonnie (1994b). Attention-Deficit Hyperactivity Disorder and Creativity--What Is the Connection? *Journal of Creative Behavior*, v*28* n3 p193-210.

Cramond, Bonnie (1995). The Coincidence of Attention Deficit Hyperactivity Disorder and Creativity. Attention Deficit Disorder Research-Based Decision Making Series. In Cramond, Bonnie. (2001). Interview with E .Paul Torrance on creativity in the last and next millennia. *Journal of Secondary Gifted Education, 12*(3), pp. 116.

Cramond, Bonnie. (2001). Interview with E .Paul Torrance on creativity in the last and next millennia. *Journal of Secondary Gifted Education*, *12*(3), pp. 116.

Csikszentmihalyi, Mihaly. (1990) .The domain of creativity. In Mark A.Runco; Robert S. Albert (Eds.), *Theories of creativity* (pp. 190-212). Newbury Park, CA: SAGE Publications Incorporated.

Csikszentmihalyi, Mihaly. (1996). The creative personality. *Psychology Today*, *29*(4), pp. 36 - 41.
Dacey, John S. (1989). *Fundamentals of creative thinking*. Lexington, MA: Lexington Books.
Davis, Gary A. (1989). Testing for creative potential. *Contemporary Educational Psychology*, *14*, pp. 257-274.
Davis, Gary A. (1999). Barriers to creativity and creative attitudes. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*: Vol. 1 A - H (pp. 165-174). San Diego, CA: Academic Press.
Dettmer, Peggy. (1981). Improving teacher attitudes toward characteristics of the creatively gifted. *Gifted Child Quarterly*, *25*(1), pp. 11-16.
Diamond, Stephen A. (1996). *Anger, madness, and the demonic: The psychological genesis of violence, evil, and creativity*. Albany, NY: State University of New York Press.
Dodds, Patt. (1978). Creativity in Movement: Models for Analysis. *Journal of Creative Behavior*, v*12* n4 p265-73.
Dudek, Stephanie Z.; Chamberland-Bouhadana, G. (1984). Primary process in creative persons. *Journal of Personality Assessment*, *46*(3), pp. 239- 247.
Dudek, Stephanie Z.; Royer, Sylvie. (1991). Personality determinants of the commitment to the profession of art. *Creativity Research Journal*, *4*(4), pp. 367-389.
Dunbar, Kevin. (1999). Science. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 2 I - Z, Indexes (pp. 525-532). San Diego, CA: Academic Press.
Ekvall, Goran [Gron]. (1972). *A study of two creativity tests*. Stockholm, Sweden: Swedish Council for Personnel Administration.
Elder, Linda. (1997). Critical Thinking: The Key to Emotional Intelligence. *Journal of Developmental Education*, v *21* n1 p 40-41.
Ewing, James H.; Gillis, Carol A.; Ebert, John N.; Mathews, Hugh M. (1975). Profile of perceptual-cognitive traits and personality style of possible relevance to creative productivity. *Perceptual and Motor Skills, 40*(3), pp. 711-718.
Ewing, Michael T.; Napoli, Julie; West, Douglas C. (2000-2001). Creative personalities, processes, and agency philosophies: Implications for global advertisers. *Creativity Research Journal*, *13*(2), pp. 161-170.
Feist, Gregory J. (1999). Autonomy and independence. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 1 A - H (pp. 157-163). San Diego, CA: Academic Press.
Feldhusen, John F. (1995). Creativity: A knowledge base, metacognitive skills, and personality factors. *Journal of Creative Behavior*, *29*(4), pp. 255-268.
Ferch, Shann R.; St. John, Iris; Reyes, Raymond; Ramsey, Marleen (2006). Person-to-Person Learning: A Form of Creativity in Education. *Journal of Humanistic Counseling, Education and Development,* v*45* n2 p148.
Fonseca, Jennifer. (2002). A study of Mother Teresa's creative problem solving process for social change in the Indian setting. Unpublished masters project, State University of New York College at Buffalo; International Center for Studies in Creativity, Buffalo, NY.
Forisha, Barbara L. (1978). Mental imagery and creativity: Review and speculations. *Journal of Mental Imagery*, *2*(2), pp. 209-238.
Forisha, Barbara L. (1983). Relationship between creativity and mental imagery: A question of cognitive style? In Sheikh, Annes A. (Ed.), *Imagery: Current theory, research, and application* (pp. 310-339). New York: John Wiley & Sons.
Galbraith, Judy; Wentzel, Katrina. (2001). Sailing on the Winds of Creativity: Recognizing & Supporting Social/Emotional Needs of Creatively Gifted Children. *Understanding Our Gifted*, v*13* n4 p3-6.
Gautschi, Ted. (2001). Invest in creativity. *Design News*, *56*(12), pp. 135.
Gedo, John E. (1997). Psychoanalytic theories of creativity. In Mark A. Runco (Ed.). *The creativity research handbook*, volume one (pp. 29-40). Cresskill, NJ: Hampton Press.
Gelade, Garry. (1997). Creativity in conflict: The personality of the commercial creative. *Journal of Genetic Psychology*, *158*(1), pp. 67-78.
Goldsmith, Ronald E. (1984). Personality characteristics associated with adaption-innovation. *Journal of Psychology, 117*, pp. 159-165.
Goldsmith, Ronald E. (1985). Sensation seeking and the sensing-intuition scale of the Myers-Briggs

Type Indicator. *Psychological Reports*, *56*(2), pp. 581-582.
Gordon, Edwin E. (1989). *Audiation, Music Learning Theory, Music Aptitude, and Creativity. Suncoast Music Education Forum on Creativity*, p.75-81.
Gough, Harrison G. (1976). Studying creativity by means of word association tests. *Journal of Applied Psychology*, *61*(3), pp. 348-353.
Gowan, John C. (1978). Creativity and Gifted Child Movement. *Journal of Creative Behavior*, *12*, 1, 1-13.
Gratton, Claude. (2001). Critical Thinking and Emotional Well-Being. Inquiry: *Critical Thinking across the Disciplines*, v*20* n3 p39-51.
Graves, Grant O.; Ingersoll, Ralph W.; Evans, Lloyd R. (1967). The creative medical student: A descriptive study. *Journal of Creative Behavior*, *1*(4), pp. 371-382.
Guilford, J. P. (1979). Some incubated thoughts on incubation. *Journal of Creative Behavior*, *13*(1), pp. 11-8.
Halpin, Gerald; Halpin, Glennelle. (1973). The effect of motivation on creative thinking abilities. *Journal of Creative Behavior*, *7*(1), pp. 51-53.
Heinzen, Thomas E. (1995). Ethical evaluation bias [Special issue: Attributional approach to creativity]. *Creativity Research Journal, 8* (4), pp. 417-422
Helson, Ravenna. (1973). Heroic and tender modes in women authors of fantasy. *Journal of Personality*, *41*(4), pp. 493-512.
Helson, Ravenna. (1999). A longitudinal study of creative personality in women [Special issue: Longitudinal studies of creativity]. *Creativity Research Journal*, *12*(2), pp. 89-101.
Herr, Kay U. (1981). Guided Imagery in the Classroom: An Enhancement to Learning.
Herrmann, Ned. (1991). The creative brain. Journal of Creative Behavior, 25 (4), pp. 275-295
Hinton, Bernard L. (1971). Personality factors and resistance to the effects of frustrations on creative problem-solving performance. *Journal of Creative Behavior*, *5*(4), pp. 267-269.
Hoffman, William C. (1995). The Dialectics of Giftedness: Gifted Intellect and Creativity. *Roeper Review*, v*17* n3 p201-06.
Huitt, W. G. (1992). Problem solving and decision making: Consideration of individual differences using the Myers-Briggs Type Indicator. *Journal of Psychological Type*, *24*, pp. 33-44.
Hunsaker, Scott L.;Callahan, Carolyn M.(1995). Creativity and Giftedness: Published Instrument Uses and Abuses. *Gifted Child Quarterly*, v*39* n2 p110-14.
Hurst, David K.; Rush, James C.; White, Roderick E. (1991). Top management teams and organizational renewal. In Henry, Jane (Ed.), *Creative management* (pp.232-253). Newbury Park, CA: SAGE Publications.
Isaksen, Scott G. (1977). The degree of relatedness of four creative personality factors with ideational fluency of intermediate grade children. Unpublished masters thesis, State University College at Buffalo; Interdisciplinary Center for Creative Studies, Buffalo, NY
James, Keith. (1995). Goal conflict and originality of thinking. *Creativity Research Journal*, 8(3), pp. 285-290.
Jensen, Linda Rae. (1973). The Relationships Among Mathematical Creativity, Numerical Aptitude and Mathematical Achievement.
Jurcovç, Marta; Zelina, Miron. (1993). Barriers of personality creativization. Studia Psychologica: The *Journal of Basic Research in Psychological Sciences*, *35*(1), pp. 33-40.
Kabanoff, Boris; Bottger, Preston. (1991). Effectiveness of creativity training and its relation to selected personality factors. *Journal of Organizational Behaviour*, *12*, pp. 235-248.
Kawenski, Mary. (1991). Encouraging creativity in design. *Journal of Creative Behavior*, *25*(4), pp. 263-266.
Kazemi Haghighi, Nasseroddin. (1992). Gifted psychology: An introduction. *Exceptional Talent*, *1*(1) pp. 55-85. (Persian)
Kazemi Haghighi, Nasseroddin. (1994). Cognitive and environmental origins of creativity. *Exceptional Talent*, *3*(2) pp. 119-140. (Persian)
Kazemi Haghighi, Nasseroddin. (1995). Influence of learning and self-concept on talent development. *Exceptional Talent*, *4*(3), pp. 231-246. (Persian)
Kazemi Haghighi, Nasseroddin.(1996). Insight and creativity. *Exceptional Talent*, *5*(1), pp. 47-74. (Persian)

Kazemi Haghighi, Nasseroddin. (1997a). *The gifted psychology and special educational strategies.* Tehran, Sayeh nama Press, pp. 39-41. (Persian)
Kazemi Haghighi, Nasseroddin. (1997b). Talented adolescent: personality traits. Exceptional Talent, *6*(1), pp. 32-41. (Persian)
Kazemi Haghighi, Nasseroddin. (1997c). *Mathematical talent: Identification and development.* Tehran, Sayeh nama Press, pp 16-17. (Persian)
Kazemi Haghighi, Nasseroddin. (1998). Self-concept and talent. *Exceptional Talent*, *6*(4), pp. 396-403. (Persian)
Kazemi Haghighi, Nasseroddin (2007a).The hexahedral paradigm of creative personality: "A review of sixty years of literature for the 21st century," World Council for Gifted and Talented Children, 17th Biennial World Conference.
Kazemi Haghighi, Nasseroddin. (2007b) *Gender differences in relationship between "Emotion of Thought" and creativity among adolescent gifted and talented* (in press)
Kazemi Haghighi, Nasseroddin. (2007c) *Age differences in relationship between "Emotion of Thought" and creativity among adolescent gifted and talented* (in press)
Kazemi Haghighi, Nasseroddin. (2007d) *New Directions in the hexahedral paradigm of creative personality* (in press)
Keller, Robert T. (1984). A cross-national validation study toward the development of a selection battery for research and development professional employees. *IEEE Transactions on Engineering Management*, *31*(4), pp. 162 - 165.
Keller, Robert T.; Holland, Winford E. (1978). Individual characteristics of innovativeness and communication in research and development organizations. *Journal of Applied Psychology*, *63*(6), pp. 759-762.
Khire, Usha. (1979). The three gifted Case studies. Research Bulletin, 9 (3 & 4), pp. 31- 39.
Knox, Bobbie J.;Glover, John A.(1978). A Note on Preschool Experience Effects on Achievement, Readiness, and Creativity. *Journal of Genetic Psychology*, *132*, 1, 151-2.
Kuo, You-yuh; Paschal, Billy J. (1974). Emotional Factors in Fluent and Elaborative Thinking. *Child Study Journal Monographs*, 1,2,3,4,5,&6, 68-75, 74.
Kurtzberg, Terri R.; Amabile, Teresa M. (2001). From Guilford to creative synergy: Opening the black box of team-level creativity. *Creativity Research Journal*, *13*(3 and 4), pp. 285-294.
Lagattuta, Kristin Hansen; Wellman, Henry M.;Flavell, John H.(1997). Preschoolers' Understanding of the Link between Thinking and Feeling: Cognitive Cuing and Emotional Change. *Child Development*, v*68* n6 p1081-1104
Lagattuta, Kristin Hansen;Wellman, Henry M.(2001). Thinking about the Past: Early Knowledge about Links between Prior Experience, Thinking, and Emotion. *Child Development*, v*72* n1 p82-102.
Lang, R. J.; Ryba, K. A. (1976). The identification of some creative thinking parameters common to the artistic and musical personality. *British Journal of Educational Psychology*, *46*(11) , pp. 267-279.
Levine, Jacob; Redlich, Frederick C. (1955). Failure to understand humor. *Psychoanalytic Quarterly*, *24*, pp. 560-572.
Levine, Jacob; Redlich, Frederick C. (1960). Intellectual and emotional factors in appreciation of humor. *Journal of Psychology*, *62*, pp.25-35.
Levy jerr. (1983). Highlights of Research on Right and Left Hemispheres of the Brain. *Educational Leadership*, v*40* n4 p68.
Lubin, Ellen.(1979). Motor Creativity of Preschool Deaf Children.
Lubin, Ellen; Sherrill, Claudine. (1977). Motor Creativity of Preschool Children on the London Trestle Tree Apparatus.
Lubin, Ellen; Sherrill, Claudine. (1980). Motor Creativity of Preschool Deaf Children. *American Annals of the Deaf*, v *125*n 4pp: 460-66.
Lucky, Sharon. (1990). *Music--Movement--Make-Believe: The Link between Creativity and Thinking Skills*.
Ludowise, Kathleen Duck. (1985). Movement to Music: Ten Activities that Foster reativity. *Childhood Education*, v*62* n1 p40-43.
MacKinnon, Donald W. (1975). IPAR's contribution to the conceptualization and study of creativity.

In Irving A. Taylor; J. W. Getzels (Eds.), *Perspectives in creativity* (pp. 60-89). Chicago, IL: Aldine Pub. Co.
Maddi, Salvatore R.; Hoover, Marlin; Kobasa, Suzanne C. (1982). High activation and internal orientation as factors in creativity. *Journal of Creative Behavior*, *16*(4), pp. 250-255.
Magyari-Beck, Istvan. (1988). New concepts about personal creativity. *Creativity* and Innovation Management, 1 , pp. 121-126.
Maker, C. June. (1993). Creativity, Intelligence, and Problem Solving: A Definition and Design for Cross-Cultural Research and Measurement Related to Giftedness. *Gifted Education International*, v*9* n2 p68-77.
Masten, William G. (1989). Creative self-perceptions of Mexican American children. *Psychological Reports*, *64*(2), pp. 556-558.
McClelland, David C. (1987). Characteristics of successful entrepreneurs. *Journal of Creative Behavior*, *21*(3), pp. 219-233.
Md-Yunus, Sham'ah (2007). How Parents Can Encourage Creativity in Children. *Childhood Education*, v*83* n4 p236.
Meadow, Arnold; Parnes, Sidney J. (1959). Evaluation of training in creative problem solving. *Journal of Applied Psychology*, *43*(3), pp. 189-194.
Mehr, David G.; Shaver, Phillip R. (1996). Goal structures in creative motivation. *Journal of Creative Behavior*, *30*(2), pp. 77-104.
Merrifield, P. R.; and others. (1964). Aptitudes and personality measures related to creativity in seventh-grade children. *Studies of high-level personnel*.
Meyer, Andrea. (1991). Strategies for stimulating innovation in your organization. In Tudor Rickards; Patrick Colemont; Per Groholt [Per Grholt]; Marjorie Parker; Hans Smeekes (Eds.), *Creativity and innovation: Learning from practice* (pp. 15-20). Delft, The Netherlands: Innovation Consulting Group TNO.
Miller, Arthur I. (1992). Scientific creativity: A comprehensive study of Henri Poincar and Albert Einstein. *Creativity Research Journal*, *5*(4), pp. 385-418.
Mudd, Samuel. (1986). Analytic review of research on Kirton Adaption-Innovation Inventory (KAI) [MS no .2775]. *Social and Behavioral Sciences Documents*, *16*(2).
Naglieri, Jack A.; Kaufman, James C. (2001). Understanding Intelligence, Giftedness and Creativity Using the PASS Theory. *Roeper Review*, v*23* n3 p151-56
Nemiro, Jill. (1997). Interpretive artists: A qualitative exploration of the creative process of actors [Special issue: Creativity, art, and artists]. *Creativity Research Journal*, *10*(2 & 3), pp. 229-239.
Nezu, Arthur M. (1986). Efficacy of a social problem-solving therapy approach for unipolar depression. *Journal of Consulting and Clinical Psychology*, *54*(2), pp. 196-202.
Niaz, Mansoor; De Nunez, Grecia Saud (1991) The Relationship of Mobility-Fixity to Creativity, Formal Reasoning and Intelligence. *Journal of Creative Behavior*, v*25* n3 p205-17.
Niaz, Mansoor; De Nunez, Grecia Saud; De Pineda, Isangela Ruiz. (2000). Academic Performance of High School Students as a Function of Mental Capacity, Cognitive Style, Mobility-Fixity Dimension, and Creativity. Journal of Creative Behavior, v34 n1 p18-29.
Nicholls, John G. (1972). Creativity in the person who will never produce anything original and useful: The concept of creativity as a normally distributed trait. *American Psychologist*, *27*(8), pp. 717-727.
OHara, Linda, A. [O'Hara, Linda, A.]; Sternberg, Robert, J. (1999). Learning styles. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*: Vol. 2 I - Z, Indexes (pp. 147-153). San Diego, CA: Academic Press.
Osaze, Jana D. (1980). The Psychology of Teaching Psychology. *New Directions for Community Colleges*, v*8* n3 p83-89.
Parnes, Sidney J. (1971). Creativity: Developing human potential. *Journal of Creative Behavior*, *5*(1), pp. 19-35.
Philipp, Joan A. (1969). Comparison of Motor Creativity with Figural and Verbal Creativity, and Selected Motor Skills. *Res Quart AAHPER*, *40*, 1, 163-173.
Powers, Robin. (1998). Psychology, pedagogy, and creative expression in a course on evil [Special Issue: Interdisciplinarity, the psychology of art, and creativity]. *Creativity Research Journal*, *11*(1), pp. 61-68.

Puccio, Gerard J.; Chimento, Melanie D. (2001). Implicit theories of creativity: Laypersons' perceptions of the creativity of adaptors and innovators. *Perceptual and Motor Skills*, *92*(3), pp. 675-681.
Radford, Mike. (2004). Emotion and Creativity. *Journal of Aesthetic Education*, v*38* n1 p53-64.
Redfearn, Joseph; Storr, Anthony. (1992). *The exploding self: the creative and destructive nucleus of the personality*. Wilmette, Illinois: Chiron Publications.
Reiter-Palmon, Roni; Mumford, Michael; Threlfall, K. Victoria. (1998). Solving everyday problems creatively: The role of problem construction and personality type. *Creativity Research Journal*, *11*(3), pp. 187-197.
Renner, Vivian; Renner, John C. (1971). Effects of a creativity training program on stimulus preferences. *Perceptual and Motor Skills*, *33*, pp. 872-874.
Renzulli, Joseph S.; Owen, S. V.; Callahan, C. M. (1974). Fluency, flexibility, and originality as a function of group size. *Journal of Creative Behavior*, *8*(2), pp. 107-113.
Richards, Ruth; Kinney, Dennis K. (1990). Mood swings and creativity. *Creativity Research Journal*, *3*(3), pp. 202-217.
Roe, Anne. (1951). A study of imagery in research scientists. Journal of Personality, 19, pp. 459-470.
Rubenson, Daniel L.; Runco, Mark A. (1995). The psychoeconomic view of creative work in groups and organizations. *Creativity and Innovation Management*, *4*(4), pp. 232-241.
Runco, Mark A. (1993). Divergent Thinking, Creativity, and Giftedness. *Gifted Child Quarterly*, v*37* n1 p16-22.
Runco, Mark A. (1999a). A longitudinal study of exceptional giftedness and creativity [Special issue: Longitudinal studies of creativity]. *Creativity Research Journal*, *12*(2), pp. 161-164.
Runco, Mark A. (1999b). Self-Actualization. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 2 I - Z, Indexes (pp. 533-536). San Diego, CA: Academic Press.
Runco, Mark A.; Albert, Robert S. (Eds.). (1990). Theories of creativity. Newbury Park, CA: Sage.
Russ, Sandra W. (1999). Emotion/Affect. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 1 A - H (pp. 659-668). San Diego, CA: Academic Press.
Ryan, Richard M.; Deci, Edward L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), pp. 68-78.
Saltford, Richard. (1981). *Assessment of Needs, Resources and Linkages for Creativity and Giftedness*.
Sandblom, Philip. (1997). *Creativity and disease: How illness affects literature, art and music*. New York: Marionboyars Publishers.
Schaeffer, C. E.; And Others. (1976). Intercorrelations Among Measures of Creativity, Openness To Experience And Sensation Seeking In A College Sample. *College Student Journal*, *10*, 4, 332-339.
Schempp, Paul G.; Cheffers, John T. F. (1982). *Influence of Decision-Making by Elementary Children on Attitudes, Creativity, Motor Skills, and Self-Concept*.
Schiever, S. W. (1985). Creative personality characteristics and dimensions of mental functioning in gifted adolescents. *Roeper Review*, *7*(1), pp. 223-226.
Schubert, Daniel S. P. (1977). Boredom as an antagonist of creativity. *Journal of Creative Behavior*, *11*(4), pp. 233-240.
Scipio, William J. (1971). Divergent thinking: A complex function of interacting dimensions of extraversion-introversion and neuroticism-stability. *British Journal of Psychology*, *62*(4), pp. 545-550.
Sheldon, Kennon M. (1995a). Creativity and goal conflict. *Creativity Research Journal*, *8*(3), pp. 299-306.
Sheldon, Kennon M. (1995b). Creativity and self-determination in personality. *Creativity Research Journal*, *8*(1), pp. 25-36.
Sheldon, Kennon M. (1999). Conformity. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 1 A - H (pp. 341-346). San Diego, CA: Academic Press
Simonton, Dean Keith. (1995). Exceptional personal influence: An integrative paradigm [Special issue: Attributional approach to creativity]. *Creativity Research Journal*, *8*(4), pp. 371-376.
Simonton, Dean Keith. (1999). *Origins of genius: Darwinian perspectives on creativity*. New York: Oxford University Press.
Skinner, Nicholas F. (1996). Behavioral implications of adaption-innovation: II .Adaption-innovation and motivation for uniqueness. *Social Behavior and Personality*, *24*(3), pp. 231-234.

Smilansky, Jonathan; Halberstadt, Naftali. (1986). Inventors versus problem solvers: An empirical investigation. *Journal of Creative Behavior*, *20*(3), pp. 183-201.
Smith, Ewart E.; Knight, Stanford S. (1959). Effects of feedback on insight and problem solving efficiency in training groups. *Journal of Applied Psychology*, *43*(3), pp. 209-211.
Smith, Gudmund J. W.; Carlsson, Ingegerd. (1987). A new creativity test. *Journal of Creative Behavior*, *21*(1), pp. 7-14.
Smith, I. Leon. (1970). Associational Achievement, Aptitude, and Creativity. *Educational and Psychological Measurement*, *30*, 4, 999-1000.
Spotts, Nina R. (1972). Divergent Cognitive Styles in Academic Overachievers. (ED079645)
Stafford, Sue P. (1998). Capitalizing on Careabouts to Facilitate Creativity. *Creativity and Innovation Management*, *7*(3), pp. 159-167.
Stein, Morris I. (1983). The creative process and the synthesis and dissemination of knowledge. In Spencer A. Ward; Linda J. Reed (Eds.), Knowledge, structure and use: Implications for synthesis and interpretation (pp. 365-396). Philadelphia, PA: Temple University Press.
Sternberg, Robert J. (1988). Mental self-government: A theory of intellectual styles and their development. *Human Developement*, *3*(4), pp. 197-221.
Sternberg, Robert J.; Tardif, Twila Z. (1989). What do we know about creativity? In Robert J. Sternberg (Ed) *The nature of creativity*. (pp. 429-440).Cambridge University Press.
Sternberg, Robert J.; Lubart, Todd I. (1992). Creativity: Its nature and assessment. *School Psychology International*, *13*(3) , pp. 243-253.
Sternberg, Robert J.; Lubart, Todd I. (1993).Creative Giftedness: A Multivariate Investment Approach. In Donald J Treffinger, *Creativity and Giftedness*. (pp 141-155) Thousand Oaks, California Corwin Press.
Sternberg, Robert J.; Lubart, Todd I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
Stohs, Joanne M. (1991). Young adult predictors and midlife outcomes of "starving artists" career: A longitudinal study of male fine artists. *Journal of Creative Behavior*, *25*(2), pp. 92-105.
Stokes, Patricia D. (1999). Learned variability levels: Implications for creativity [Special issue: Creativity and deviance]. *Creativity Research Journal*, *12*(1), pp. 37-45.
Street, W. R. (1974). Brainstorming by individuals, co-acting and interacting groups. *Journal of Applied Psychology*, *59*(4), pp. 433-436.
Thalbourne, Michael A. (2000). Transliminality and creativity. *Journal of Creative Behavior*, *34*(3), pp. 193-202.
Therivel, William A. (1999). Why Mozart and not Salieri [Special Issue: Creativity and Deviance]. *Creativity Research Journal*, *12*(1), pp. 67-76.
Thurston, Becky, J.; Runco, Mark A. (1999). Flexibility. In Mark A. Runco; Steven R. Pritzker (Eds.), *Encyclopedia of creativity*. Vol. 1 A - H (pp. 729-731). San Diego, CA: Academic Press.
Torrance, E. Paul. (1971). some validity studies of two brief screening devices for studying the creative personality. *Journal of Creative Behavior*, *5*(2), pp. 94-103.
Torrance, E. Paul. (1972). Tendency to produce unusual visual perspective as a predictor of creative achievement. *Perceptual and Motor Skills*, *34*(3), pp. 911-915.
Treffinger, Donald J (2004) *Creativity and Giftedness. (Introduction to Creativity and Giftedness)* Thousand Oaks, California Corwin Press.
Tucker, I. F. (1991). Predicting scores on the Rathus Assertiveness Schedule from the Myers-Briggs Type Indicator categories. *Psychological Reports*, *69*(2), pp. 571-576.
Van Hook, Cheryl W.; Tegano, Deborah W. (2002). The relationship between creativity and conformity among preschool children. *Journal of Creative Behavior*, *36*(1), pp. 1-16.
Vernon, Ann. (1998). *Thinking, Feeling, Behaving: An Emotional Education Curriculum for Adolescents. Grades 7-12*.
Waelsch, Salome G. (1994). The development of creativity [Special issue: Creativity and discovery in biomedical sciences]. *Creativity Research Journal*, *7*(3 & 4), pp. 249-264.
Walberg, Herbert J.; Rasher, Sue P.; Parkerson, Joann. (1979). Childhood and eminence. *Journal of Creative Behavior*, *13*(4), pp. 225-231.
Walker, A. Marie; Koestner, Richard; Hum, Andrew. (1995). Personality correlates of depressive style in autobiographies of creative achievers. *Journal of Creative Behavior*, *29*(2), pp. 75-94.

Wallace, R. Duncan. (1979). The Universal Action Pattern of the Mind and Self: A Unifier and Simplifier for All Forms of Learning.
Wang, Joanne Hui-Tzu. (2003). *The Effects of a Creative Movement Program on Motor Creativity of Children Ages Three to Five.*
Webster, Peter R. (1990). Creativity as Creative Thinking. *Music Educators Journal*, v*76* n9 p22-28.
Westby, Erik L.; Dawson V.L. (1995). Creativity: Asset or burden in the classroom? *Creativity Research Journal*, *8*(1), pp. 1-10.
White, Kinnard. (1968). Anxiety, extraversion-introversion, and divergent thinking ability. *Journal of Creative Behavior*, *2*(2), pp. 119-127.
Woodman, Richard W. (1981). Creativity as a construct in personality theory. *Journal of Creative Behavior*, *15*(1), pp. 43-66.
Yau, Cecilia. (1991). an essential interrelationship: healthy self-esteem and productive creativity. *Journal of Creative Behavior*, v*25* n2 p154-61.
York, Peter. (2000). Space for creativity. *Management Today*, (Sept), pp. 103.
Yuk, Keun Cheol; Cramond, Bonnie (2006).Program for Enlightened and Productive Creativity Illustrated with a Moire Patterns Lesson. *Journal of Secondary Gifted Education*, v*17* n4 p272-283.
Zachopoulou, Evridiki;Trevlas, Efthimios; Konstadinidou, Elisavet. (2006). The Design and Implementation of a Physical Education Program to Promote Children's Creativity in the Early Years. *International Journal of Early Years Education*, v*14* n3 p279-294.
Ziv, Avner. (1984). *Personality and a sense of humor*. New York: Springer Publishing.

About the Author

Nasseroddin Kazemi Haghighi began research about giftedness, creativity and talent in 1984. Dr. Kazemi also has authored sixty two articles and two books on gifted education and psychology: including *gifted child psychology and special education*, and *Mathematical talent: Identification and development*. He has established more than seventy workshops and seminars for scholars, parents, teachers and administrative staff in giftedness and creativity development. Dr. Kazemi was Editor – in – Chief of journal of Exceptional Talents (The first scientific journal about giftedness in Asia).He has played an essential role in creativity and giftedness research, counseling, education and psychology in Iran for over 23 years. Dr. Kazemi also serves on: 1) As a member of chair committee in Iranian Association of Council Exceptional Children (I.C.E.C.), 2) Chief consultant in National Organization for Development of Exceptional Talents (N.O.D.E.T), 3) Director assistant of department of exceptional children psychology and education in Science and Research University, 4) Director of selecting committee for creative teachers in ministry of education, and 5) Director of research committee for formal definition of giftedness and talent in ministry of education.

(A.25)

Wei-Wen Lin, Integrating distributed expertise: The relationship of creative climate, transactive memory system and teachers' creative teaching: Group creativity plays an important role in facilitating teachers' creative teaching. If a team member fully utilizes her/his unique expertise and integrates the differentiated expertise of other members, she/he will produce more creative ideas. The construct of transactive memory systems (TMSs) focuses on utilizing and integrating distributed expertise. Researchers proposed that TMSs could be discerned from the differentiated structure of members' knowledge (specialization), members' beliefs about the reliability of other members' knowledge (credibility), and effective, orchestrated knowledge processing (coordination). The study proposed a model to describe the relationships between school creative climate, TMSs, and creative teaching. If the school climate was more creative, the TMSs of teams would be developed by team members and teachers will perform higher intrinsic motivation and creative teaching. A number of 507 teachers of elementary/junior high school in Taiwan (176 male, 331female, 213 junior high school teachers and 294 elementary school teachers) had been randomly chosen and tested with the creative climate questionnaire, TMSs scale, the intrinsic motivation in teaching scale, and the innovative teaching behavior scale. The data was fitted with the proposed model via structural equation modeling (SEM) analysis (χ^2=152.36, df=79, p<.001, RMSEA =.043, NFI=.97, NNFI=.98, CFI=.99, GFI=.96, AGFI=.94, RMR=.035, SRMR=.035). Teachers in higher school creative climate (challenge, freedom, idea support, trust/open, liveliness, playfulness/humor, debates, conflict (negative factor), risk-taking, idea time) had higher transactive memory systems in practical teams. And teachers who responded higher in TMSs indicators (specialization, credibility and coordination) performed higher creative teaching (intrinsic motivation and innovative teaching behavior).

About the Author

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(A.26)

Mathematical knowledge and strategies: Highlighting the similarities and differences of Year 4 students.

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Abstract
Research has shown that successful mathematics students use different types of strategies from those struggling with mathematics. Gray & Tall (1994) stated that students struggling with mathematics are usually procedural thinkers dependent on the procedure of counting and limited to the "count-all" and "count-back" strategies. While some students are dependent on rules and procedures others give instant responses to mathematical tasks. According to Gray and Tall (1994) the use of known facts and procedures to solve mathematical problems, along with a combination of conceptual and procedural thinking, indicates that these students are proceptual thinkers.
The Australian national goal states that 'every student should be numerate, able to read, write, spell and communicate at an appropriate level'. To support this goal national numeracy benchmarks were developed for Years 3, 5 and 7. The Principal of a large metropolitan primary school in Melbourne expressed her concern about the mathematical standard of her students after receiving the results from Year 3 and Year 5 state-wide testing. Year 4 students were tested using the One Minute Tests of Basic Number Facts (Westwood, 2000) and a paper and pencil Number Screening Test developed by the author and colleagues. Observation of the students during the assessment procedures highlighted the vast difference in the students' speed and accuracy when recalling basic facts and the types of strategies they used when solving mathematical tasks. This paper will focus on the individual differences of Year 4 students' mathematical knowledge and skills as demonstrated by results to two assessment protocols.

Introduction

In a review of research about mathematics education Bell, Costello & Kuchemann (1983) identified four components of mathematical competence: facts and skills, conceptual structures, general strategies and attitudes. Considerable research has been conducted about students' understanding of mathematical concepts and the strategies they use to solve mathematical tasks. Gray and Tall (1994) have shown that successful mathematics students use different types of strategies from those struggling with mathematics. This paper will focus on the individual differences of Year 4 students' mathematical knowledge and skills as demonstrated by results to two assessment protocols: *The One Minute Basic Number Facts Tests* (Westwood, 2000) and a paper and pencil Number Screening Test (Pearn, Doig & Hunting, in press).

Previous Research

Research studies by Gray and Tall (1994) have shown that young students who are successful with mathematics use different types of strategies to those who are struggling with mathematics. Students struggling with mathematics are usually procedural thinkers dependent on the procedure of counting and limited to the "count-all" and "count-back" procedures. Gray and Tall (1994) defined procedural thinking as being demonstrated when:

> Numbers are used only as concrete entities to be manipulated through a counting process. The emphasis on the procedure reduces the focus on the relationship between input and output, often leading to idiosyncratic extensions of the counting procedure that may not generalize. (p. 132)

For example, when asked to count back from a given number, Year 1 students have been heard to count up to each number before responding with the number required. This method is highly unlikely to generalise into a backward counting sequence.

While some students are dependent on rules and procedures other students give instantaneous answers. When students, who have given an instant correct response to tasks, were asked: "How did you do that?" they give several different strategies they could have used and checked that their solutions were correct. According to Gray and Tall (1994), the use of known facts and procedures to solve problems, along with the demonstration of a combination of conceptual thinking and procedural

thinking, indicate that these students are proceptual thinkers. Gray and Tall (1994) defined proceptual thinking as:

> the flexible facility to ... enable(s) a symbol to be maintained in short-term memory in a compact form for mental manipulation or to trigger a sequence of actions in time to carry out a mental process. It includes both concepts to know and processes to do. (pp. 124-125)

Procedural thinkers usually take much longer to solve a mathematical task than proceptual thinkers. For example, when asked: "What is 17 take away 6?" proceptual thinkers will respond instantly as they aware that 17 is one more than 16. However if students attempt to solve the task using procedures and rules it will take a lot longer as they try to count back from 17 sixteen times or draw 17 tally marks and cross out sixteen. Hiebert and Lefevre (1986), commenting on the reliance of Year 3 and 4 students on rules and procedures, noted that

> … by the time students are in third and fourth grade, they have acquired a large array of symbol manipulation rules. In general, the rules are more sensitive to syntactic constraints than to conceptual underpinnings. (pp. 20-21)

Previous research by Steffe, Cobb, von Glasersfeld and Richards (1983) also focused on the development of more efficient strategies that students used to solve addition and subtraction tasks. In summary these five Counting Stages are:

1. *Perceptual*. Students are limited to counting those items they can perceive.

2. *Figurative*. Students count from one when solving addition problems with screened collections. They appear to visualise the items and all movements are important. (This is often typified by the hand waving over hidden objects.) If required to add two collections of six and three the student must first count the six items to understand the meaning of "six", then count the three items, then count the whole collection of six and three.

3. *Initial number sequence.* Students can now count on to solve addition and missing addend problems with screened collections. They no longer count from one but begin from the appropriate number. If adding two collections of six and three, students commence the count at six and then count on: six, seven, eight, nine.

4. *Implicitly nested number sequence.* Students are able to focus on the collection of unit items as one thing, as well as the abstract unit items. They can count-on and count-down, choosing the most appropriate to solve problems. They generally count down to solve subtraction.

5. *Explicitly nested number sequence*. Students are simultaneously aware of two number sequences and can disembed smaller composite units from the composite unit that contains it, and then compare them. They understand that addition and subtraction are inverse operations.

Within some of these counting stages there appears to be a progression in the types of responses by students at the beginning of the stage compared to a more sophisticated or efficient strategy when they have consolidated within that stage (Pearn, 1994, 1999; Pearn & Merrifield, 1996). In Table 1 is an example of the counting stage, an example of a task and the responses that indicate whether a student is beginning at that stage or is using a more efficient strategy within that counting task

Table 1: Counting Stages and indicators showing progression in students' strategies.

Counting Stage	**Example of task**	**Indicator for *"beginning"***	**Indicator for *"efficiency"***
Stage 3: *Count on.* Students begin from the appropriate number to solve addition and missing addend problems with screened collections.	There are three counters on the table. "Under this paper are seven counters."(Lift paper briefly) "How many counters do I have altogether?"	Student counts on from the three counters he/she can see: 3 4 5 6 7 8 9 10. That is, they count on from the first number given.	Student counts on from the larger number: 7 8 9 10. That is, they count on from the most efficient number.

Difficulties with recall of basic number facts

Many primary age students struggle to remember and reproduce basic number facts instantly. Westwood (2000) states: "Without easy recall of basic number facts, students have difficulty with even simple mental addition and subtraction problems" (p.45). There appear to be two main reasons for failure to recall basic number facts. Some researchers attribute difficulties to limitations of short-term memory. That is, students do not retain several pieces of information long enough in working memory to make use of this information and become confused. For example, students say: "Is it …?" Some students, however, have difficulty with the basic number facts because they simply have not had enough practice and the responses have not become automatic. This could well be the consequence of using the 'count-all' or count by ones strategy where students in fact, do a triple count. To add 6 + 3 they initially count the six objects, then count the three, then attempt to count the six and three added together. It many cases this third count may be incorrect.

Many students mathematically 'at risk' have difficulties remembering basic facts and use immature problem-solving procedures to solve simple arithmetic problems As Garnett (1998) states:

> Many learning disabled students have persistent trouble "memorizing" basic number facts in all four operations, despite adequate understanding and great effort expended trying to do so. Instead of readily knowing that 5 + 7 = 12, or that 4 x 6 = 24, these students continue laboriously over years to count fingers, pencil marks or scribbled circles and seem unable to develop efficient memory strategies on their own".

In previous work the author found that Year 3 and 4 students struggling with mathematics relied on rules and procedures even when these were inefficient and unreliable (see for example Pearn, 1994,1999; Pearn & Hunting, 1996; Pearn & Merrifield, 1996). To add two groups of objects students could "count on" but were counting on from the first number given. They were also reliant on using their fingers to complete the "counting on". For example, if they were given 6 + 3 = they would count: 6, 7, 8, 9. However if they were given 3 + 6 = they would count: 3, 4, 5, 6, 7, 8, 9. Students using this strategy did not recognise that addition was commutative. One example of this range of strategies is highlighted is the students' responses to the following word problem (see for example, Pearn, 1999).

> Richard is 131 cm tall.
> Mary is 17 cm shorter than Richard.
> How tall is Mary?

Several examples of the students' responses are shown in Table 2. Although most students were able to identify the word problem as subtraction, 53% of the students were unable to complete the computation successfully.

Table 2: Examples of students' solution strategies for subtraction task.

Student	Response	Strategy Type
James	Drew, or attempted to draw, 131 tally marks. This required constant checking. Crossed off 17 marks, then attempted to count the number of tally marks left.	Count all
Lynda	Successfully counted back by ones from 131 keeping track on her fingers. Gave correct answer.	Count back
Mike	Immediate response of 114. When asked how he worked it out he explained: "I took 10 away from 31 then 7 away from 21 and that gives 114."	Intuitive
Barry	Written algorithm. 131 - 17 126 Incorrect answer.	Buggy algorithm or faulty procedure
Megan	 Incorrect response	Faulty procedure
Mary	Written algorithm 131	Traditional algorithm

	- 17 114 correct response	

Lynda successfully used the procedural strategy of counting back by ones on her fingers. Using a similar procedural strategy some students drew 131 tally marks but because these were not in any regular array they then had difficulty counting the number of tally marks left after crossing off 17 of them. Students using this strategy were usually unsuccessful and took a long time to complete the task. Mike used his own informal strategy to solve the task correctly. There were several different invented strategies used by students and those students who used them were all successful and able to explain their strategies. Barry was just one example of the difficulty experienced by students trying to "remember the rule". Megan had her own misconception of the rule she had been taught. When asked to explain her method she said she "just worked it out". Several researchers have focused on students' systematic errors in addition and subtraction, and one hypothesis is that:

> … systematic errors or buggy algorithms, as they are frequently called, are a result of students relying on rote manipulation of symbols, and that developing understanding of multi-digit procedures would eliminate most buggy algorithms (Carpenter, Franke, Jacobs, Fennema, & Empson, 1998, p. 6).

The Australian perspective

In March 1997, Australian state and territory education ministers agreed to a national goal that "every child leaving primary school should be numerate, and be able to read, write and spell at an appropriate level" (Masters & Forster, 1997, p.1). A national plan to support this goal requires education authorities to provide support for teachers in their task of identifying students who are not achieving adequate literacy and numeracy skills and in providing early intervention strategies for these students.

National numeracy benchmarks were developed for Years 3, 5 and 7. For example, Year 3 students are expected to remember, or work out, basic addition facts to 10 + 10, the matching subtraction facts and extensions of those facts. Year 5 students are expected to have achieved the Year 3 benchmark standard and also know or work out multiplication facts to 10 x 10 and use these to work out extensions of those facts.

Table 3: Examples of the numeracy benchmarks for Years 3 & 5.

As part of the minimum set of achievements in Number sense, year 3 students are expected to:	As part of the minimum set of achievements in Number sense, year 5 students are expected to have achieved the year 3 benchmark standard and, in addition, are expected to:
compare and order numbers up to 99 (eg put 92, 89 and 95 in the right order)	read, write and use whole numbers up to 9999 and place them in order of size
remember, or work out, basic addition facts to 10 + 10, the matching subtraction facts (eg 9 + 4 = 13, 13 – 9 = 4) and extensions of those facts (eg 23 – 9 = 14)	identify simple patterns involving numbers (eg see the patterns in extensions of addition or subtraction facts such as 16 – 9 = 7, so 46 – 9 = 37, 56 – 9 = 47, 66 – 9 = 57)
add and subtract whole numbers (to 99) by using mental and written methods or by using a calculator	work out the answers to addition and subtraction problems that involve three-digit whole numbers or money, and decide the most appropriate way to do that (ie mentally, by written methods or using a calculator)

Benchmarks were developed to enable the reporting to the Australian community of aggregated student achievement data against common minimum standards through the annual *National Report on Schooling in Australia* (MCEETYA). Data is reported in relation to the achievement or non-achievement of the appropriate benchmark. Information to enable reporting against benchmarks is

gathered by rigorous State-based procedures, and school authorities collaborate to enable the comparability of the assessment data .

The Current Study

Every year Victorian students from Years 3, 5 and 7 undertake state-wide tests for literacy and numeracy. In 2007 this was the Achievement Improvement Monitor (AIM) which tested students' literacy and numeracy knowledge and skills. This testing is designed to provide information about the development of students' literacy and numeracy skills for both state and Federal governments. The results provide information to enable state and Federal governments to plan new programs and are meant to be a useful source of feedback and guidance to students, parents and teachers.

Results from recent state-wide testing in Victoria revealed that Year 3 and year 5 students from a large metropolitan primary school in the outer northern suburbs of Melbourne were not achieving at the level that the Principal expected. To provide additional information about the mathematical skills and understandings of the current Year 4 students, two additional pieces of assessment were used: The *One Minute Basic Number Facts Tests* (Westwood, 1995 in Westwood, 2000) and a paper and pencil Number Screening Test (Pearn, Doig & Hunting, in press) developed by the author and colleagues. These tests are simple and easy for both researchers and classroom teachers to administer and to mark.

The Assessment Protocols

The author has used both assessment protocols in previous research studies to identify students mathematically 'at risk'. The author administered both assessment protocols to ensure consistency with the administration.

There are four *One Minute Basic Number Facts Tests*. Each test has 33 items that focus on one of the four processes: addition, subtraction, multiplication and division. These items are not ordered in difficulty but randomly. The addition test items include one-digit addends with either one- or two-digit sums. The subtraction test items include one-digit minuends and subtrahends with a positive one-digit difference and some two-digit minuends and one-digit subtrahends with a one-digit difference. The multiplication test contains items with one-digit multipliers and one-digit multiplicands while the division test has six one-digit dividends and 27 two-digit dividends divided by a one-digit divisor with one-digit quotients. The first three items from each of the *One Minute Basic Facts Tests* are shown in Table 4.

Table 4: The first three items from the Basic Number Facts Tests (Westwood, 2000)

Addition	Subtraction	Multiplication	Division
2 + 1 =	2 - 1 =	1 x 2 =	2 ÷ 1 =
1 + 4 =	5 - 1 =	2 x 3 =	4 ÷ 2 =
2 + 2 =	3 - 2 =	2 x 5 =	3 ÷ 1 =

The norm tables for the *One Minute Basic Number Facts Tests* (Westwood, 2000) are based on the performance of 2297 students from 6 years to 11 years in a representative sample of South Australian Government schools who completed the test (Westwood: 1987). Data collected in 1995 and 1996 in South Australia was used to establish norms for the four processes of addition, subtraction, multiplication and division. The term "normal range" indicates the range of scores for 50% of the students in the particular age group (i.e. +/- 0.68 standard deviation). The "critically low score" is one standard deviation below the mean for the age group. According to Westwood that means a student designated as having "a critically low score" is in the bottom 16% of the age group.

The Number Screening Tests 2A and 2B (Pearn, Doig, & Hunting, in press) were designed to identify students mathematically 'at risk' in Years 3 and 4. The tests included tasks that had previously been found to be difficult for students 'at risk' (see for example, Pearn 1999). Both versions of the test were deemed to be of similar difficulty. This was to allow students to be seated side by side for the test but unable to copy from the student beside them.

The Number Screening Tests contains 34 items that focus on number. Eight items focus on counting, six on place value, six on addition, six on subtraction and one item had multiplication as the focus. There are seven word problems.

The counting tasks include items that required students to complete the sequence of counting forwards by ones from a two-digit number (including bridging across 100), counting backwards by ones from two-and three-digit numbers, counting forwards by tens from multiples and non-multiples of ten, counting forwards by fives from a multiple of five and counting forwards by twos from a non-multiple of two. The place value tasks include items that require students to write the number that is one more or less than a given number, or ten more or less than a number and ordering two and three digit numbers. The addition and subtraction tasks include one-digit and two-digit addends and subtrahends and one task requires students to find the missing addend. The addition and subtraction whole number word problems from Number Screening Test 2A are shown in Table 5.

Table 5: Addition and subtraction word problems.

Addition Word Problem	**Subtraction Word problem**
You have saved $35. You get another $20 for your birthday. How much do you have now?	Tom's cat is 31 cm long. Mary's kitten is 17 cm shorter than Tom's cat. How long is Mary's kitten?

The Sample

There were 122 students from five Year 4 classes that ranged in size from 19 to 27 students in each. Table 6 shows that the students' ages ranged from 8.92 (8 years and 11 months) to 10.25 years (10 years 3 months). That is, there was a 16 month difference between youngest and oldest students. The average age of the students was 9.60 with a median age of 9.58 which is approximately 9 years 7 months.

Table 6: Comparison of ages (n = 122).

	Minimum	**Maximum**	**Median**	**Average**	**Standard deviation**
Age in years (to 2 decimal places)	8.92	10.25	9.58	9.60	0.29

Administration of tests

Students from all five Year 4 classes were administered the *One Minute Basic Number Facts Tests* as given in the instructions for administration (Westwood, 2000, p.107). There were breaks between all the tests and as each test was administered the author ensured that students were aware of the process being used. For example, the author said something like: "Don't forget this is subtraction. You are taking the number away this time (p.107)." All students also completed the Number Screening Test (Pearn, Doig & Hunting, in press).

As the author administered the *One Minute Basic Number Facts Tests* several students from each class made the comment: "I can't do division!" Careful observation of the students during the assessment procedure revealed that students not only had difficulties with division but with all four processes. Many students completed the *One Minute Basic Number Facts Tests* using a 'counting by ones' strategy that was evidenced by the tapping of fingers, nodding of heads and the drawing of tally marks on the paper. As students completed the Number Screening Test many struggled with the word problems. They could read the problems but appeared to have difficulty deciding which process to use.

Analysis of the data

This paper will discuss the analysis of the data from the *One Minute Basic Number Facts Tests* and from the Word Problem section of the Number Screening Tests (2A and 2B). The author marked all four *One Minute Basic Number Fact Tests.* The student's score indicates the number correct for each of the tests. However this raised a dilemma when entering the data. A student score of seven (7) indicates only that a student has correctly answered seven of the items correctly. This can be achieved in three different ways:

- attempt the first seven items and answer the seven correctly;
- attempt any seven items from the test and answer the seven correctly; and

- attempt more than seven items correctly and answer seven correctly.

However, for this study the score is indicative of the number of items correct and does not differentiate between students who worked systematically, those that chose the ones they were confident they could get right or students who answered items incorrectly.

The One Minute Basic Number Facts

One Minute Basic Number Facts Tests (1995 in Westwood, 2000, p.107) were analysed. Using Peter Westwood's analysis as a guide the mean and standard deviation were calculated. Students' ages ranged from 8.92 years to 10.25 years with an average age of 9.6 or 9 years 7 months. For this analysis the whole grade cohort were initially used and finer tuned analyses were subsequently completed. In Table 6 the total students' scores are compared for the four processes: addition, subtraction, multiplication and division. All results have been rounded to two decimal places.

Table 7: Analysis of the One Minute Basic Number Facts Tests (Westwood, 2000).

	addition	subtraction	multiplication	division	word problems
Range of scores	2 - 33	0 - 33	0 - 33	0 - 33	0 - 6
Median	23	14	12	6	3
Mean	22.34	15.93	13.21	8.56	2.66
Standard Deviation	6.49	7.48	7.73	7.72	1.743
Normal range (Mean +/– 0.6 * Standard Deviation)	17.92 – 26.75	10.84 – 21.01	7.96 – 18.47	3.27 – 13.77	1.47 – 3.84
Critically low score	15.84	8.45	5.49	0.8	0.9
Critical low score to nearest whole number	16	8	5	1	1

Students achieved higher scores in addition than subtraction. Subtraction scores are generally higher than multiplication scores which are generally better than scores for division. While some students were unable to correctly answer any items there were some students who completed the 33 items for each process in less than one minute. See Figure 1 for a graphical comparison of the scores from the four processes.

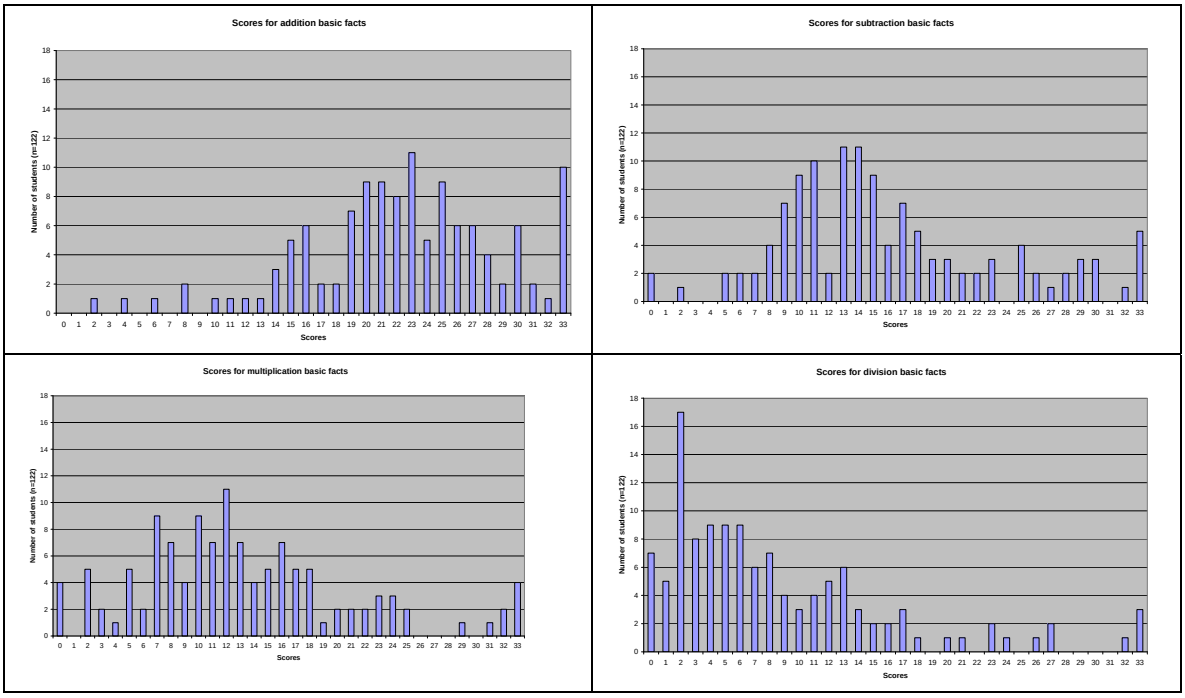

Figure 1: Comparison of the scores for the four processes.

Ten students answered all 33 addition basic facts correctly within one minute. However 12 students correctly answered 14 or less addition facts. The mean for the addition facts for this group of students was 22.34, the median was 23, and the critically low score for addition was 16. Five students answered 33 subtraction basic facts correctly in less than one minute, 13 answered 8 facts or less. The mean for subtraction was 16 with the median of 14. The critically low score for subtraction was 8. Four students answered all 33 multiplication basic number facts correctly in less than one minute. Twelve students correctly answered 4 or less multiplication facts. The mean was 13 and the median was 12 correct multiplication facts and the critically low score for multiplication was 5 multiplication facts correct. Three students correctly answered 33 division number facts in less than 1 minute while 12 students correctly answered one or less number facts in one minute. The mean was 9, the median was 6 and the critically low score was 1 for division. Table 8 compares the number of students at or below the critically low score for each of the four processes. The "critically low score" is one standard deviation below the mean for the age group.

Table 8: The number of students at or below the "critically low score".

	Addition	Subtraction	Multiplication	Division	Word problems
Score	16	8	5	1	1
students at or below critically low score (n)	23 (6)	13 (4)	17 (5)	12 (5)	41 (30)
students at or below the critically low score (%)	19	11	14	10	34

Table 9 compares the number of students at or above the "high" score. The "high score" is one standard deviation above the mean for the age group.

Table 9: The number of students at or above the "high score".

	Addition	Subtraction	Multiplication	Division	Word problems
Score	33	28	26	21	6
students at or below critically low score (n)	10	14	8	11	9
students at or below the critically low score (%)	8	11	7	9	7

Number Screening Test

All students completed one version of the Number Screening Test 2. Many students from all classes struggled with the word problems on both versions. Figure 2 shows the comparison of scores for each of the word problems. There were 12 students (8%) who did not attempt any word problem. There were 30 students (25%) who were only successful with one task but nine students (6%) correctly answered all six whole number word problems.

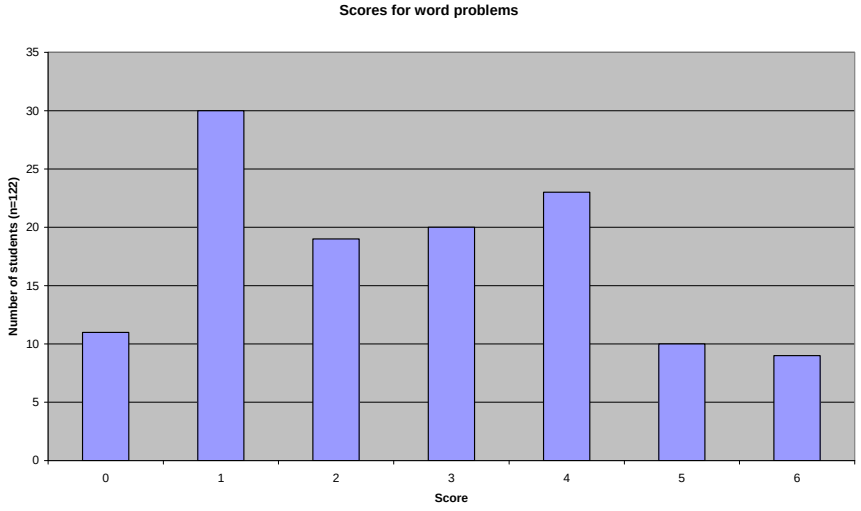

Figure 2: The scores for the word problems.

Table 10 shows the percentage of students who were successful with each of the whole number word problems. While 78% of students successfully answered the addition word problem only 34% were successful with one of the subtraction problems while only 25% were successful with the second subtraction task. Nearly half the students were successful with the multiplication problem and more than half succeeded with one of the division problems with only 23% successful with the second division problem.

Table 10: Success with word problems (Number Screening Test) in percentages.

Addition	Subtraction		Multiplication	Division	
Task 1	Task 2	Task 5	Task 3	Task 4	Task 6
78	34	25	49	57	23

In Figure 3 the results from the *One Minute Basic Number Facts Tests* are compared to the results from the word problems from the Number Screening tests.

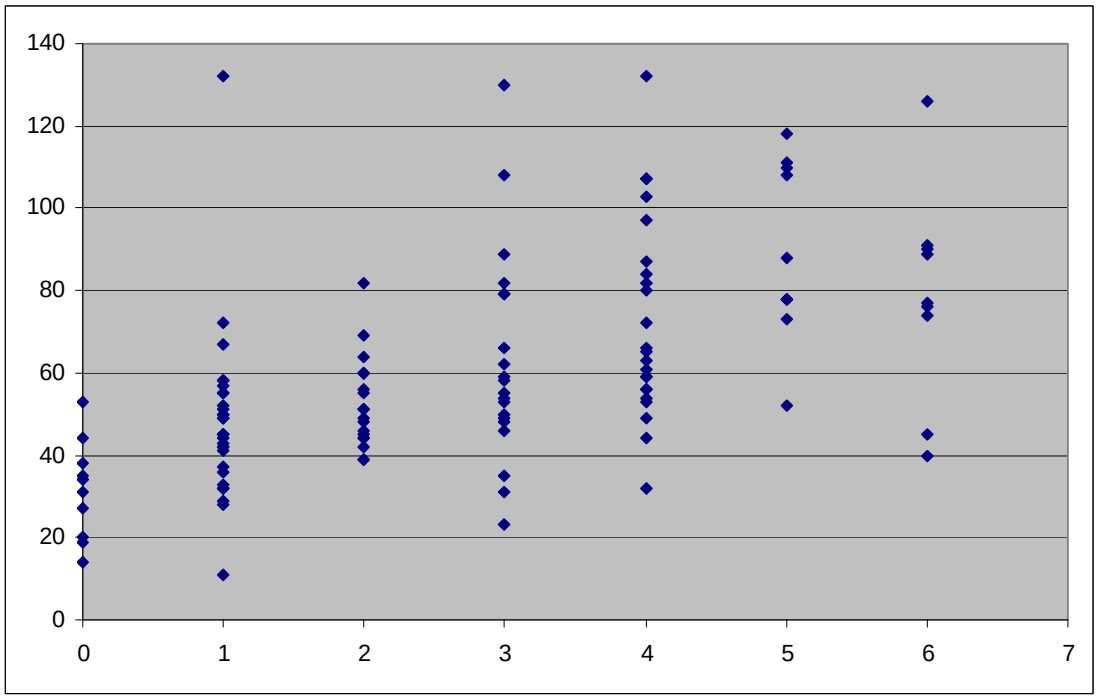

Figure 3: Comparison of One Minute Basic Number Facts Tests and Word Problem total scores.

There were large differences in scores for the one minute Basic Number Fact Tests and the Number Screening Tests. These results fell into four distinct categories:

- high score for Basic Number Facts and for the word problems from the Number Screening tests;
- high score for basic Number facts but low score for the word problems from the Number Screening tests;
- low score for basic Number facts but high score for the word problems from the Number Screening tests; and
- high score for basic Number facts and low score for the word problems from the Number Screening tests.

One student, Marcus, scored a total of 44 for the *One Minute Basic Number Facts Tests*. He systematically attempted and answered correctly all the addition & subtraction facts he attempted (22 for addition and 11 for subtraction). He chose specific multiplication & division number facts and correctly answered eight of the 11 multiplication facts he attempted and 3 of the 11 division facts he

attempted. While he made several errors with multiplication facts his difficulties were not obvious. However the division facts he answered incorrectly he gave responses to subtraction facts instead of the division facts. That is, he confused the division sign with the subtraction sign. Although he attempted all the word problems he was only successful with one. Marcus added all the numbers in the word problems regardless of the task. One major difficulty for Marcus was his inability to align the digits correctly. For example, when he attempted to add 4 and 40 his sum was 80 because he incorrectly aligned the two fours.

$$\begin{array}{r} 4 \\ +\,40 \\ \hline 80 \end{array}$$

Comparing classes

The results of the two tests were analysed by class. When the results for the addition number facts were compared, the medians ranged from 20 (Class 2) to 24 (Class 4) with Classes 1, 3 and 5 with a median of 23, and an overall median of 23. The critical low scores for addition varied between 12 and 18. For the subtraction number facts the median scores ranged from 13 (Classes 2 & 3) to 20 (Class 4) with an overall median of 14. The critically low scores for subtraction varied from 9 to 14. Table 11 highlights the differences between the scores for each of the classes for the multiplication facts.

Table 11: Analysis of One Minute Basic Number Facts Tests: Multiplication (Westwood, 2000).

	Class 1	**Class 2**	**Class 3**	**Class 4**	**Class 5**	
Range of scores	2 – 32	0 – 18	0 – 33	2 – 33	2 – 24	0 - 33
Median	11	9	13	17.5	13	12
Mean	12.04	8.05	12.41	17.81	14.4	13.21
Standard Deviation	6.69	4.13	7.86	9.8	5.39	7.73
Normal range (Mean +/– 0.6 * Standard Deviation)	7.49 – 16.59	5.25 – 10.86	7.07 – 17.75	11.15 – 24.47	10.73 - 18.07	7.96 – 18.47
Critically low score (2 d.p.)	5.34	3.92	4.55	8.01	9.01	5.49
Critical low score (to whole number)	5	4	5	8	9	5

Results for the division number facts also highlighted the differences of the results for each of the classes. The range of total scores for Classes 1 and 2 were 0 – 6 and 0 - 5 respectively, 0 – 33 (Classes 3 and 4) and 0 – 21 (Class 5). The median scores ranged between 1 and 11 and the mean scores between 5.63 and 13.08. The critically low scores for division varied between 1 and 3. When the scores for the word problems were analysed the median scores varied between 1 (Class 2), 3 (Classes 1, 3 and 5) and a score of 4 (Class 4).

The teachers varied considerably in their own mathematical confidence and ability. When presented with their class results the teachers varied in their approach to analysing the results. The teacher of Class 4 carefully studied his students' tests and commented on individual results. Another teacher, from Class 2, flicked quickly through the tests and said that the results did not tell her anything she did not already know.

Conclusion

These classes were not based on mathematical ability of the students. However the results from the *One Minute Basic Facts Tests* highlight the large diversity of the ability to recall basic number facts within each class and between classes. *The One Minute Basic Number Fact Tests* (Westwood,

2000) identified students struggling to recall basic number facts and those who had instant recall. The Number Screening Tests were designed to identify students mathematically 'at risk' but in this case were also able to identify students who were successful at Year 4.

The results highlighted the large range of mathematical knowledge of skills of students at Year 4. This study also highlighted the difficulty that teachers had in identifying students mathematically 'at risk' and those who had a range of mathematical strategies. Some students deemed by their teachers to be good at mathematics had good recall of learnt facts but were unable to solve simple word problems. Some students who were unable to recall number facts instantly were able to solve the word problems.

A large number of the Year 4 students assessed using these two assessment protocols used inefficient counting strategies for both types of assessment. These strategies were demonstrated when the students tapped their fingers, blinked or rolled their eyes, and using tally marks on both tests. Teachers need to ensure that student develop more flexible strategies that allow them to develop fluency with number facts and know when and how to use them.

References

Bell, A. W., Costello, J., & Kuchemann, D.E. (1983). *A Review of Research in Mathematical Education, Part A*. Windsor, Berks.: NFER-Nelson.

Carpenter, T., Franke, M., Jacobs, V., Fennema, E. & Empson, S. (1998). A longitudinal study of invention and understanding in students's multidigit addition and subtraction, *Journal of Research in Mathematics Education, 29*(1): 3-20.

Curriculum Corporation (2000) Numeracy Benchmarks Years 3, 5 and 7 website

http://cms.curriculum.edu.au/numbench/bench.HTM Last accessed 21/5/2007

Garnett, K. (1998) *Math Learning Disabilities* http://www.ldonline.org/article/5896 last accessed 12/6/2008

Gray, E. M. & Tall, D. O. (1994). Duality, ambiguity, and flexibility: A "proceptual" view of simple arithmetic. *Journal for Research in Mathematics Education.* 25*(2),* 116-140

Masters, G. N., & Forster, M. (1997). *Literacy standards in Australia*. Canberra: Commonwealth of Australia.

Ministerial Council on Education, Employment, Training and Youth affairs [MCEETYA] (2005) *National Report on Schooling in Australia: Preliminary Paper* http://cms.curriculum.edu.au/anr2005/pdfs/2005_benchmarks.pdf Last accessed 21/5/2007

Pearn, C. (1999). Megan: "Seventeen take away sixteen? That's hard!" *The Weaver: A Forum for New Ideas in Education,* no. 3 <http://www.latrobe.edu.au/www/graded/CPed3.html> last accessed 26th March, 2007

Pearn, C. A. (1994). A connection between mathematics and language development in early mathematics. In G. Bell, R. Wright, N. Leeson, & J. Geake (Eds.), *Challenges in mathematics education: Constraints on construction* (Vol 2, pp. 463-470) Lismore, NSW: Southern Cross University.

Pearn, C., Doig, B., & Hunting, R. (in press) *Number Screening Test 2A.*

Pearn, C., Doig, B., & Hunting, R. (in press) *Number Screening Test 2B.*

Pearn, C. A., & Hunting, R. P. (1995) Mathematics Intervention: An Overview of the first two years. In B. Atweh & S. Flavel (Eds.), *Proceedings of the Eighteenth Annual Conference of the Mathematics Education Research Group of Australasia* (pp. 446-452). Darwin: Northern Territory University.

Pearn, C. A., & Merrifield, M. (1996). Strategies for classroom teachers: A lesson from Mathematics Intervention. In H. Forgasz, A. Jones, G. Leder, J. Lynch, K. Maguire, & C. Pearn (Eds.), *Mathematics: Making connections*. Brunswick: Mathematical Association of Victoria.

Victorian Curriculum & Assessment Authority (VCAA) http://www.vcaa.vic.edu.au/prep10/aim/index.html last accessed 29/3/2007.

Westwood, P. (2000). *Numeracy and learning difficulties: Approaches to teaching and assessment.* Victoria: Australian Council for Educational Research (ACER).

About the Author

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Discovering and Engaging Our Diamonds in the Rough

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Abstract
In a low-income inner city learning environment, fostering talented and gifted students' potential tends to be treated as an unaffordable luxury. This manuscript describes a pilot study on how gifted and talented youth in an economically and crime troubled inner-city, predominantly black area, with the lowest performing school system in the state, may be identified and have their academic acumen fostered. This program was developed to address the quandary of needing to direct the educational resources of an academic course toward meeting the core educational needs of the average student, thus leaving the potentials of gifted students unfulfilled. To address this situation, the authors utilized several forms of instructional technologies (e.g., a course management system and a lecture capture system) that provided for the creation of individualized learning plans for gifted students in the new millennium. Gifted students were identified early in the semester via direct discussions and by their performance on examinations. Their individualized programs of study were then tailored to exceed the core course requirements. Gifted students were invited to participate in advanced course lecture material (research methods), and develop their own research project largely through the use of instructional technologies. Results indicate that the average students' needs were met, while gifted students were more fully engaged and challenged.

Keywords: Gifted students, college students, learning environment, instructional technology, program development, New Millennium Learner.

Discovering and Engaging Our Diamonds in the Rough

Serving the academic needs of all college students is a primary goal in higher education. Toward this end, college courses are commonly designed to address the need of the average student at respective levels of matriculation. Courses are designed for an academically normed level of knowledge and skills, and student performance is evaluated accordingly. Students who perform better than the norm attain proportionately higher grades and students who perform worse receive relatively lower grades. This strategy is generally successful and is perhaps the predominant approach used in the course development and delivery process. Unfortunately, this strategy does not always ensure the adequate education of gifted students. In our experience, there are two common factors that lead to a breakdown of this strategy: 1) the nature of the student group, and 2) the nature of the academic environment. We see these two factors as tending to be highly related with one another. That is, when the average student in a college/university tends to be more academically marginal, this tends to pull for similarly marginal academic standards and vise versa. When conditions related to these factors arise, it is our belief that gifted students suffer significantly because their academic potential tends to go unchallenged and unmet.

We, the authors, are affiliated with a small (approximately 4 to 5 thousand students) inner city historically black college/university (HBCU), and the school is situated in a very high crime and low socio-economic area. This school predominantly serves a population of students from poorer economic backgrounds and who tend to be among the first generation to attend college/university. The majority of students attending the university are graduates from the city school system which has the lowest academic test scores in the state and is among the lowest in the nation. Thus, many of the students entering our university are unprepared for the rigorous demands and challenges of higher education. As instructors at this university, we have worked hard to create the academic scaffolding to assist the average student to succeed while maintaining appropriate academic standards. Furthermore, we have struggled to nurture the full potential in our academically gifted students and not allow their talent(s) to go to waste. It has been shown that gifted students living within an economically disadvantaged background are generally not afforded the level of education they merit (Borland & Wright, 1994; Diaz, 1998; Ford, 1996; Herbert, 1998).

This paper describes our efforts to meet the challenge of properly serving gifted students within such an academically bimodal environment.

The Research Project and Methodology

We decided to focus our initial efforts to nurture the potential of gifted students toward those in an advanced undergraduate psychological research methods course. Course delivery is largely online but also has many face to face (f2f) qualities. It is instructed by the lead author who had substantial prior experience teaching at both this and other universities. This provided him with a good sense of the academic preparation of both the regular and the gifted students who take the course. Among both of these sets of students, there were common areas in which students had difficulty, albeit in respectively proportional levels. Both sets of students tended to be proportionally challenged in their mathematical, statistical, analytical, and writing skill sets. Furthermore, it was a rarity for students to have even the most rudimentary knowledge of American Psychological Association (APA) writing style, the standard for the profession.

Since the student composition, gifted and regular, of the course was essentially bimodal, it was decided that the developmental tracks created for them should be bifurcated. For regular students, a track was developed that was comprised of both remedial and course level appropriate elements. However, given that the development of gifted students was assumed to be asynchronous to that of regular students, their course development track included not only the elements required for the regular students (remedial and course level appropriate) but advanced elements as well. The gifted track would be tailored in a manner reflective of individualized learning plans.

Developing this two track course system (regular and gifted) would have been more challenging to accomplish in a course which strictly met f2f, however the asynchronous qualities of online education allowed for gifted students to proceed at a different rate and to cover distinct material. In other words, the nature of asynchronous online learning permitted the instructor to address the asynchronous nature of regular and gifted students within the same course section by establishing a two-tiered course program. Other investigators (Aamido & Spicker, 1995; Adams & Cross, 1999-2000; Belcastro, 2002) have found online instructional technologies to similarly useful as a means of providing gifted students in educational environments (e.g., rural) where advanced educational material was often unavailable except by distance education.

We conceptualize the course model we developed as being analogous to 'pull out' school programs for gifted children in which an individualized learning plan is created for each student. In our course model, gifted university students covered, and were graded, on the same course content as their regular peers, but, in addition they received advanced supplemental instruction. This supplemental material was focused around these students conducting their own research project. In contrast, regular students were not expected to develop a research project. While gifted students who chose to participate in the gifted program were quizzed on the same course content as regular students, in order to provide them with an inducement for participating in the program, they were exempted from taking the final exam, with their grade on the research project serving in its place.

It was determined that gifted students needed to be identified by the midpoint of the semester to provide them with ample time to conduct the research study and prepare a written report. All students met f2f with the instructor at the beginning of the semester. At that time, the instructor informed them of the option of participating in the gifted portion of the study provided that they had a 3.5 GPA and had excelled (i.e., having a grade of 95) in the course by the midpoint of the term. At mid-semester, the instructor made inquiries to all students meeting these requirements regarding their interest in participating in the gifted program. Students accepting this offer were placed in the gifted track of the course.

As noted above, the gifted instructional program used students' completion of an individualized research project as its central feature. While these students studied, and were quizzed on, the same material as the regular students, they were expected to fully complete a self-developed research

project. In order for the gifted students to complete this project, several instructional resources were deemed necessary, including additional tutorials on: 1) research design and hypothesis generation; 2) measurement instruments; 3) participant selection; 4) data collection, entry, and analysis; and 5) APA writing style. A lecture capture system (LCS) (i.e., Tegrity®), along with other software programs (e.g., PowerPoint® and the Statistical Package for Social Science®) were extensively used to provide gifted students with these tutorials. The LCS allowed students to view the audio-visual tutorials via the internet at any time of day. Students accessed this LCS through the course management system (CMS) (i.e., Blackboard®) classroom used for the course. In addition, each gifted student regularly met individually with the instructor to assess his/her progress on their individual project. At the end of the semester, gifted students' research projects were graded. This grade was substituted for what would have been their final exam grade. As noted above, opting out of the final exam served as an inducement for students eligible for the gifted group.

Findings

In a class of 45 students, 11 were considered to be eligible for the gifted student program using the criteria noted above. Of these 11 eligible students, 9 chose to participate in the gifted program and of these all but one completed their research project. Among the 8 students completing the project, the project grade distribution was four A's; three B's; and one C. The distribution of course grades for the 8 gifted program students was seven A's and one B. End of the semester interviews with the 8 students also provided some qualitative data. All 8 students stated that they were more prepared and interested in attending graduate school due to having been part of the gifted program.

Comparison of the entire course class, including gifted and non-gifted student groups, indicates that there is no statistically significant grade difference between the new course format and the format used in prior semesters (which was not bifurcated into two academic tracks) ($t = 1.22$, $df = 89$; $p > .05$). Furthermore, student course evaluations across the two formats showed that students were equivalently satisfied with the instructor ($t = 1.45$, $df = 89$; $p > .05$) and the course ($t = 1.87$, $df = 89$; $p > .05$). These findings suggest that the extra resources given to the gifted program students did not lead to a detriment for the regular students.

Conclusion

Even at lower tiered universities, there are numerous students with superior intellectual gifts. As educators, it is our responsibility to develop ways to nurture these gifted students. However, transforming gifted students' aptitudes into substantive achievements can be a challenging task. This is especially true for instructors working in environments where the average student's educational preparation is more marginal. We attempted to make reasonable accommodations to the composition of a course, allowing gifted students to flourish while not discriminating against the regular students.

Our strategy was to create two tracks which allowed for an appropriate level of rigor to be maintained for all students, while providing additional academic challenges for the gifted. The results of this preliminary study suggest that this 'pull out' strategy and creation of individualized learning plans commonly used at the pre-college level is also a viable strategy for educators to utilize at the college/university level.

The possibility of creating a bifurcated course program, regular and gifted, is significantly advanced by the utilization of instructional technologies. Use of a CMS and a LCS, along with other course related software, permit for specialized tutorials to be delivered to gifted students beyond the time restraints established by a given course schedule. Such flexibility in course instruction would be more challenging if it had to be delivered in an entirely f2f modality.

Furthermore, the findings of this preliminary study clearly show that, if designed properly, that the creation of a gifted track within a college level course does not have to lead to an adverse impact on

regular students. It is our opinion that the strategy of using instructional technologies to develop a gifted course track may also be applied to other courses as well. Clearly the potential of educators using these instructional technologies in serving our gifted students has yet to be fully explored.

References

Aamidor, S., & Spicker, H. H. (1995). Promise for the future: Gifted education in rural communities. *Rural Special Education Quarterly, 14*, 39-46.

Adams, C. M., & Cross, T. L. (1999-2000). Distance learning opportunities for academically gifted students. *Journal of secondary and gifted education, 11*, 88-96.

Belcastro, F. P. (2002). Electronic Technology and its use with rural gifted students. *Roper review, 25 (1)*, 12-17.

Borland, J. H., & Wright, L. (1994). Identifying young, potentially gifted economically disadvantaged students. *Gifted Child Quarterly, 38*, 164-171.

Diaz, E. I. (1998). Perceived factors influencing the academic underachievement of talented students of Puerto Rican descent. *Gifted Child Quarterly, 42*, 105-122

Ford, D. Y. (1996) *Reversing underachievement among gifted Black students*. New York: Teachers College Press.

Hebert, T. P. (1998). Gifted Black males in an urban high school: Factors that influence achievement and underachievement. *Journal for the Education of the Gifted, 21*, 385-414.

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Debating Single-Sex Education

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Abstract

Single-sex education has recently dominated discourse among education policymakers confronting declining achievement among adolescents. A longstanding model in some countries, single-sex classes had been construed as illegal in the United States since 1975 when Title IX legislation forbade sexually segregated arrangements in physical education and athletics. Educators in the US avoided single-sex academic classes until 2002, when No Child Left Behind, allowed schools to experiment with single-sex classes as a way to address declining achievement among students. Since 2006, when the US Department of Education formally legalized single-sex classes, the arrangement has been growing exponentially across that nation, despite the scarcity of research into the efficacy of such classes. Perennial concerns over social interactions among adolescent students and recent studies on brain-based differences in males and females have further fueled the bonfire of interest in this arrangement. This presentation is based on a three-year study by the author of single-sex classes in a small urban school district in the Northeast United States. This mixed methods study provides both quantitative and qualitative data on the efficacy of single-sex classes, reporting on interview and survey data from students, teachers, and parents and changes in standardized test scores over the three-year period of the study. The presentation will also provide the results of similar studies of single-sex education both in the US and in Africa, contained in the new book, Debating Single-Sex Education: Separate and Equal (Rowman & Littlefield, 2007), of which the presenter is lead author and editor.

Introduction

Renewed interest in single-sex schooling in the United States parallels similar interest worldwide, as educators grapple with providing appropriate curriculum and productive organizational arrangements for students not only according to their gender but also according to their performance, abilities, and talents. Brain-based research on differences in cognitive processing among males and females (Gurian, 2000) has fueled the argument for single-sex schooling as a potential means of enhancing student performance by providing gender-specific learning environments. Understanding the potential implications of single-sex schooling for gifted students requires an awareness of research that has explored the effectiveness and the perceived benefits of creating single-sex classes and schools.

This paper presents a recent study of single-sex classes in an urban middle school in the Northeastern United States. This three-year study employed a mixed model design to explore single-sex academic classes in a small (N = 600) middle school through two lenses: first, to examine the perceptions of the stakeholders in this organizational reform (students, parents, and teachers); and second, to explore the extent to which the reform affected student achievement, captured in standardized test scores. Age, gender, and social development emerged as important considerations in the organization of single-sex classes in this school.

Historical Context: Single-sex Schooling in the United States

Coeducational classes are a relatively new development in American education and education in general. Throughout the early days of American education, single-sex schools were the norm in secondary schools. However, at that time, only students of above average ability and above average income attended secondary schools, i.e., primarily upper class white boys. During the Progressive Era of the early twentieth century, coeducation became a staple of American education. This represented a significant change from common practice during the nineteenth century when single-sex schools were the norm. Moreover, in these early single-sex schools and classes, women most often pursued basic skills courses and did not often study academic subjects that would lead to higher education.

Therefore, early feminists urged access for all students to the entire academic curriculum, particularly the pre-collegiate academic subjects, like math and science. This resulted in substantial increases in the enrollment of girls in colleges across the nation throughout the twentieth century.

In the early 1970s, the feminists and the civil rights movement in the United States focused on inequities in single-sex physical education classes and teams that routinely lacked the same resources for girls as afforded to the boys. Ultimately, in 1972, the federal government enacted Title IX (Tyack & Hansot, 2002), which specifically forbade separate single-sex physical education classes. School districts construed this prohibition to extend to academic classes even though the statutory exemptions to Title IX "suggest that Congress did not intend to impose a sweeping ban on all single-sex education" (Salomone, 2003, p. 184).

Over the last two decades, the pendulum of concern about achievement among students of both genders has swung from concerns about girls (Sadker & Sadker, 1995) in the 1990s to more recent discussion of single –sex schools as a means of addressing underachievement among boys (Sommers, 2002). In 2002, an amendment to *No Child Left Behind* legislation paved the way for single-sex classes as a means of improving educational outcomes for all students. Education policymakers looked to single-sex classes as a solution for declining achievement in specific content areas, i.e., mathematics and science for girls and language arts and reading for boys, with little or no specific interest in these arrangements for students identified as gifted. Since 2006, when the United States Department of Education confirmed the legality of single-sex arrangements, the number of single-sex classes and schools has increased exponentially, but many of these arrangements have been ideologically driven without the benefit of research–based foundations.

Context for the Study

The study took place over three years in a small urban public middle school (N = 600 students) in northeastern United States that offered voluntary single-sex classes to all students in grades 6, 7, and 8 in the four core academic subjects: language arts, math, science, and social students. All students in those grades remain in mixed groups for all non-academic classes and at lunchtime. Therefore, the students were not completely isolated from the peers of the opposite sex, but saw them daily (approximately 50% of the day) to interact and socialize. This arrangement provided choice with minimal disruption for the students. In the first year of the reform, approximately 75 percent of the students chose the single-sex academic classes. Over the next two years, there was some attrition among the original pool of students in single-sex classes, but there was also movement into the single-sex classes by students who had originally chosen mixed classes.

Design of the Study

Following Creswell's dictum that researchers must examine reforms from multiple points of view in order to capture "the essence of the experience" (Creswell, 1998) for all the stakeholders, this study employed a sequential exploratory mixed-methods design (Creswell, 2003), involving both qualitative and quantitative analyses, i.e., combining observations, surveys, and interviews with teachers (n = 12), students (n =24), and parents (n = 7) with analysis of standardized test data. The interviews, lasting approximately one class period (40 minutes), were conducted during the school day according to standard protocols for confidentiality and human subjects' protection. All participants were advised that they could Themes derived from the interview data were then converted into questions for the surveys that were later administered to all three data populations. Two years later, follow-up interviews were conducted with a purposeful sample of teachers (n = 6) and eighth grade students (n = 12) who had been interviewed in the sixth grade.

Classroom observations of single-sex and mixed classes, lasting one 40-minute each, were conducted throughout the three years of the study. Initially, the role of the observer was not stated to the students, who were accustomed to the presence of visitors to their classes. As the study progressed, however, the students began to recognize the observer, so that her role switched from complete observer to participant observer. From the onset of the study, the teachers were informed of the observer's purpose and engaged in conversation after the observations.

In this sequential design, the first quantitative component (surveys) was conducted after the initial interviews. Three surveys were administered to all three stakeholder groups at the end of the third

year of the study and were analyzed for frequencies of the responses according to a likert scale of 1 to 5. For the purposes of reporting, this scale was collapsed into three categories: agree, neutral, and disagree. The students responded to the survey in their homeroom classes and were advised that their response was voluntary. The return rate for the students' surveys was approximately 98% of the population, with the two-percent attrition due to attendance the day the survey was administered. Teachers received surveys in their interoffice mailboxes and were informed that their return of the surveys was voluntary. This yielded a return rate of 54% within a week after the surveys were distributed. Parents were invited to complete a voluntary survey at an evening event, the annual middle school science fair. This resulted in a convenience sample of parents (n=78) who happened to attend the science fair. The second quantitative component was both descriptive and comparative analysis of the students' scores on Terranova achievement tests in 2002, 2003, and 2004.

Findings

This study, then, gathered findings from several lenses: the students, the teachers, and the parents. These data were then combined with standardized test data to provide as full a picture as possible. It is helpful to examine each component before drawing conclusions from the interaction of the findings.

What the students said

"All-boy classes are fun!" exclaimed James, age 11, cheerfully, but he quickly and quietly added a cautionary note, "Please write down that I will probably want to be with girls when I am in high school." On the other hand , Melissa, age 13, reflected with the wisdom of adolescence, "You can say what you want and not be afraid of being teased in all-girl classes…but sometimes we just want to be with the guys." clearly emphasizing her developmental need for social interaction with the opposite sex.

These students (Spielhagen, 2006) captured the paradox of the student view of single-sex classes. The younger the student, the more likely were they to express positive reactions to the single-sex classes. Younger adolescents (11 and 12 year olds) routinely characterized peers of the opposite sex "distracting" and "noisy" and stated that they preferred to be with their same-sex friends. Observations in the mixed academic classes and other mixed environments during the day, i.e., lunch, art and music classes, physical education classes, confirmed that students of this age seek the company of same-sex peers. Both boys and girls noted that they could concentrate more in single-sex classes and decided that they were getting better grades in the single-sex classes than they might in the mixed classes. Observations in the single-sex classes suggested that the students appeared to be livelier than their peers in mixed classes, as well as more focused and more on-task.

One eleven-year old boy noted that he preferred to be on all-boy teams in gym class and that he felt "more challenged" in his all-boy classes because he enjoyed the competition with the boys in his classes, "I want to try to beat them. I didn't try to beat the girls (when he was in mixed classes) because I didn't think I could beat the top girls, so why bother?" An eleven-year old girl emphasized that she was happy she chose all-girl classes because "you don't have to worry about boys picking on you or making fun of you." Another sixth grade girl, age 12, reported that she had asked her mother to enroll her in the all-girl classes because "the boys picked on me because I am smarter than them." She asserted that in all-girl classes the teachers "word things better and say them differently. In mixed classes they say things more simply for the boys." She felt that girls have the same ideas and can work well together, because the boys think of "disgusting things", especially in science. She added that all-girl classes are more fun and get more accomplished, even though the girls "get loud and ask too many questions."

Student attitudes began to change in as these young adolescents progressed through puberty and began to express their developmental need to socialize with the opposite sex. By the age 13, most students said they would prefer mixed classes, even if those who had opted to stay in the single-sex classes. Boys more than the girls expressed discontent with the single-sex arrangement, particularly those boys who were less physically developed and more likely to be bullied by their more aggressive peers. One boy noted that he had been curious about all-boy classes, but now that he was in them, he planned to choose mixed-gender classes for the next academic year. He did concede that in the all-boy classes he could talk more about sports with his friends and "just hang out", but that in all-male

classes, "Boys try to act tougher." He explained, "The guys who pick on us would be more interested in impressing the girls" in mixed classes. Another thirteen year-old boy noted that there was bullying in mixed classes, but there seemed to be more of it in the all-boy environment.

Two years later, interviews with the students provided more seasoned perspectives of single-sex classes. One thirteen year-old girl reported that had decided to stay with her al-girl class because "I can concentrate better." Other girls agreed that they had gotten better grades "…because we pay attention more and don't get distracted." A thirteen year-old boy said that he enjoyed the all-boy classes because "I can concentrate more. The girls make too much noise." However, he also stated that bullying had become a problem in his all-boy class.

Polling the Population: Student Survey Responses

Overall reactions to survey questions provide a simple view of single sex classes across all populations. Table 1 displays responses to selected questions from the student survey, which was administered to students in all single-sex classes at the end of the third year of the arrangement.

Table 1: Student Survey: Selected survey responses in grades 6 (age 11), 7 (age 12), 8 (age 13) combined, N=263.

Survey Statement	Agree	Neutral	Disagree
You can concentrate more in single-sex classes.	51%	21%	30%
You don't have to be afraid of being wrong in a single-sex class.	42%	35%	23%
Single-sex classes are quieter than mixed classes.	33%	14%	53%
You can act more like yourself in single-sex classes.	45%	27%	28%
Single-sex classes are fun because you can see your friends.	46%	27%	27%
Students should have a choice between single and mixed classes.	86%	11%	3%

Closer scrutiny of the survey responses revealed that positive reactions to single-sex classes varied according to the age and gender. Satisfaction was greatest among eleven year-olds, dipped drastically among twelve year-olds, and increased dramatically among thirteen year-olds. Table 2 records student responses according to their gender and grade.

Table 2: Comparison of Responses by Grade and Gender.

Survey Statement	Grade 6 (age 11)			Grade 7 (age 12)			Grade 8 (age 13)		
	All	Boys	Girls	All	Boys	Girls	All	Boys	Girls
I wanted to experience single-sex classes.	40%	29%	51%	24%	9%	35%	21%	8%	30%
You can concentrate more in single-sex classes.	60%	36%	84%	46%	43%	49%	50%	22%	70%
My grades have improved in single-sex classes.	53%	45%	67%	31%	23%	37%	33%	22%	41%
Single-sex classes are fun because you get to see your friends.	57%	52%	54%	48%	51%	46%	38%	46%	32%
I would choose single-sex classes again.	40%	21%	58%	30%	23%	35%	19%	10%	25%

Sixth grade students (age 11) gave more positive responses on all key questions than their older peers, with the girls sounding a positive note across the board on all points. An astounding 84% of the eleven year-old girls stated they could concentrate more in all-girl classes, compared to 60% of the boys in those classes. According to the responses on the surveys, the ability to concentrate was extremely important (70%) to the oldest girls in the study.

Boys, on the other hand, provided the most negative responses on the survey. When asked whether they had wanted to experience single-sex classes, only nine per cent of the seventh grade boys agreed, followed by a low of eight per cent among the eighth grade boys. Overall, 19% of all eighth grade students said they would choose single-sex classes again, but only ten per cent of the boys agreed to the statement. Among the girls, 25% of the eighth grade girls would choose single-sex classes again, compared to 58% of the sixth grade girls.

What the teachers said

Teachers who worked with both single-sex and mixed classes volunteered to be interviewed about their perceptions of their students in each environment in two rounds of interviews. The first took place during the first year of the reform, and follow-up interviews were conducted two years later, at the close of the third year of the reform.

In the first year, the teachers were generally positive about the single-sex classes and reported differences in the responses of boys and girls in the single-sex classes. The teachers also stated that the single-sex classes allowed them to teach the students more effectively. One teacher objected to the arrangement in the interest of promoting diversity, noting, "We don't live in a world segregated by sex, so why should they go to school in that world?"

Overall, however, most teachers interviewed in the first year were comfortable with the single-sex classes and were curious about how the reform would work out over time.

Two years later, teachers had become more polarized and more vocal either in support or disapproval of the single-sex classes. One teacher approached the interviewer in the hall and stated, "I hope you found it didn't work. I hate those classes." However, another reported that she still believed strongly that single-sex classes provided the safest learning environment for her students, especially for the girls. "They are more engaged and less social in the all-girl classes." Clearly lines were drawn, and the teachers had taken sides in the reform.

By the third year, several teachers expressed strong concerns about dealing with the negative dynamics among the students, particularly the boys. They suggested that previous aggressive behaviors exhibited by some of the boys should determine class composition. They also explained that organizational concerns, specifically teaming and the segregation of honors math students, also affected the composition of the single-sex classes.

While several teachers stated that they would choose to teach single-sex classes again, they were adamant that they that no teacher should be required to teach single-sex classes.

Polling the Teachers: Teacher Survey Responses

At the end of the third year, the middle school teachers responded to a survey containing thirty statements about the effectiveness of single-sex classes. In general, the teachers felt both boys and girls were comfortable and participated more in single-sex classes. Several teachers reported continued positive effects for girls in single-sex classes, but corroborated their colleagues' concerns about behavior problems and immaturity among the boys in single-sex classes.

The teachers acknowledged differences in learning styles between the girls and the boys and noted that they had changed their own teaching styles to accommodate each group. They generally agreed that they needed in-service training to teach single-sex classes.

Table 3: Selected items from the teachers' survey with their responses.

Statement	Agree	Neutral	Disagree
Girls are more social than boys in single-sex classes	56%	33%	11%
Girls respond more in single-sex classes.	61%	22%	17%
Boys in single-sex classes act less maturely than they do in mixed-gender classes.	53%	5%	42%
Students are more focused and on-task in single-sex classes.	53%	5%	42%
Girls have shown sustained, positive growth in single-sex classes.	60%	33%	7%
Both genders seem comfortable with single-sex classes.	75%	13%	12%
There is greater participation by both genders in single-sex classes.	56%	6%	38%
Girls and boys process information differently.	69%	31%	0%
I focus on different aspects of the content with each single-sex class.	19%	25%	56%
I change my style to accommodate the gender I am teaching.	50%	25%	25%
Teachers need in-service training to teach single-sex classes.	44%	44%	12%
Single-sex classes should continue to be an option for students and parents.	44%	19%	37%
I would choose to teach single-sex classes again.	50%	25%	25%

What the parents said

Parents who had selected the single-sex option for their children were overwhelmingly pleased with the arrangement and satisfied with their children's behavior and academic achievement. Many of these parents had experienced single-sex classes in their own (parochial) high schools. Most of them considered the arrangement to be beneficial both academically and socially for their children as they entered puberty, citing the social pressures on their children, particularly the girls, to act older than they were. Several parents expressed concerns about the sexual precocity of their children and the pressures on young adolescents to be socially engaged with the opposite sex. Another parent, who had opted not to put her son in a single-sex arrangement, objected to the program on philosophical grounds. She felt that he "needed to be with girls in order to learn how to live with women when he grows up." On the other hand, some parents of boys said that they felt that the single-sex classes afforded their sons the opportunity to concentrate and flourish. Mothers were the most vocal about this.

All parents interviewed emphasized their right to choose single-sex arrangements. They did not want the school to make that decision for them. They also wanted to be able to make that decision each school year, according to the development of their children. However, very few parents reported that they had changed their children's classes over the three years of the study. An overwhelming majority of the parents who had selected the single-sex option for their children in the first year continued with that option in the second and third school year.

Polling the Parents

At the end of the third year, a survey of the parents reflected their concerns over the social pressures among young adolescents and the desire to stabilize the learning environment for their children. A large number (49%) felt that single-sex classes help students learn better, but they were not decisive about whether single-sex classes provide a safer learning environment for children. An even larger number of parents (61%) felt that mixed classes create more social pressure than single-sex classes, but many (51%) also felt that mixed classes help children learn how to function in the real world. A large number of parents (59%) also felt that single-sex classes should continue to be an option at this school, and many (46%) would choose single-sex classes again for their children. Table 4 contains responses to selected survey questions.

Table 4: Parents' responses at the end of year 3.

No.	Statement	Agree	Neutral	Disagree
1.	I was adequately informed about the option of single gender classes for my children.	63%	16%	20%
2.	I have had experience with single-sex classes myself as a student.	17%	18%	65%
3.	I wanted my child to be in single-sex classes.	51%	24%	25%
4.	My spouse/partner agreed with my decision about single-sex classes.	56%	32%	12%
5.	My child agreed with the decision we made about single-sex class placement.	60%	21%	19%
6.	Single-sex classes help students learn better.	49%	26%	25%
7.	Single-sex classes provide a safer environment for children.	38%	38%	24%
8.	I have seen an improvement in my child's school achievement because of single gender classes.	29%	43%	28%
9.	My child has enjoyed single-sex classes.	36%	42%	22%
10.	Mixed-gender classes create more social pressure than single-sex classes.	61%	18%	21%
11.	There is more bullying in single-sex classes than in mixed classes.	31%	42%	27%
12.	Single-sex classes allowed my child to stay younger longer.	22%	56%	22%
13.	Mixed-gender classes help children learn how to function in the real world.	51%	30%	19%
14.	I would choose single-sex classes again.	46%	22%	32%
15.	Single-sex classes should continue to be an option at Ellenville Middle School.	59%	25%	16%

Does it all add up? Standardized test results

Questions of social and emotional safety of students aside, the current educational environment mandates accountability through evidence-based practice that enhances student achievement. As a result, the potential of single-sex class arrangements has entered the discussion among educators striving to address declines in student performance, especially in the middle school years. Therefore, an examination of this school's experience through the lens of achievement tests scores might inform policymakers about the efficacy of this arrangement.

Standardized testing is an annual event in this school. Since Terranova tests were being used to predict student performance on the state's eighth grade proficiency test, school officials were eager to examine these tests to assess the effectiveness of the single-sex classes. Therefore, after the first year of the reform, a comparison was made of that year's Terranova scores of students with the scores of the previous school year when all students were in mixed classes. This analysis revealed small gains in

achievement throughout the dataset, for students in both single and mixed classes. Interestingly, these gains in achievement test scores were more pronounced in the sixth grade. However, it is important to note that t-tests for independence revealed no statistically significant differences among the scores in both grades, except in the area of Spelling.

Two years later, after the single-sex classes had been established for three years, comparison of the Terranova test scores from Year 1 and Year 3 revealed specific and perhaps more interesting results, with some limitations. Because the student population had changed over time due to normal attrition and change within the community, students not in school for all three years were eliminated from the sample. This reduced the dataset but made it possible examine the performance of the students over the three years of the reform. However, an important change in the data sample occurred because the school placed students with higher academic grades into mixed Honors Mathematics classes. Because of staffing concerns, the school had not created three separate honors level math classes, one each for boys and girls and one mixed class. This organizational change caused students to switch from single-sex to mixed arrangements for academic reasons that precluded the choice to remain in single-sex classes. This was a clear example of how other organizational reforms within the school environment make it difficult to attribute any changes in achievement solely to single-sex classes.

Despite this important limitation, several interesting insights emerged about the performance of students in each of the arrangements. In Reading, there were gains across the board for all students regardless of whether they were in mixed or single-sex classes. In Math, scores declined in single sex-classes, but increased for all students in mixed classes, with a notably large increase among girls in the mixed classes. This finding seems to contradict conventional wisdom about the achievement of girls in mathematics classes. However, the gains in mathematics scores in the mixed classes quite logically derived from the sample of honors students in those mixed classes and the rigor of the curriculum. Students in the mixed mathematics classes started with higher scores and gained more over the year.

Students in the single-sex classes showed the greatest gains on the Language subtest. On the other hand, students in mixed classes declined sharply (10 percentile points) in the language section of the test, with the sharpest decline among boys in the mixed classes. These findings merit further exploration. There were also gains on the Total Battery of the Terranova test, except among boys in the mixed classes and among all mixed students taken as a group. Although the scores among the girls in mixed classes virtually stayed the same from Grade 5 to 7 on the Total Battery of the test, there were large gains in reading and mathematics. Table 5 contains the percentile changes for all academic courses over the three years of the single-sex arrangement.

Table 5: Percentile changes on Terranova tests in Year 3.

	Reading	Math	Language Arts	Total Battery
Whole School	+1.7	-.85	+3.6	+1.4
Total Boys	+1.1	-1.2	+3.2	+.95
Total Girls	+2.3	-.49	+3.9	+1.8
All students in single-sex classes	+1.4	-1.6	+6.1	+2.0
All students in mixed classes	+3.5	+5.6	-10.8	-1.5
Single-sex Boys	+.80	-1.9	+6.0	+1.8
Single-sex Girls	+2.0	-1.4	+6.3	+2.3
Mixed Boys	+2.9	+2.3	-11.1	-3.3
Mixed Girls	+4.1	+9.0	-10..4	+.28

Discussion

Age, gender, and social development have emerged as important considerations in the organization of single-sex classes in this public middle school. According to the students interviewed and surveyed, the majority of students in all grades stated that they could focus more in single-sex

classes. However, students in the sixth grade reported greater satisfaction with single-sex classes than the older students. Seventh grade students felt the most negatively about the arrangement, verbalizing the importance of social concerns. On the other hand, eighth grade students were more positive about the arrangement than the seventh graders. Boys were more dissatisfied than girls with the single-sex arrangements, a finding that is supported by similar studies in other parts of the United States (Marks & Burns, 2007; Rogers, 2007). Girls' behavior and focus were reported by both students and teachers in this study, another finding that is supported by other studies conducted during the same time period (McCotter, 2007; Kohl, 2007, Marks& Burns, 2007; Rogers, 2007).

Single-sex classes are not a panacea for the conventional stresses and discontent experienced by adolescents. Not surprisingly, the students overwhelmingly agreed that they should have the power to decide whether they would be in single-sex classes and how long they would remain in those classes. The right to choose the organizational format of their classes was perceived as beneficial by both students and their parents. Other similar studies chronicle arrangements where no choice was given (Kohl, 2007; McCotter, 2007; Rogers, 2007) but where other outcomes were similar.

The adults in this study, the teachers and the parents, gave mixed reviews to the reform. Most of the parents regarded the single-sex arrangements as both socially and academically safe. The teachers were divided in their assessment of the reform. Many of them attested to the cognitive benefits of the reform, but several others also decried the behavioral dynamics of students in the seventh and eighth grade. The placement of the students with higher academic grades into mixed mathematics classes in seventh and eighth grade may have affected those dynamics among those students left in the single-sex classes.

The analysis of achievement test scores provide limited support for the conclusion that can be drawn from the qualitative component of this study. Single-sex class arrangements seem to have worked for some students. Tests of statistical significance failed to reveal strong quantifiable results, but those analyses were ancillary to the qualitative explorations.

The quantitative analyses of test scores after the first year of single-sex classes suggest that other factors might well have been working together that year to produce these results among the sixth grade students. First, changes in curriculum delivery and/or awareness of curriculum delivery might have impacted the ways in which teachers presented that information to the students. Second, the opportunity to select the type of class arrangement might well have affected the way in which students approached their studies.

In other words, because students had more control over how they were arranged, they might have interacted more readily and more eagerly with their course work. Moreover, the age and development of the students may also have affected the outcomes. These results are supported by a few other studies (Rogers, 2007; McCotter, 2007) but are inconclusive in others. Therefore, no definitive statement can be made about the effectiveness of single-sex classes in raising test scores.

Conclusion

So, does it all add up? Two key conclusions emerged from this study. First, single-sex class arrangements seem to be most effective when related to the developmental needs of the students: i.e., the younger the student, the more likely that being in a single-sex class will be a positive experience. Second, in a public school environment, single-sex classes should presented as optional to parents and students, with flexibility within the school day and over the student's middle school years.

This study suggests that single-sex class arrangements seem to have merit for those students who are positively disposed to being involved in them, as long as they are given the choice to participate and the opportunity to opt out. Moreover, it seemed that the younger the student, the more likely that student responded favorably to single-sex classes. Both in the interviews and the surveys that followed, students in the sixth grade reported more positive responses than the older students in the

study. Teachers corroborated the benefits for the youngest students in the population. Therefore, this study further suggests that providing single-sex classes for very young adolescents, from 10 to 12 years old, might be most effective.

Students of all grades reinforced the importance of emotional, intellectual, and physical safety in single-sex classes. However, the problem of bullying emerged over time among boys in single-sex classes. The students who were interviewed did not agree on which arrangement might be less bully-prone. The teachers, on the other hand, cited negative behaviors, like bullying, as a problem they associated with the single-sex classes among the older students. Further analysis might reveal a pattern of bullying developing over time, especially in the all-male environment. On the other hand, the predominantly positive responses among the girls in this study seem to suggest that single-sex classes might be effective for girls in young adolesecense. Teachers and parents alike regarded the single-sex classes as positive environments for the girls, providing both social and academic benefits.

Taking the Long View: Implications for Practice

In adolescence, choice and ownership are critical to the development of young adolescent into autonomous learners. Jackson and Davis (2000) strongly recommend the involvement of the students and their parents in decision-making involving school arrangements for the students. When schools implement single-sex classes, they should also offer that choice equitably to both girls and boys, and there must be no distinction about the types of courses afforded to students of either sex. By providing the option of single-sex environments within the existing school framework for students in the early middle years (grades 5 and 6), middle schools can also provide cost-effective school choice for parents, and thereby involve them as stakeholders in the education of their children.

Much of the rhetoric surrounding school reform centers on the monolithic structure of the typical public school. Organizational concerns that involve staffing and facilities often prevent any choice in a typical public middle school, particularly in suburban and rural schools where there is only one school to serve all students within the sending area. Creating single-sex classes for academic areas allows students to experience the benefits of single-sex classes, to interact with other genders throughout the day, and to remain within the confines of one school building. However, one landmark study of single-sex classes in California concluded that, while providing choice for parents and students, single-sex public schooling "…is not necessarily a panacea for the problems of gender equity in public education" (Datnow, Hubbard, & Conchas, 2001, p. 203).

Teacher buy-in is also important, as is the training of teachers for this reform. Brain-based studies (Gurian, 2000) on the ways in which boys and girls learn can inform teachers about the ways in which they might best serve their students, whether they are in single-sex or mixed classes. Teachers should also have the choice of whether they will teach in single-sex classes. This study did not explore the assignment of teachers to single-sex classes according to their sex, an arrangement that has recently gained attention (Dee, 2006).

Responses from all stakeholder groups strongly suggest that single-sex scheduling should be flexible within the school environment. This district displayed innovative programming by restricting single-sex classes to only the academic core courses and providing for coeducational interaction throughout the rest of the school day. Offering subject specific single-sex classes in each grade would provide even more flexibility within the existing school walls. This type of "co-instructional" planning would provide an innovative solution and address the needs of the young adolescents for focused academic classes and social integration during the remainder of the school day.

The teachers who taught both single-sex and mixed classes in this study attested to their belief that cognitive benefits derived from the single-sex arrangement for those students who had selected that option. Parents also corroborated the teachers' perspectives, but it was the students' themselves who offered the most salient observations of this phenomenon that has been regarded as new among public schools but actually has had a long history in American education.

References

American Association of University Women. (1998). *Separated by sex: A critical look at single-sex education for girls*. Washington, DC. AAUW.

Clewell, B. (2002). Breaking the barriers: The critical middle school years. In E. Rassen, L. Iura, & P. Berkman (Eds.), *Gender in education* (pp. 301-313). San Francisco: Jossey-Bass.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches.* (2nd Ed.) Thousand Oaks, CA: Sage.

Datnow, A., Hubbard, L., & Conchas, G. (2001). How context mediates policy: The implementation of single gender public schooling in California. *Teachers College Record*, *103(2)*, 184-206.

Dee, T. S. (2006). *The why chromosome: How a teacher's gender affects boys and girls*. (Hoover Institution, Education Next, 2006: No.4). Stanford, CA: Stanford University.

Gurian, M. (2000). *Boys and girls learn differently.* San Francisco: Jossey-Bass.

Kohl, R. (2007). "We've always doen it this way": Single-sex classes in Kenya. In F. Spielhagen (Ed.), *Debating Single-Sex Education: Separate and Equal* (pp. 116-125). Lanham, MD: Rowman and Littlefield.

Marks, D., & Burns, C.S.. (2007). Jumping into the fray: How to implement single-sex classes. In F. Spielhagen (Ed.), *Debating Single-Sex Education: Separate and Equal* (pp. 17-31). Lanham, MD: Rowman and Littlefield.

McCotter, M. (2007). Bumps along the way: Mistakes made and lessons learned. In F. Spielhagen (Ed.), *Debating Single-Sex Education: Separate and Equal* (pp. 17-31). Lanham, MD: Rowman and Littlefield.

Rogers, K. (2007). For better or worse: Classroom dynamics in single-sex science classes. In F. Spielhagen (Ed.), *Debating Single-Sex Education: Separate and Equal* (83-115). Lanham, MD: Rowman and Littlefield.

Sadker, M., & Sadker, D. (1995). *Failing at fairness: How our schools cheat girls.* New York: Simon & Schuster.

Salomone, R. (2003). *Same, different, equal: Rethinking single-sex schooling.* New Haven: Yale University Press.

Sommers, C. (2002). Why Johnny can't, like, read and write. In E. Rassen, L. Iura, & P. Berkman (Eds.), *Gender in education* (pp. 700-721). San Francisco: Jossey-Bass.

Spielhagen, F. (April, 2006). How 'teens view single-sex classes: Students talk about some benefits—and some drawbacks—of single-sex classes. *Educational Leadership, 63*(7), 69-75.

Spielhagen, F., Ed. (2007). *Debating Single-Sex Education: Separate and Equal.* Lanham, MD: Rowman and Littlefield.

Tyack, D., & Hansot, E. (2002). Feminists discover the hidden injuries of coeducation. In E. Rassen, L. Iura, & P. Berkman (Eds.), *Gender in education* (pp. 12-50). San Francisco: Jossey-Bass.

About the Author

Frances R. Spielhagen, Ph.D., is an Assistant Professor of Education at Mount Saint Mary College, Newburgh, New York, where she teaches both pre-service and in-service teachers. She also conducts professional development for school districts across the United States. From 2003-2006, she was an AERA/IES Post-Doctoral Research Fellow, at the Center for Gifted Education at the College of William and Mary in Williamsburg, Virginia, under the mentorship of Dr. Joyce Van Tassel-Baska. During that time, she also conducted funded research on motivation and college-going through the Texas Higher Education Opportunity Project at Princeton University.

Dr. Spielhagen conducts funded and published educational research, as well as grant-writing and program evaluation. Her book, *Debating Single-Sex Education: Separate and Equal*, was published by Rowman and Littlefield in December, 2007. Her research on single-sex education has also been published in *Educational Leadership* (ASCD, April, 2006), *The Handbook for Research in Middle Level Education* (Information Age Press, 2007), and *Taking Sides in Education* (Houghton Mifflin, 2007). She has presented her research at the American Educational Research Association and the

National Association for Gifted Children. In addition to her presentation at International Centre for Innovation in Education at the Universite Descartes in Paris, she will also present her work on single-sex education at the Gurian Institute in Colorado Springs in July, 2008, and at the National Association for Gifted Children in Tampa, Florida in November, 2008.

Dr. Spielhagen is a career educator with over 30 years experience in secondary schools, 25 of which as a coordinator of programs for gifted students. As a public school teacher, she received local, state, and national awards for her work with adolescent students, including Teacher of the Year, *Time Magazine's* "Time for Kids" Award for Excellence, and the *National Make A Difference Day* award. Her interest in gender differences in learning began in the early years of her career when she taught in an all-boys K-8 school in New York City. As a high school teacher in the 1990s, she conducted action-research on girls' perceptions of achievement. Now as a teacher-educator and policy analyst, she is continuing her research and discussion of appropriate educational arrangements that meet the specific needs of both boys and girls and of the motivational factors that influence young adolescents. She is currently working on a new book for Corwin Press, with the working title of *Unsolved Equations: The Algebra Solution.*

(A.29)

Fred A. Bonner, II; Mary V. Alfred; Lonnie J. Booker; Chad E. Broussard, Definition, Identification, Identity and Culture: A Unique Alchemy Impacting the Success of Gifted African American Millennial Males in School: This presentation focuses on the underrepresentation of African American males in gifted and talented programs, and offers a number of key recommendations to practitioners and researchers who seek viable strategies to circumvent this problem. Beyond the focus on underrepresentation, several additional topics for discussion are excogitated to provide a clear perspective on the challenges these students experience in school; namely, (a) definitions of giftedness; (b) identity development, and (c) student Millennial culture are treated. Additionally, data collected from a recent study of a large Midwestern school district will be presented in an authentic case study format to further highlight the topics under investigation.

Pedagogical Diagnostics - TOOLS

Linda Huber

The Austrian Research and Support Centre of the Gifted and Talented

Abstract

The identification of gifts and talents is a very important part in the support of the gifted and talented by educators and teachers. In order to identify the gifts and talents of their children and pupils they need instruments that are specifically made for their hands. In a research project the Özbf is currently developing screening methods and checklists that may help educators and teachers identify and support traits that are relevant for the development of gifts and talents: Checklist for teachers to evaluate their assessment tendencies (all grades); Questionnaire regarding the striving for knowledge (grades 5-8); Picture method regarding effort (grades 5-8); Questionnaire regarding learning-related anxiety (grades 5-12); Screening list for creative activities (primary school); Task-oriented analysis of creative activities (primary school); Scale regarding flow-experience (grades 5-12); Checklist regarding the striving for knowledge (preschool) These tools will be published in 4 manuals including definitions as well as guide-lines and instructions for the methods' application. So far, manuals on the checklist for teachers to evaluate their assessment tendencies and on the questionnaire regarding the striving for knowledge, the picture method regarding avoidance effort and the questionnaire regarding learning related fear have been published and will be presented at the conference.

The Austrian Research and Support Centre for the Gifted and Talented (özbf) was established in 1999. It is a registered association and financed by the Ministry for Education, the Arts and Culture and the Ministry of Science and Research. As a national centre the özbf acts as a think tank for innovative enterprises in the field of gifted and talented support.

We set up national and international networks and collaborations. By cooperating with scientists nationally and internationally we create a link between the status quo of research and practice.

Our activities include:

- The development of concepts and national strategies in the field of gifted education
- The initiation of pilot projects and provision models
- Research projects
- The organisation of international conferences: our next international conference "Gifted – Enduing – Outspent: Educators in the Light of manifold Challenges" will take place from November 6 – 8, 2008 in Salzburg. It will mainly focus on the characteristics of educators of the gifted and talented.
- Information: The centre provides information via our website, the journal "news & science – Begabtenförderung und Begabungsforschung", brochures, a web-based teaching resources pool, a web-based Best Practice databank etc.
- The support of school improvement via brochures and training courses
- Teacher training
- The initiation of workshops for children and parents

Definition of Giftedness (özbf)

There are many different conceptions of giftedness.

To serve a multitude of children with a multitude of potentials, a multi-dimensional model of giftedness works best. We take giftedness as an individual's potential for achievement in various (also non-cognitive, non-academic) fields. This potential is a product of the interaction between an individual's disposition, learning, and environmental influences. Giftedness is not a gift one has or has not but rather a process what may be influenced by a lot of factors.

Identification Criteria

Since giftedness is the product of the interaction of various factors and very complex by nature, it can not be identified per se.

One aspect of giftedness, intelligence, may be assessed by IQ-tests which usually measure verbal, numeric, visual-spatial, and logical-reasoning abilities. However, in intelligence tests many aspects relevant for the development and exhibition of giftedness and high ability such as motivation, effort, stress management, self-concept, learning and thinking styles, interests, creativity to name a few, are

not taken into account. Therefore, IQ scores are not sufficient as measures of giftedness and do not offer enough information for the best possible provision.

Model of Multiple Intelligences

An example for a wider definition of giftedness is the Theory of Multiple Intelligences by Howard Gardner. Gardner's concept of intelligence has alerted many educators to more comprehensive means of identifying and nurturing potential. According to Gardner, intelligence is an interaction between inherited possibilities and environmental contributions. In other words, our experiences influence the degree to which each of the intelligences may be expressed.

The theory of multiple intelligences claims there are 7 (or 9) relatively independent intelligences. These are linguistic, logical-mathematical, visual-spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal. (naturalistic and existential) intelligence.

Hence, rather than characterizing one's intelligence by a single test score, Gardner argues for determining the profile of an individual's intelligences which implies the need for new forms of assessment.

Project "Pedagogical Diagnostics"

In Austria mostly tools for psychological diagnostics have been used for identifying gifted and talented children. However, the identification of gifts and talents is also a very important part of the daily practice of educators and teachers, not only of psychologists. The development of scientifically-tested methods for pedagogical diagnostics is therefore substantial for the efficient support of the gifted and talented.

In cooperation with Prof. Lehwald from the Kinderbüro Leipzig, the özbf is currently conducting a research project on the development and adaption of procedures that may help educators and teachers identify and support traits relevant for the development of gifts and talents:
These tools will be published in 4 manuals including a short scientific background and guide-lines how to use the information gathered by the analysis.

Booklet I: comprises a questionnaire which deals with assessment tendencies of teachers.

Booklet II: comprises 3 methods:
- A questionnaire to detect striving for knowledge in secondary school pupils
- Cartoons to detect the degree of willigness for exertion in secondary school pupils
- A questionnaire to detect the degree of learning-related anxiety in secondary school pupils

Booklet III: comprises a questionnaire on creative activities for primary school pupils and a task related method on creative activities for primary school pupils

Booklet IV: comprises a checklist to detect striving for knowledge in children in kindergarten and pre-school pupils

Booklets I and II will be published within the next months.

Booklet I: Assessment Tendencies of Teachers

By means of a questionnaire, teachers and educators of all school levels can find out about their assessment tendencies in the field of students' performance, individualisation of tasks and feedback strategies and the consequences for the students. The teachers are urged to reflect and maybe change their attitude.

According to F. Rheinberg (2002) 3 tendencies are defined:

1) Factual Benchmark: Teachers determine teaching objectives and develop standards which need to be fulfilled by the students in order to attain a certain grade. For example: A student who fulfils 70% of the set standards gets grade B.
2) Social Benchmark: Teachers judge a students' performance by comparing it to the rest of the learning group. For example: A student who performs above the average level of performance in a class gets grade B.

3) Individual Benchmark: Teachers judge a student's performance by comparing it to his previous performances. For example: A student who performs much better than usual in a presentation gets grade B even though he still performs worse than his class mates.

In manifold studies the consequences of these benchmark tendencies in school have been proved.

Consequences of Social Benchmarking – Consequences of Individual Benchmarking

Social Benchmark:

Teachers who tend to apply social benchmarking mainly use equal tasks for all students in order to compare their performances. Teachers usually refer to the class scores for comparison which may lead to misjudgements. Students' performances are often either under- or overrated and they do not get information on their individual learning progress which may lead to a decrease in motivation.

A student may, for example, be judged to perform really well in a low-achieving class and would be judged to perform badly when compared to a high-achieving class.

Individual Benchmark:

Teachers who tend to apply individual benchmarking, adapt their tasks to the individual needs of their students. They rather focus on the individual learning progress and include it into the grading. Therefore, each student may detect the link between effort and success which increases motivation.

Questionnaire

The questionnaire consists of 20 statements. Teachers need to mark off if the statement is fully applicable (+3), highly applicable (+2), somewhat applicable (+1), somewhat inapplicable (-1), not very applicable (-2) or not applicable (-3). Then they assign their points to a scale divided into the three features: students' performance, individualisation of tasks and feedback strategy. By means of an evaluation template, teachers may evaluate their own tendencies and get useful hints for their teaching practice in the field of differentiation strategies and feedback.

Sample:

1.	I think it's fair to provide all students with the same tasks.		x				
		-3	**-2**	**-1**	**+1**	**+2**	**+3**
8.	I often provide students with different tasks in class, according to their performance level.	x					
		-3	**-2**	**-1**	**+1**	**+2**	**+3**

12.	I often provide students with different tasks in class, according to their performance level.					x	
		-3	**-2**	**-1**	**+1**	**+2**	**+3**
18.	When I talk about "good performances" I refer to a comparison of his current and previous performances.					x	
		-3	**-2**	**-1**	**+1**	**+2**	**+3**

Teachers need to mark off if the statement is fully applicable (+3), highly applicable (+2), somewhat applicable (+1), somewhat inapplicable (-1), not very applicable (-2) or not applicable (-3). Then they assign their points to a scale divided into the three features: students' performance,

individualisation of tasks and feedback strategy. By means of an evaluation template, teachers may evaluate their own tendencies and get useful hints for their teaching practice in the field of differentiation strategies and feedback.

Booklet II: Striving for Knowledge in Secondary School Pupils

Striving for knowledge is defined as a motivational condition triggered off by an interesting topic which brings pupils to search for new information independently.

Overall external signs of the striving for knowledge are a high willingness for exertion and an interest in profound knowledge about a subject.

Other external signs are:

- preference of independent intellectual work
- pursuit of perfection
- affective-emotional devotion to problems
- tendency to persevere and solve problems
- continuous interest in additional information
- interest in complex activities which allow flexible thinking
- wish to apply moral standards during the knowledge striving process

Questionnaire

By means of a questionnaire, teachers and educators of secondary school students are supported in detecting the striving for knowledge in their students. The students complete a questionnaire consisting of 23 statements. They mark off if a statement is applicable (true) to them or not (not true).

Sample:

	true	**not true**
I like solving riddles.		x
I am interested in documentaries about cultures and countries.	x	
Since I am bored by studying, I only feel comfortable at weekends.		x
I would like to know everything about the people around me.	x	

By means of an evaluation template, the teacher then assigns points to students' replies and gets information on the level of knowledge striving in their students.

Methods of enhancing the striving for knowledge which are dealt with in the booklet are:

- Reflexion of assessment tendencies to differentiate between "just" excellent performers and gifted children;
- Enhancement of self-responsibility in students; and
- Enhancement of creativity.

Booklet II: Willingness for Exertion in Secondary School Pupils

Gifted children often act because they enjoy plunging into a topic without the need of an external incentive. Activities are being done because of the pleasure of carrying them out no matter what the consequences are.

The willingness for exertion may be expressed by a tendency…

- to overcome difficulties (p);
- to keep to tasks (p);
- to feel free stress when solving problems (p);
- to show task-related diligence (p);
- to show willpower in a special field (p);
- to be a specialist in a certain field (p); and
- to put high standards on oneself (p).

Cartoons and Questionnaire

The tool consists of 3 pictures and attached questions. By means of the combination of pictures and a questionnaire, the students should be able to identify themselves with the situations described better.

The students mark off if a statement is applicable (yes) to them or not (no).

Sample:

He/She thinks…

1. I do not give up until I have found a satisfying solution to a problem.	o yes	o no
2. I often work without any breaks.	o yes	o no
3. I am slightly annoyed when I do not succeed with a task.	o yes	o no
4. I can not resist challenges.	o yes	o no

By means of an evaluation template, the teacher then assigns points to the students' replies and gets information on the level of willingness for extertion in their students.

Methods of enhancing the willingness for exertion which are dealt with in the booklet are:

- Enhancement of self-responsibility in students;
- Reduction of deficits in learning and working behaviour; and
- Encouragement of a good relationship between teachers and pupils.

Booklet II: Learning-related Anxiety

Learning-related anxiety is defined as a subject-related motive which may discourage learning activities.

Whether students feel anxious in certain situations, depends on their learning experience in a subject and whether they believe they can handle a task.

Students who show little or no learning-related anxiety ...

- believe they have power over the task;
- their striving for knowledge is well developed;
- they experience flow; and
- show hardly any worries about learning and performance.

Highly anxious students show little knowledge, have limited interests and show little if any striving for knowledge. Their confidence in their performance is significantly reduced. They do not work well under pressure and seem unstable.

This behaviour is especially noticeable when tasks involve problem-solving:

- Students pose fewer questions.

- Students do not use the information given during the lessons sufficiently.
- Students draw overhasty conclusions.

Questionnaire

By means of a questionnaire, teachers and educators of secondary school students are supported with detecting learning-related anxiety in their students. The students complete the questionnaire consisting of 23 statements and mark off if a statement is applicable (true) to them or not (not true).

Sample:

	true	**not true**
It often happens to me that I do not understand the tasks in test and need to re-read them again and again.	x	
I perform much better when a task is important to me.	x	
I rather stick to known ways of solving a problem because new ways might be risky.		x
I work better under the pressure of a test.	x	

By means of an evaluation template, the teacher then assigns points to the students' replies and gets information on the level of learning-related anxiety in their students.

Methods of dealing with learning-related anxiety mentioned in the booklet are:

- Encouragement of communication;
- Support of students' self-worth;
- Reduction of deficits in learning and working behaviour; and
- Sensitising for indications of underachievement.

This paper is best concluded with the following quotation: "In the end, fully developing any talent, no matter the theoretical lens through which we see it, rests on the appropriate educational challenge and also on the development of attitudes and values that translate potential into real-world results."[22]

The first two booklets on pedagogical diagnostics will be available in German on our website within the next months and may be downloaded for free at www.begabtenzentrum.at

You may also order them at e-Mail: info@begabtenzentrum.at.

If you have any further questions, please contact e-Mail: silvia.friedl@begabtenzentrum.at

References

Callahan, C. (1997, June). President's column: Let's be intelligent about intelligence. *Parenting for High Potential, 1,* 6-7.

Gardner, H., & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. *Educational Researcher*, 18 (8), 4-10.

Holling, H. (1998). Forschung und Förderung von Kindern und Jugendlichen im Bereich der Hochbegabung. Gutachten im Auftrag des Bundesministeriums für Bildung, Wissenschaft, Forschung und Technologie (bmb+f). Bonn.

Mittag, E., Remmert, B. & Sticker, E. Hoch (2006) Begabung diagnostiziert – was dann? Strategien der Beratung. Intellektuelle Hochbegabung. Aspekte der Diagnostik und Beratung. Tagungsband. Bad Honnef, K. H. Bock.

Lehwald, G. (1999). Der Fragebogen Erkenntnisstreben FES-R (Handanweisung). Leipzig: Zentrum für Potentialanalyse und Begabtenförderung.

[22]Yekovich, F. (1994). Current issues in research on intelligence. Washington, DC: ERIC Clearinghouse on Assessment and Evaluation.

Lehwald, G. (2005). Motoren der Begabungsentwicklung. In: *Forscher/innen von morgen. Bericht des 4. Internationalen Begabtenkongresses.* Salzburg: özbf, 76 – 85.
Rheinberg, F. (2004). Motivationsdiagnostik. Göttingen: Hogrefe.
Schneider, M. (2005). Talentiert – Begabt – Motiviert. ECHA Diplomarbeit, Universität Nijmegen (unveröff).
Yekovich, F. (1994). Current issues in research on intelligence. Washington, DC: ERIC Clearinghouse on Assessment and Evaluation.
Waka, C. (2006). Bezugsnormorientierung Checkliste CSBT. ECHA Diplomarbeit Spezialist in Gifted Education: Universität Nijmegen.

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The Big Question

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Abstract

The Big Question is an innovative teaching technique for raising attainment across all subjects for all children. A big question is an open question which cannot be answered definitively; it is a matter of judgement based on the information available. A big question, used as the focus for a lesson or series of lessons can provide highly motivating, challenging lessons. These lessons help develop rational, critical and creative thinking skills at the same time as teaching subject knowledge and skills. Given appropriate teaching, the challenge of a big question can be met by children of all abilities, each being equally involved. Children with Special Educational Needs can research, discuss and form opinions at their own level, and gifted children can use their unique abilities in original ways. We have found that carefully chosen big questions motivate all children and result in raised attainment for all, as measured by teacher assessment and national tests.

The Big Question is an innovative teaching technique for raising attainment across all subjects for all children.

A big question is an open question which cannot be answered definitively; it is a matter of judgement based on the information available. A big question, used as the focus for a lesson or series of lessons can provide highly motivating, challenging lessons. These lessons help develop rational, critical and creative thinking skills at the same time as teaching subject knowledge and skills.

Given appropriate teaching, the challenge of a big question can be met by children of all abilities, each being equally involved. Children with Special Educational Needs can research, discuss and form opinions at their own level, and gifted children can use their unique abilities in original ways.

We have found that carefully chosen big questions motivate all children and result in raised attainment for all, as measured by teacher assessment and national tests.

Context

For the last few years Edward Feild Primary School has been addressing the issue of how to cater for Able, Gifted and Talented children in a Primary school, with generalist teachers who do not have in-depth knowledge of every subject they are teaching.

In the UK we have extreme demands on curriculum time with great emphasis on attainment in the core subjects of English, mathematics and science through compulsory testing, the introduction of Modern Foreign Languages, and pressure groups pushing for more time for PE and games, the arts and personal development and citizenship lessons.

With children of all abilities in classes of thirty or more it is unrealistic to expect teachers to differentiate objectives and activities for every level of ability and attainment in all lessons.

In addition we have a large number of children who have low expectations of education and of themselves with a lack of support from the home environment; this particularly affects boys in the Primary, although girls are similarly influenced as they become older.

These factors mean that we must teach cross-curricular lessons that appeal to children of all interests and all abilities, catering for most of the needs of A G&T children within mainstream lessons.

At the same time we frequently need to awaken the interest of potentially gifted children, then nurture it.

At Edward Feild Primary School we adopted the “Talk and Thought” approach developed for gifted and talented children by Tony Hurlin, an educational consultant from Hampshire, UK, but we have applied it across all subjects and across all abilities.

From this early beginning, we have tried to develop our teaching to be brain-friendly and inclusive.

This paper describes **The Big Question** one particular method within our teaching which works across all **academic** subject areas and across all abilities.

The Big Question

1. What is "The Big Question"?

- "The Big Question" is a question that provides the focus for a lesson, a series of lessons or a whole topic.
- "The Big Question" is an open question – one which cannot be answered definitively – it is a matter of judgement and opinion based on the information available.
- "The Big Question" is a question that demands the whole range of thinking skills, as defined by Bloom's Taxonomy.
- "The Big Question" is an integral part of the topic to be studied as part of the National Curriculum.

It helps motivation if "The Big Question" implies some action. **In addition it is preferable if "The Big Question" relates to the children's previous knowledge, experience or interests.**

2. Examples of "The Big Question"

- Should the Aswan Dam be dismantled?
- Was Picasso the best artist ever?
- Why do people invade other countries?
- What is a god?
- Do we need rules?
- How can we improve the view from our window?
- What makes a good playground?
- What makes a good story?

3. Using a Question

Using a question for the focus of a topic provides motivation and develops essential life-skills.

Motivation

Using a topic to answer a question gives purpose to the work that the pupils are doing. They have a target to work towards and a reason to work as individuals or as collaborative partners.

A well-chosen question can provide interest for the pupil. If a question relates to previous learning, some general shared experiences or a specific interest, pupils will more eagerly pursue a line of enquiry.

A question that needs knowledge or skills previously acquired will motivate pupils to work on answering that question. They recognise that they are in a strong position to research or answer the question because they possess relevant information or skills, and are keen to take part in the quest.

A question can easily be seen to involve an element of competition. Competition is a strong motivator, especially for male learners. If different groups are researching a question, competition can easily be generated in a non-threatening way.

Working cooperatively applies positive peer pressure to ensure that everyone fulfils a role in order to achieve the best results

The nature of "The Big Question" encourages teachers to provide novel ways to give their pupils experiences that will help them answer the question more thoroughly.

Life Skills

The skills involved in answering big questions, speaking and listening, thinking skills, learning skills, research methods, weighing evidence, and drawing conclusions are all essential life skills that underpin all everyday activities. The recognition that the teacher is not the source of all information, that given guidance anyone can become the class expert on something.

Speaking and listening are clearly activities that almost everyone participates in every day. Yet many classrooms actively discourage these activities for the great majority of the day. We are seeing ever increasing numbers of children coming to school with very poor social skills and almost non-existent communication skills. Schools need to be pro-active in improving pupil communication skills very quickly.

Thinking skills can be deliberately nurtured by creating a non-judgemental environment and then deliberately addressing questions that demand specific thinking skills. One example of defining types of thinking skills is Bloom Taxonomy. This, or other definitions, can be used to provide a framework for teaching higher order thinking, such as analysis, synthesis, evaluation, critical thinking and creative thinking. We call on these skills constantly ever day of our lives. Working on these higher order skills also makes it clear that the lower order skills, such as knowledge and comprehension are just as important as the higher order skills, for example we cannot apply without the knowledge to apply.

Our world is changing at an ever increasing pace. We all have to continually learn new knowledge, new skills and new attitudes. The exponential increase in the rate of change shows no signs of abating, and we have to equip our children to deal with this in their careers and in their everyday lives. Citizens of tomorrow's world will need to understand how they learn so that they can cope with the ever-changing demands of their society. We must teach pupils learning skills and meta-cognition.

From the most trivial information to the most complex decision, we use research skills to find out things we do not know. We need to know how to find sources of information, how to judge their reliability, how to weigh evidence, and how to draw conclusions.

To successfully implement "The Big Question" the teacher needs to be an expert teacher, not a subject expert. The organisational and teaching skills involved are central to the success of the strategy, but they can be learnt by teachers who have open minds and are prepared to spend a little time practising them.

4. The Type of Question

Questions can be classified as "closed" or "open".

Closed Questions

A closed question has a defined factual answer. Closed questions are quick and easy to answer with a word or a phrase. Closed questions are a matter of fact.

We frequently use closed questions as ice-breakers, making them easy to answer to put people at ease, or to keep the conversation at a superficial level. "Isn't it hot today?"

Teachers use closed questions to test knowledge, "what is the answer when you multiply 5 by 4? and to some extent to test understanding "what is the result when you add 99 to 199?"

Closed questions can be used to lead someone into a way of thinking "Is it right to hit someone because they pushed into the queue?"

Closed questions can be used to arrive at a conclusion "So, do you think you should be punished for breaking the rules?"

With a closed question, the questioner keeps control of the conversation by directing the responder to a specific area of interest.

All of these are valid reasons for a teacher to use closed questions.

Open Questions

An open question has no defined answer. Closed questions need sentences and explanations as an answer. Open questions are a matter of opinion.

- We use open questions when we want someone to think in some depth "what do you think is the best way to add 99 to 199?"
- We use open questions to gather feelings "how would you feel if someone hit you for queue-jumping".
- We use open questions to gather opinions "what rules do you think we need at school?"

- With an open question the questioner hands control over to the "audience". A teacher uses open questions to start a discussion, but it can be difficult to have any control over the subsequent conversation.

In the classroom situation it can be difficult to ensure that all pupils are engaged and that everyone gains from the discussion. Often, left to their own devices a few children will dominate the discussion and many of the others will lose interest. It is important to organize the classroom in a way that will ensure all pupils take part.

5. Choosing the Open Questions

Interest and Motivation

The pupils must be motivated, and so an open question must be of interest to them, and ideally leads to some sort of action. "Do we need a school uniform?" is guaranteed to get a response from everyone if they think they can have some influence as a result of the debate – for instance that the arguments will be put to the headteacher or the governing body.

Similarly "Should children be evacuated from a war-zone?" is of direct interest because we are talking about children, and because the pupils see children in war-torn countries on the television, and, with some help, can empathise with their situation.

Thinking Skills

To develop pupils thinking skills we have to choose questions that lend themselves to the types of thinking we wish to encourage. Virtually all children in our schools are capable of every level of thinking skill. What we are trying to develop is the extent to which these skills are applied, and the quality, depth and breadth of the thinking. If we choose suitable questions every child will be able to practise their thinking skills and develop their thinking ability. The teacher must be aware of the hierarchy of skills to be developed.

If we examine the skills in the order suggested by Bloom we will be able to understand the attributes we are looking for in a big question. In order to have knowledge we must have facts. To show comprehension we need to have a question that requires use of facts, some interpretation or extrapolation. Application requires the use of general principles in new situations. Analysis requires a question that asks us to determine inter-relationships.

To establish new relationships through synthesis we must provide opportunities to determine new links between different events or facts. It is only possible to evaluate a conclusion or decision if it is based on evidence, the wider and more disparate the evidence the more the evaluation can be questioned.

All of the questions in Section 2 would enable us engage pupils in thinking skills at all levels of Bloom's taxonomy, and they are all suitable big questions. Further, the last four could be used with children of any age.

6. Preparing for the "Big Question"

Before we start using "The Big Question" we need to prepare our teachers, and our classrooms.

Planning

To make the most efficient use of time and energy "The Big Question" should be planned to address thinking skills, development of speaking and listening, reading and writing development, and subject specific knowledge and skills. Planning should take into account previous assessment of pupils in these areas and appropriately differentiated learning objectives for the project. This will help the teacher decide on an appropriate big question.

Appropriate climate

To keep pupils engaged, and ensure everyone participates, they must be convinced that the organisation is fair. It must be clear that everyone will get an equal chance to participate, that no-one is excluded, that no-one can opt out. The teacher must establish a climate of respect, where everyone's view is heard and given weight.

Asking Questions

The teacher must practice asking questions, listening to the answers and helping to develop the discussion.

It is important the teachers give plenty of time for pupils to think and reconsider, not just rush everyone into an instant response. By definition, open questions demand thinking time.

Equally, the teacher cannot be a passive observer. The teacher must listen to the contributions of all, and show appreciation by asking follow-up questions and taking pupils' responses into account in summing-up and in furthering the discussion.

Debating Skills

Pupils debating skills, so that they can debate and discuss, not just argue. Pupils must be taught how to speak, to justify a point of view, listen and take account of other views.

Facilitate discussion

Teachers will need to facilitate the discussion. They can ask for alternative opinions, play Devil's advocate, or may need to suggest some different thoughts or ideas. Teachers can elicit support for a point of view, or ask for someone to provide some evidence that supports an argument. Writing points on a display board can act as a reminder or a trigger for new ideas. Displayed information can be sorted visually to aid the thinking process.

Ensuring participation

There are many ploys that teachers can use to help ensure that all pupils are fully engaged in the discussion. For example, pupils can be assigned individual tasks or activities to report on, they can be given talk partners, or a teaching assistant, they may be given specific information that they alone can offer to the discussion group.

Benefits

Teaching & Learning

Using "The Big Question" greatly improves the quality of Teaching and Learning. Teachers become very enthusiastic about researching the subject they are teaching and they find new ways of giving children opportunities to explore subjects. Teachers draw on pupils' previous learning, reminding them of what they have previously been taught and found out. Teachers give pupils the opportunity to have new experiences and feel some of the emotions under discussion, so that they can speak from first-hand knowledge. The teacher is clearly in control of the class, but is not the source of all information and does not limit the thinking and learning that is taking place. The classroom becomes an active learning environment rather then a place where pupils go to be told things to learn.

Benefits for all pupils

Once pupils see that they can ask wide ranging questions and follow their own interests and curiosity to seek solutions, "The Big Question" helps stimulate them to challenge themselves and each other with original thoughts and ideas.

If the correct disciplines are followed, and measures taken to ensure all pupils participate in all discussions, pupils' speaking and listening skills improve very rapidly. Children start to speak in sentences rather than single word answers. They eagerly put forward ideas, because they know they will not be scorned or ignored, they begin to justify their statements, and argue a case.

In this way, given suitable guidance and encouragement, pupils develop the full range of thinking competencies. They learn techniques to help them think about what they already know and apply that knowledge to new situations. They learn to analyse problems, and ask new questions to help them determine relationships, rules and theories that they can test. They learn to critically think about their beliefs and conclusions and to judge whether their ideas are sound.

Because the answers to "The Big Question" can only be found by using subject knowledge, pupils' knowledge is used in argument and counter-argument and that knowledge becomes more firmly embedded in their memories. At the same time pupils come to see the relevance of each subject to their own lives. For example we can apply the lessons of history to help us make decisions now, and the more we know about different religions the more we can draw on similarities and differences to help us form our own beliefs.

Open questions provide opportunities for pupils to show their gifts and talents. The more open a question is the more likely it is that everyone has a valid experience of knowledge that can contribute to a point of view. Pupils start to believe that everyone has specific knowledge or experiences that are useful to their community.

Open questions provide opportunities for teachers to identify children who have unusual ways of thinking, or pupils who normally are reserved or quiet and would not offer an opinion. In an open forum where everyone is obliged to contribute, these children are often more easily identified.

Benefits for More Able pupils

More Able pupils find "The Big Question" challenges them in new and exciting ways. An open question makes good use of their ability to draw together many strands of an argument and employ complex thinking strategies to come up with new ideas.

With "The Big Question" More Able pupils revel in their ability to fuse disparate ideas allows them to produce innovative answers and solutions. "The Big Question" gives implicit permission for more able pupils to indulge themselves in expressing original and wacky responses which in other situations would be scoffed at and derided.

Because everyone is expected to participate actively in big question sessions, more able pupils have to express themselves and justify their statements. This allows other members of the class to see that these talented individuals, who may usually seem remote and inaccessible, are part of a class effort to pursue an enquiry. Others may also start to understand how the more able pupils operate. These factors help more able children to integrate socially with their peers.

More Able children take the opportunity offered by "The Big Question" to challenge themselves and set difficult questions for their own investigation.

Benefits for lower attaining pupils

Lower attaining pupils enjoy "The Big Question" because the sessions are non-threatening. Everyone can have an opinion and almost all opinions are valid. Big question sessions are mainly oral with very little writing. Research will be from sources written at a level accessible to each child, and so the lower attaining child is not expecting to fail as is the case in many lessons. Indeed, as children's confidence improves teachers and children can be very surprised by the in-depth knowledge in responses offered by children perceived to be quiet or lower attaining.

Since everyone can respond at their own level, everyone is given time to contribute and everyone's ideas are accepted. This provides a huge boost to the morale of the lower attaining child, and this success makes the child even more determined to contribute the next time. In this way the child's self respect improves and the child and the class come to expect success.

The openness of the interactions in "The Big Question" sessions provide a safe environment in which lower attaining pupils can ask questions to further their own understanding without fear of ridicule.

Experiences and Conclusions

- We have been using The Big Question throughout the school for several years now.
- Pupils are more open-minded and more motivated to learn.

- Pupils have noticeably more self-confidence; they are more willing to express themselves, giving and justifying an opinion.
- Pupils' speaking and listening skills, reading, and writing are greatly improved.
- Lower attaining pupils are well behaved, participating fully in lessons and making valuable contributions.
- Children who were not achieving their potential, because they were naturally quiet or reluctant, now participate and move forward quickly.
- Higher attaining pupils challenge themselves with high-level questioning, creating their own scenarios and theories.

We have increased the proportion of pupils working at the expected level from 70% (2002) to 96% (2007) and the proportion of pupils working above the expected level from 26% (2002) to 60% (2007). These figures are well above the National Average, despite an intake which is significantly below the National Average.

Acknowledgements

Bloom, Benjamin: Taxonomy of Educational Objectives. Longman 1984
Kagan, Spencer: Kagan Cooperative Learning. www.kaganonline.com
Hannan, Geoff: Improving Boy's Performance. Geoff:hannan.org.uk
Hurlin, Tony: Challenging Able Children
Sousa, David: How the Brain Learns. Corwin Press 2001.

About the Author

John Hawkins started his teaching career 23 years ago, completing a PGCE at Leeds University, Trinity & All Saints College. John taught in Hampshire, (England) and Hong Kong, before becoming a headteacher in three successively larger schools. He has been head of Edward Feild Primary and Foundation Stage Schools for nine years, taking it from special measures to a high achieving school. John has worked as an inspector for OfSTED inspections, an External Adviser and a Primary Strategy Leader during his headships. Edward Feild was the first school in Oxfordshire to be awarded the NACE Challenge Award for Excellence in Provision or Gifted and Talented Children, and is a provider of courses for gifted and talented children for the S.E. of England Excellence Hub.

(A.32)

Excellence in Disguise: An Examination of the Reading Achievement Scores of Bilingual and Multilingual Gifted and Non-Gifted Students

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Introduction

Gifted students whose main language is not English face many challenges as they acculturate to a largely monolinguistic and often ethnocentric dominant curriculum throughout the U.S.A. Bilingual students who are gifted may find themselves placed in classrooms for English Language Learners that have lowered expectations and concentrate on basic knowledge and comprehension in lower levels of thinking and learning. Their cultural, linguistic and ethnic specific gifts and talents may be obscured or even ignored in these programs and services for English as a Second Language.

It is rare to find ESOL Gifted services. Typically, no accommodations are made for their giftedness and there may not be opportunities to develop their gifted abilities in their own language. Educators of both gifted students and bilingual students expressed their concern that a tremendous part of their students might be "untapped, uneducated, and ultimately lost" (Riley, Kent McGuire, Hammond, & Hearn Dorfman, 1998). This is of major concern, considering that the Jacob K. Javits Gifted and Talented Students Education Act of 1994 (Javits Act), the only federal program, was ultimately created to serve the special needs of gifted and talented students, particularly students of underrepresented groups including bilingual students. This Program encourages research, program development and evaluation. One of the Javits Act's highest priorities is described as: "Identifying and serving gifted and talented students who may not be identified and served through traditional assessment methods (including economically disadvantaged, individuals of limited-English proficiency, and individuals with disabilities)". (U.S. Department of Education, 2000; National Association for Gifted Children, 2008a)

Challenges Faced by Bilingual Gifted Students

The USA dominant culture is largely monolinguistic and in transition to a more multicultural curriculum that ensures equity for marginalized groups, including bilingual students. Federal legislation ensures the right of bilingual students to an appropriate education (Bilingual Education Act of 1968). Few schools and counties offer bilingual education programs in their own language - most are transitional to English. This is further complicated by the fact that high percentages of students identified as Limited English Proficient (L.E.P.) come from low-income backgrounds and face additional challenges. In addition, bilingual students are largely immigrants or migrants who face acculturation challenges and xenophobia. The reality is also that most teachers come from the dominant culture and may not be trained in teaching bilingual students nor in skills of intercultural competence.

Cultural Bias in Assessment and Identification

It is clear that the current educational system does not serve the diverse group of ELL or LEP students (Crawford, 2004). Identifying potential giftedness in bilingual students remains difficult, because of their differing linguistic and culture background and different levels of proficiency in the English language (Kogan, 2001).

According to Sattler (1992) "No test can be created that will entirely eliminate the influence of learning and cultural experiences. The test content, the materials, the language in which the questions are phrased, the test directions, the scoring criteria, and the validity criteria are all culture bound." Kogan (2006) p. 26

One of the goals of the No Child Left Behind (NCLB) Act is to close the achievement gap that exists between disadvantaged and minority students and their fellow students. (George, 2002). Another goal is to improve the reading ability of students to grade level according to the norms on statewide reading tests. These goals set high academic standards for reading, mathematics, and science for all students, and conduct assessments every year to be able to keep track of progress (AYP -

Annual Yearly Progress). Schools are held accountable for this progress, and could be cut from funding if they are not able to comply with these standards for four years. The NCLB policy also includes the reauthorization of the Javits Act as Title V, Part D, Subpart 6 (Elementary and Secondary Education Act, 1965). Under this policy gifted and talented are defined as "students who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services or activities not ordinarily provided by the school in order to fully develop those capabilities" (U.S. Department of Education, 2008a).

The U.S. Department of Education funds grants, sponsors a national research center on the research of gifted and talented students' education, and provides leadership (U.S. Department of Education, 2008a). According to the National Association for Gifted Children (NAGC) most decisions and funding are made on state level and conform to federal law regulations developed to serve limited English Proficiency (LEP) students. A LEP student was defined as a student with limited proficiency in English who had attended schools in the United States for less than twelve months. Local Educational Agencies provide students with a proper instruction in the English language to improve their proficiency and knowledge of the English language.

Educating Bilingual Students In Florida

The State of Florida is an interesting state to observe for its English language learners (ELL) and their education, since 9 percent of all the students in Florida are enrolled in ELL programs. In the academic year 2006/2007 Florida counted 234,934 ELL students of the 2,689,176 students in total (Florida Department of Education, 2007a). In Florida, a student is defined as an LEP student if a student speaks a language other then English and whose "English aural comprehension, speaking, reading, or writing proficiency is below the average English proficiency level of English speaking students at the same age and grade" (Florida Department of Education, 1998). The state has required that every LEP student should receive proper and comprehensible instruction in every subject and equal admission to all academic opportunities. This also includes access to exceptional education, like gifted programs.

Students are considered gifted in Florida when they have "superior intellectual development and are capable of high performance" (Florida Department of Education, 2002). There must be: a need for a program, evidence on a scale or checklist of a majority of typical traits of gifted students, and an intelligence score of two or more standard deviations above the mean. However, for students that are members of an underrepresented group, like LEP students, the criteria differ slightly. This is called Plan B, and has greater flexibility toward these students on behavioral fields, social competency, motivation, creativity, and on cut-off scores to identify giftedness. After the student has been screened by a teacher through techniques and tools like parent interview, academic assessment, academic skills that do not depend on proficiency in English, student interview, and observations, the school will decide if the student is in need for an evaluation by a certified (bilingual) school psychologist, who will conduct an intelligence assessment . When the student is eligible for placement in a gifted instruction program, access to an appropriate program or services will be provided in the district (Florida Department of Education, 1998; Florida Department of Education, 2002). According to VanTassel-Baska, Johnson, and Avery (2002) standardized tests are less suitable for the purpose of assessing intelligence in LEP students.

Florida's response to the high standard norms required by the NCLB policy is the Florida Comprehensive Assessment Test (FCAT). The FCAT measures the growth of knowledge through education in the domains of reading, writing, mathematics, and science. However, it fails to consider the inequalities of phenomena in the daily life of the students, like poverty, race, ethnicity, etc. (Kent, 2007; Florida Department of Education, 2007b). Crawford (2004) found that it is difficult for all students to live up to their potential, when every student has to comply with the same standard norms, assessed with the same instrument. This is particularly true for ELL students, who are a diverse group in terms of language and culture, socioeconomic status, education level and English proficiency level. Another reason is the inconsistency in time these children need to learn a second language (Crawford, 2004). In other words, not all ELL and bilingual students have the same background and learn to read English in the same way and so it is a difficult task for them as a group to comply with the high standards set by the NCLB policy.

Bilingual Reading Scores

Jiménez, García, and Pearson (1996), who preferred to consider bilingualism as a potential strength, came to a similar conclusion concerning the reading process. Differences in the reading success in bilingual children mainly appeared in the use of reading strategies and the level of metacognition – the knowledge readers have about themselves, the task and reading strategies. For example, successful bilingual readers used the knowledge of their first language (Spanish) to comprehend the second language (English). Moreover, besides the fact that bilinguals experience two or more cultures, Baker and Jones (1998) describe the advantage of having two or more words for every concept. This may create more creativity and flexibility in thinking compared to children that speak one language only (monolinguals), especially when bilinguals are reasonably well proficient in both languages. Additionally, Bialystok, Martin, and Viswanathan (2005) conclude that using two languages throughout life enhances the ability to execute a basal cognitive process. Results showed that bilinguals outperform monolinguals in controlling their attention during exposure to misleading information. In other words, being able to master two languages could have considerable cognitive benefits.

Masking Giftedness

The reality is therefore, that a singular concept of "gifted" is often determined by standardized assessments in English. Diverse cultural concepts of giftedness may not be recognized, nor valued in the dominant culture. English competence takes precedence and competence in one or more languages is not viewed as an asset. In the identification of their linguistic competencies, their talents and abilities in their own culture and language may not be evident. Misconceptions about ability cause stereotypical reaction to accents or diverse cultural expressions, motivations and values and may be interpreted as lower ability. In addition, many students may struggle to understand local American-English accents and basic learning procedures, and may be seen as non-responsive. Within this context, the classroom expectations, learning styles, evaluation and standards may be different from their home country. Bilingual students who are immigrants face acculturation challenges as they adjust to new cultural norms and a dominant culture curriculum. These bilingual students are largely from minority ethnicities with diverse cultural perspectives that are different from the dominant culture. In many minority cultural perspectives: time is fluid; more authoritarian; collective; collaborative; naturalistic; and roles are clear. They have to learn to adjust to the dominant cultural perspectives: strict schedules; interactive communication; individualistic, competitive; controlled environment; ambiguous roles. Another challenge is that parents or peers from these marginalized groups may not have the same aspirations or values as the school regarding academic achievement.

Equity or excellence

Cultural and linguistic minorities are underrepresented in gifted education programs throughout the USA (due to test bias, low referrals, deficit-based views, underachievement).

"Ultimately we must decide what we want gifted education to be. Do we really want to trade our focus on and support of intellectual excellence for one that seeks to achieve equal representation under any conditions? Disparity cannot be completely alleviated through changes in either the definition of giftedness or the identification process. Here is the dilemma of excellence versus equity. Why shouldn't we strive for both? To optimize brain development, it will take a long-term effort requiring systemic change in the belief systems and cultural practices that shape early learning and child rearing" (Clark, 2006, p.345).

Placement of Bilingual Gifted Students

Bilingual students are assessed for English competence and placed in varying levels according to their individual profile. However, many bilingual programs carry lower expectations and focus on lower levels of thinking as few teachers have been trained in bilingual gifted education. Inappropriate placement in Bilingual Education Programs or services may neglect their gifted abilities. This approach may ignore a broadened view of giftedness focusing only on general intellectual ability and may not give support for acculturation needs or a culturally responsive curriculum. Ideally, students should be assessed using multiple measures that include: standardized tests in their home language,

alternative performance assessments ("Discover" Maker, 2007); portfolio; demonstrations; observations, qualitative measures from their own culture. Identified students are placed in a Bilingual Education Program that allows them full access to an enriched and accelerated curriculum in both languages. The curriculum would be differentiated according to their individual profile and their cultural positives with opportunity for higher-level independent research. There would be maximum challenges for productivity with equal opportunity to learn in both languages, easing the transition to dominant culture and language.

Appropriate Teaching Strategies for Bilingual Gifted:

- Use multiple sources of information - concrete examples, visual imagery, illustrations, online translations to explain higher level concepts;
- Offer "How-to" methodology for developing acculturation and competencies needed with tutoring or mentoring;
- Use cultural positives and creative problem solving to motivate (Torrance, 1977);
- Infuse a constructivist perspective that allows students to share and manifest their own cultural examples, themes, and issues and develop their own abilities, interests and talents;
- Allow practice in conflict resolution and exploration of cultural differences;
- Develop specific counseling programs to support self-esteem needs; and
- Include parents and community members from their culture in curriculum projects.

Research Objectives

In the light of this knowledge, the potential strength of bilingual students posed by Jiménez et al. (1996), and the issues raised by the NCLB policy, the present research focused on the differences between development of achievement in reading ability of bilingual students and monolingual students, measured by the FCAT. The assumption was that bilingual students would outperform monolingual students in the area of reading comprehension. Another focus of the research is bilingualism and the high achieving or gifted student. Therefore, the second assumption was that bilingual gifted students would outperform monolingual gifted students in the area of reading comprehension.

The following questions were examined:

Research question 1a: Are there differences between the reading level of gifted monolingual English students and the reading level of gifted bilingual students?

Research question 1b: Are there differences between the reading level of non-gifted monolingual English students and the reading level of non-gifted bilingual students?

Research question 2: Are there difference among the reading level of gifted monolingual English students and the reading level of gifted bilingual (Spanish-English; Portuguese-English; Chinese-English; Vietnamese-English; other languages-English) students?

Research question 3: Are there difference among the reading level of gifted students and the reading level of non-gifted students?

Research question 4a: Are there differences between the reading level of gifted monolingual students and the reading level of gifted bilingual students across grade levels?

Research question 4b: Are there differences between the reading level of non-gifted monolingual students and the reading level of non-gifted bilingual students across grade levels?

Description of Sample: Students from Orange County, Florida, U.S.A.

Research was conducted in a school district in Central Florida (U.S.A.) on the reading achievement in gifted versus non-gifted 3rd, 4th and 5th grade bilingual and multilingual second language learners. Orange County is the largest district in Central Florida, and it serves a diverse urban community. Orange County Public schools counted 137 languages/dialects spoken by students in this district in 2006. In 2006 Orange County counted 120 public elementary schools, and at the start of the school year 2006/ 2007 123,287 students were enrolled in pre-kindergarten, kindergarten, or 1st to 8th grade (Metro Orlando Economic Development Commission, 2007). These demographics are an important reason for investigating how Orange County in Florida served its bilingual gifted students.

The sample consisted of third, fourth and fifth grade students (N=41,562) of public schools in Orange County, Florida, and included gifted and non-gifted children, that were either monolingual (speaking English as a first language) or bilingual (speaking a language other than English as a first language). They keep track of English language learners (ELL), not whether students are bilingual or not, but most students that were receiving English for Speakers of Other Languages services (ESOL services) were bilingual. Therefore, the students enrolled in an ESOL program, were considered to be the bilingual students in this study. The group of gifted students consisted of 1371 male students and 1307 female students, of which 1,939 were monolingual, and 739 were bilingual. ESOL services were provided for 523 gifted students, 201 gifted students were tested for ESOL services but were not found eligible, and for 1,954 gifted students there was no need for ESOL services or testing. These gifted students included 535 students that were 10 years old, 879 students were 11 years old, 946 students were 12 years old, 309 students were 13 years old, and one student was 14 years old. Most of the gifted students were speaking English as their first language (1939). The group of students that spoke Spanish as their first language consisted of 422 students. There was a group of 33 students speaking Portuguese as their first language, 55 students speaking Vietnamese as their first language, and the group of students speaking Chinese as a first language consisted of 33 students. The remainder of 196 students spoke another language: French, Albanian, German, Polish, Swedish, Catalan, Georgian, Dutch, Turkish, Italian, Czech, Greek, Rumanian, Japanese, Korean, Tamil, Thai, Eyak, Laotian, Malayalam, Mandarin, Arabic, Hebrew, Malagasy, Kazakh, Tagalog, Indonesian, Haitian Creole, Jamaican Creole, Urdu, Hindi, Bengali, Sindhi, Punjabi, Russian, Singhalese, Lithuanian, Afrikaans, Patwin or other languages.

The non-gifted monolingual group of students included participants that spoke English only, and consisted of 29,969 male and female students. The non-gifted bilingual group of 8915 students were able to speak English or learning to speak English (English language learners) as a second language and as a first a language mentioned above.

Methodology

The research in this study was conducted on data of students provided by Orange County Public Schools. To determine the intelligence level of the students varying intelligence tests and methods were used. For instance, the Wechsler Intelligence Scale for Children, IV (WISC-IV, 2003), Differential Ability Scale, second edition (DAS-II, 2006), Stanford-Binet V (2003), and the Universal Non-verbal Intelligence Test (UNIT, 1998). Orange County Public Schools provided information on the intelligence level of students, stating that students were gifted or not.

The test that was used to determine the degree of reading comprehension was the Florida's Comprehensive Assessment Test (FCAT) developed by the state of Florida (Florida Department of Education (2007b), which measured particular benchmarks in reading, mathematics, science, and writing. For the purpose of this study only the reading scores were used. By means of the following benchmarks the FCAT determined if third, fourth, and fifth grade students were reading according to the state norms for reading, referred to as the Sunshine State Standards (Florida Department of Education, 2007b). Students had to be able to use basic strategies to enhance their vocabulary, to determine what a text means, and to define word relationships. The students had to read literary texts (i.e. short stories, literary essays, poems, etc.) and informational texts (i.e. magazines and newspaper articles, informational essays, advertisements, etc.) and answer 50 to 55 questions. Students in the third and fifth grade were given multiple choice questions only, choosing from four possible responses. The time given to finish the FCAT reading was 120 minutes. Students in fourth grade were given multiple choice questions with four possible responses, and performance tasks. The performance tasks included short-response questions (a single number or a set of numbers) and extended-response questions (an example of a response). Fourth grade students had 160 minutes to finish the test. The FCAT is only available in English, but for ELL students or handicapped students some help was allowed, for instance: the teacher was allowed to help the ELL student understanding the instruction in the student's first language, and also, the use of dictionaries containing translation of words without definitions, in the student's first language was granted (Florida Department of Education, 2007d).

This test has to be assessed by public schools throughout the state at the end of every school year, therefore data on the reading scores of 2007 of the students, presented by Orange County Public Schools, were used to answer the research questions of this study.

Procedure

In this study the data that was provided by Orange County Public Schools was used anonymously. The data on the background information, reading scores, and level of reading of the gifted students was put into a statistical analyses software program (SPSS). Background information, reading scores and level of reading of non-gifted students was obtained from Orange County Public Schools (Florida Department of Education, 2007c). Because gifted students could be enrolled in an ELL program or in the standard curriculum they were extracted from these programs by means of removing the number of gifted students per grade and per reading level. A new mean was created for the non-gifted bilingual students, and the non-gifted monolingual students. After collecting all the information, the data was analyzed in SPSS. To determine the differences between the reading scores of the bilingual/monolingual gifted and bilingual/monolingual non-gifted students and their background factors t-tests, analyses of variances, and factor analyses were conducted.

Preliminary Findings

There is a significant difference between the reading scores of gifted monolingual students and gifted bilingual students: The reading scores of students speaking English as a first language were significantly higher than those of students speaking a first language other than English (Table 1).

Table 1: Reading scores of gifted monolingual students and gifted bilingual students.

	Mean	SD	Sig.
First Language			
1. English	385.67	39.66	*.002
2. Other than English	380.28	41.53	
Total	384.19	40.25	

There is no significant difference between the reading level of gifted monolingual English students and the reading level of gifted bilingual (Spanish-English; Portuguese-English; Chinese-English; Vietnamese-English; other languages-English) students (Table 2).

Table 2: Reading level of gifted monolingual English students and the reading level of gifted bilingual students. (Spanish-English; Portuguese-English; Chinese-English; Vietnamese-English; other languages-English).

	Mean	SD	Sig.
First language			
1. English	385.67	39.664	.001
2. Spanish	376.09	41.179	
3. Portuguese	388.42	40.771	
4. Vietnamese	381.16	35.591	
5. Chinese	387.88	57.343	
6. Other	386.40	40.066	
Total	384.19	40.251	

After making multiple comparisons (Bonferroni) it became clear that the difference was significant between students with English as a first language and students with Spanish as a first language (p =.000). Further the difference between students with English as a first language and students in the language group 'Other' was significant (p =.045). It appeared that there were no significant differences between students with English as a first language and students speaking Portuguese, Chinese or Vietnam as a first language.

There is a significant difference between the reading level of gifted students and the reading level of non-gifted students. The reading scores of gifted students were higher than the reading scores of non-gifted students (Table 3).

Table 3: Reading level of gifted students and the reading level of non-gifted students.

Gifted or non-gifted	Mean	*F*	Sig.
1. Gifted	384,19	106,92	*.000
2. Non-gifted	301		

There are significant differences between the reading level of gifted monolingual students and the reading level of gifted bilingual students across grade levels (Table 4).

Table 4: Reading level of gifted monolingual students and the reading level of gifted bilingual students across grade levels. Grade: scaled score reading * Language in English vs Non-English.

ANOVA

		Sum of Squares	df	Mean Square	*F*	Sig.
Scaled score reading	Between Groups	72498.755	2	36249.378	22.737	.000
	Within Groups	4263052.602	2674	1594.261		
	Total	4335551.357	2676			
language 2 categories	Between Groups	.004	2	.002	.011	.989
	Within Groups	535.067	2675	.200		
	Total	535.071	2677			

Multiple Comparisons

Bonferroni

Dependent Variable	(I) Grade	(J) Grade	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Scaled score reading	3	4	6.325*	1.936	.003	1.69	10.96
		5	12.873*	1.913	.000	8.29	17.46
	4	3	-6.325*	1.936	.003	-10.96	-1.69
		5	6.548*	1.840	.001	2.14	10.96
	5	3	-12.873*	1.913	.000	-17.46	-8.29

		4	-6.548*	1.840	.001	-10.96	-2.14
language 2 categories	3	4	.00104	.02168	1.000	-.0509	.0530
		5	.00310	.02143	1.000	-.0482	.0544
	4	3	-.00104	.02168	1.000	-.0530	.0509
		5	.00206	.02061	1.000	-.0473	.0514
	5	3	-.00310	.02143	1.000	-.0544	.0482
		4	-.00206	.02061	1.000	-.0514	.0473

*. The mean difference is significant at the 0.05 level.

Discussion of Findings

As could be expected, the scores of gifted students on reading exceed those of non-gifted at a significant level. The reading scores of monolingual gifted students were significantly higher than bilingual gifted; a finding that is contrary to the view that bilingual students would have additional skills from the second language that would aid in their reading. However, it appears that to group all students in one "bilingual group" is inappropriate; results show that individual linguistic groups differ. Hispanic gifted students showed significantly lower scores and Asian gifted students showed no significant differences to monolingual gifted. This finding is supported by data that show that Asian students are overrepresented in gifted programs in the U.S.A. (Wallace & Eriksson, 2006). Therefore it is important to examine the ethnic and linguistic preferences of bilingual gifted students in planning appropriately differentiated curriculum.

Conclusions

It is clear that further research is needed to address the needs of students who are both bilingual and gifted. In addition, the needs of these diverse populations and linguistic diversity within the gifted populations are other areas of important research. If we are to meet the individual needs of these students according to their profile of both the strengths in areas of giftedness and challenge their development of English skills, they need both a differentiated as well as a culturally responsive curriculum.

References

Baker, C. & Jones, S. P. (1998). *Encyclopedia of bilingualism and bilingual education*. Clevedon: Multilingual Matters.

Bialystok, E., Martin, M. M., & Viswanathan, M. (2005). Bilingualism across the lifespan: The rise and fall of inhibitory control. *International Journal of Bilingualism*, *9*(1), 103-119.

Crawford, J. (2004). *No Child Left Behind: Misguided Approach to School Accountablility for English Language Learners*. Washington D.C.: National Association of Bilingual Educators.

Florida Department of Education (1998). Assessing Limited English Proficient (LEP) Students for Eligibility for Gifted Programs. Florida Department of Education. Retrieved May 12, 2008, from http://fldoe.org/ESE/pdf/tap99-6.pdf

Florida Department of Education (2002). Rule Title: Special Instructional Programs for Students Who are Gifted. Florida Department of Education. Retrieved May 12, 2008, from http://www.flrules.org/gateway/ruleNo.asp?ID=6A-6.03019

Florida Department of Education (2005). Use of Part Scores with Tests of Intelligence. Florida Department of Education. Retrieved May 14, 2008, from http://www.fldoe.org/ese/pdf/y2005-9.pdf

Florida Department of Education (2007a). Florida Count of Students by English Language Learners (ELL) Status. Florida Department of Education. Retrieved May 13, 2008, from http://www.fldoe.org/aala/pdf/0607ellstatus.pdf

Florida Department of Education (2007b). Understanding FCAT Reports 2007. Florida Department of Education. Retrieved May 16, 2008, from http://fcat.fldoe.org/pdf/ufr_07_cover.pdf

Florida Department of Education (2007c). FCAT Student Performance Results Demographic Report, 2000-2007. Florida Department of Education. Retrieved May 8, 2008, from http://www.fcatresults.com/demog/

Florida Department of Education (2007d). FCAT Released Tests and Questions. Florida Department of Education. Retrieved May 20, 2008, from http://fcat.fldoe.org/fcatrelease.asp

George, P. (2002). *No child left behind: implications for middle level leaders*. Westerville: National Middle School Association.

Jiménez, R. T., García, G. E., & Pearson, P. D. (1996). The Reading Strategies of Latina/o Students Who Are Successful English Readers: Opportunities and Obstacles. *Reading Research Quarterly*, *31*(1), 90-112.

Kent, R. (2007). Contextualizing the FCAT in Florida: A Spatial Investigation of Neo-Liberal Educational Reform. The Florida State University. Retrieved May 16, 2008, from http://etd.lib.fsu.edu/theses/available/etd-03272007175620/unrestricted/fcatthesis05142007.pd

Kogan, E. (2001). Gifted Bilingual Students: A Paradox? New York: Peter Lang.

Metro Orlando Economic Development Commission (2007). Metro Orlando School District Summary 2007. Retrieved May 21, 2008, from http://www.orlandoedc.com/core/file.php?loc=/Documents/EDC%20Documents/Data%20Center/education/Education_K12StatsbyCounty_2007.pdf

National Association for Gifted Children (2008a). Grant Made Under the Jacob K. Javits Gifted and Talented Students Education Program. National Association for Gifted Children. Retrieved May 14, 2008 from http://www.nagc.org/index.aspx?id=1061

National Association for Gifted Children (2008b). All Gifted is Local. National Association for Gifted Children. Retrieved May 14, 2008, from http://www.nagc.org/index2.aspx?id=976

Riley, R. W., Kent McGuire, C., Hammond, P. A., & Hearn Dorfman, C. (1998). Talent and Diversity: The Emerging World of Limited Proficient Students in Gifted Education. U.S. Department of Education. Retrieved May 12, 2008, from http://www.ed.gov/PDFDocs/talentdiversity.pdf

Sternberg, R. J. (1996). The Sound of Silence: A Nation Responds to Its Gifted[A]. *Roeper Review*, *18*(3), 168-173.

U.S. Department of Education (2000). Jacob K. Javits Gifted and Talented Education Program: National Research and Development Center. U.S. Department of Education. Retrieved May 12, 2008, from http://www.ed.gov/legislation/FedRegister/finrule/2000-2/061300b.html

U.S. Department of Education (2006). Title I Improving the Academic Achievement of the Disadvantaged. U.S. Department of Education. Retrieved May 13, 2008, from http://www.ed.gov/legislation/FedRegister/finrule/2006-3/091306a.html

U.S. Department of Education (2008). Jacob K. Javits Gifted and Talented Students Education Program. U.S. Department of Education. Retrieved May 13, 2008, from http://www.ed.gov/legislation/FedRegister/finrule/2008-2/042108c.html

U.S. Department of Education (2008a). Jacob K. Javits Gifted and Talented Students Education Program. U.S. Department of Education. Retrieved May 14, 2008, from http://www.ed.gov/legislation/FedRegister/finrule/2008-2/042108c.html

VanTassel-Baska, J., Johnson, D, & Avery, L. D. (2002). Using Performance Tasks in the Identification of Economically Disadvantaged and Minority Gifted Learners: Findings From Project STAR. *Gifted Child Quarterly*, *46*(2), 110-123.

Wallace, B; Eriksson, G. (2006). *Diversity in Gifted Education: International perspectives and Global Issues*. Oxon, UK: Routledge - Taylor & Francis.

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(A.33)

Successful Intelligence, Cognitive Flexibility and Professional Excellence: A Study in a Portuguese Company

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Abstract
Dissatisfaction with traditional models about professional competence requires a complementary position with social-cognition to take into account the diversity of sources that can cause and explain inter and intrapersonal differences. In order to perceive how people develop professional knowledge and abilities and as they use them in their work, we set up the proposition of studying the interaction between successful intelligence, cognitive styles and cognitive flexibility.
Based on a study with 90 professionals from a Portuguese company, we applied the *Questionnaire of Successful Intelligence, the Questionnaire of Successful Cognitive Styles and the Questionnaire of Cognitive Flexibility,* in order to analyze the multidimensional nature of cognitive dimensions that supports professional competence. Regression analysis (stepwise) supports our analysis in order to understand the influence of successful intelligence, cognitive styles and professional performance on cognitive flexibility.
These findings allow a more specific and significant way to assess and to identify cognitive process characteristics and are a way to promote a new look at human abilities in professional contexts.

Keywords: Successful intelligence; cognitive Styles; cognitive flexibility; professional performance; psychological assessment.

Successful Intelligence, Cognitive Flexibility and Professional Excellence

A closer linking from intelligence to culture, the learning and the personal experiences of the individual are being more and more claimed (Almeida, 1996; Candeias, 2001; Gardner, 1983; 2000; Sternberg, 1985, 1999, 2000, 2003, 2005). This need is claimed by the scientific community in the field of Psychology as well as by people, groups and institutions in general.

The traditional concept of intelligence, sustained through a factor g, translatable in the intelligence quotient, or in multifactor approaches, subsists in the present, and is strengthened by a century of empiric studies (Gottfredson, 1988, 2002, 2003, 2004, 2005). There are several studies that correlate the results obtained in IQ tests with good academic and professional performance (Gottfredson, 1988; Kuncel, Hezlett & Ones, 2004; Salgado Anderson, Moscovo, Bertua, Fruyt & Rolland, 2003; Schmitdt & Hunter, 1988, 2004; Schmidt, Hunter, Outerbridge & Goff, 1988).

If intelligence is what IQ tests measure why don't all individuals with high IQ have professional success? Do we need an intelligence concept that goes beyond cognitive components? Some studies suggest that intelligence tests explain only 25% of the variance in school success and 25 to 29% in professional context (Afonso, 2002, 2005; Neisser, Boodoo, Bouchard_Jr, Brykin, Ceci, & Halpern 1996). Even if we don't take into account the enormous amount of variance that is not explained, considering IQ as a predictor of academic and professional performance, this matter is not explained, the issue is just statistically stated (Ceci, 2000).

We consider urgent to assume a dynamic construct of intelligence, being understood as a developing experience or expertise (Sternberg & Grigorenko, 2003; ternberg & Hedlund, 2002), in which the focus is placed in the cognitive modifiability (Candeias & Almeida, 2005). In this context intelligence should be considered as a capacity of adaptation of the individual to the contexts and not a fixed entity. We presume that such adaptive or practical intelligence has a significant association with cognitive flexibility. Some studies sustain the hypothesis that cognitive flexibility depends on the processes of attention (Cañas et al., in press), others are sustained by the hypothesis that cognitive flexibility can also depend on the knowledge it represents (Azevedo, 2005; Cañas et al., in press). The theory of cognitive flexibility (Spiro, 1991 a,b; Spiro et al., 1988; Spiro & Jehng 1990) presupposes that this competence can be developed in contexts structured for that end. But that depends on the knowledge being taught in a flexible way and with several "points of entrance" for each theme. If it goes like this, the knowledge will be equally represented in a flexible way and easily transferred to different situations from the ones where it was learned.

In summary, we understand cognitive flexibility as a superior cognitive function that integrates the following dimensions: (i) capacity to (re)interpret situations, (ii) capacity to restructure knowledge (iii) intrinsic motivation to learn and, (iv) capacity to develop strategies or functional behaviours.
More specifically, we hypothesized that successful intelligence, cognitive styles and professional performance are predictors of cognitive flexibility, as well as, of the individual's capacity to apply knowledge and competences, in order to understand the influence of successful intelligence, cognitive styles on cognitive flexibility.

Method

Participants

This study was carried out in enterprise and academic environments with samples of convenience. The application of the questionnaires occurred in the months of October and December of 2006, in the Superior School of Technology and Management of Portalegre (ESTGP) and in a Portuguese Company. In the ESTGP we worked with three different samples (two of pupils and one of teachers), in the Portuguese Company with a sample of 91 persons (all with management functions).

Procedure

The administration of the questionnaires took place during a single session and in the presence of the researcher. Responses to the questionnaires were provided on a totally voluntary basis. Collected data are analyzed through SPSS 16.

Measures

– **Successful intelligence: Questionnaire of Successful Intelligence** (API(q), Guerra, 2006). This instrument is made up of 55 items and provides an indicator of perceived adaptive intelligence levels. The participants are requested to evaluate the extent to which they agree with each of the items on a 5-point Likert-type scale that ranges from "Strongly disagree" (1) to "Strongly agree" (5). Guerra (2006) found an internal consistency of .92 for Total API(q), and a great construct validity, made by factorial analysis, that favour a global score in the API(q), improving the full version properties of the questionnaire.

– **Cognitive flexibility: Questionnaire of Cognitive Flexibility** (EEP, Guerra, 2006). This instrument is made up of 27 items and provides an indicator of perceived adaptive intelligence levels. The participants are requested to evaluate the extent to which they agree with each of the items on a 5-point Likert-type scale that ranges from "Strongly disagree" (1) to "Strongly agree" (5). Guerra (2006) found an internal consistency of .85 for Total EEP, and a great construct validity, made by factorial analysis, that favour a global score in the EEP.

– **Styles of Thought: Questionnaire of Successful Cognitive Styles** (EFC, Guerra, 2006). This instrument is made up of 48 items and provides an indicator of perceived adaptive intelligence levels. The participants are requested to evaluate the extent to which they agree with each of the items on a 5-point Likert-type scale that ranges from "Strongly disagree" (1) to "Strongly agree" (5). Guerra (2006) found an internal consistency of .94 for Total EEP, and a great construct validity, made by factorial analysis, that favour a global score in the EEP.

Analysis and discussion of results

Considering cognitive flexibility as the dependent variable (considering the total score obtained in the EFC) and the variables Successful Intelligence (API(q)) and Styles of Thought (EFC), and Professional Variables (Last promotion, Last performance classification, Years of experience and Special Training to be leader), as well as, the age, as independent variables, we've using the stepwise procedure to do analysis of regression. The final model of predictors retained just one variable, corresponding to the total in the API (q). The analysis of table 1, show a value R2 = .665 (F = 28,814, p <.001). In table 1, we present the regression coefficients (beta coefficients), the values of statistics t

and p, for the variable that enters in the equation, as well as the *part correlation* (r part.) and the coefficient of determination (R2).

Table 1: Analysis of regression (Cognitive Flexibility).

Predictors	R2	Beta	t	Signif.	r part
API(q)	.665	,830	5,368	.000	66,5%

API (q) test contributes with 66.5% in the explanatory model of performance in Cognitive flexibility. Considering the results of the regression analysis, self-perception of intelligence appears as being a predictor of cognitive flexibility. Therefore, we consider the hypothesis proven: practical and successful intelligence, or the cognitive ability to develop and apply knowledge and skills, is predictive of flexibility of the individuals'. Such results are in accordance with theoretical models that propose a necessary and useful construct of practical, adaptative and successful intelligence to understand professional performance (Neisser, Boodoo, Bouchard_Jr, Brykin, Ceci, & Halpern 1996), and the process of intelligence as a process of developing experience (Afonso, 2002, 2005; Sternberg & Grigorenko, 2003). In the other hand, that results suggest that cognitive flexibility depends from the individual´s self perception of its own abilities and competences to cope with everyday problems, suggesting that cognitive flexibility depends on the knowledge being taught in a flexible way that the knowledge will be equally represented in a flexible way and easily transferred to different situations from the ones where it was learned, as Cañas et al. (in press) and Azevedo (2005) proposed.

In summary, the study we carried out opens this study contributed for the construction of a new understanding of human abilities, facilitators in proficient interaction in professional contexts. Otherwise, new possibilities to psychological practice, namely at the level of psychological assessment of adults and professional development and education. It specially opens up new possibilities for the evaluation and the diagnosis of the process of strategies used in daily processes of problem solving, decision making and leadership in professional contexts.

References

Afonso, M. (2002). Inteligência Funcional: Aspectos heurísticos e hermenêuticos do constructo. *Revista Portuguesa de Psicologia, 36*, 9-24.

Afonso, M. (2005). A "Inteligência Funcional" e a Amostragem de Funções: A versão portuguesa do STAT-R (H) (2004) no Panorama Internacional. In A. Candeias (Coord.). *Actas do I Simpósio Inteligência Humana – Investigação e aplicações*. Évora: Universidade de Évora (CD-ROM).

Almeida, L. (1996). Cognição e aprendizagem: Como a aproximação conceptual pode favorecer o desempenho cognitivo e a realização escolar. *Psicologia: Teoria, Investigação e Prática*, *1* (1)17-32.

Azevedo, A. L. (2005). Competências transversais: O caso da flexibilidade. *Formar, 50*, 57-63. Lisboa: IEFP.

Cañas, J., Quesada, J. & Antoli, A. (1999). Flexibilidad del conocimiento implícito. *Psichotema*, *11* (4), 901-916.

Cañas, J., Quesada, J., Antoli, A. & Fajardo, I. (2003). Cognitive Flexibility and adaptability to environmental changes in dynamic complex problem-solving task. *Ergonomics Science*, *46* (5), 482-501.

Cañas, J., Antoli, A., Fajardo, I & Salmerón, L. (2005). Cognitive inflexibility and the development and use of strategies for solving complex dynamic problems: effects of different types of training. *Ergonomics Science*, *6* (1), 95-108.

Cañas. J., Fajardo, I. & Salmeron, L. (no prelo). Cognitive flexibility. *Ergonomics Science, 10* (2), 94-108.

Candeias, A. (2003). *A (s) Inteligência (s) que os testes de QI não avaliam*. Évora: Universidade de Évora.

Candeias, A. & Almeida, L. S. (2005). Competência social: A sua avaliação em contextos de desenvolvimento e educação. *Psicologia, Educação e Cultura*, *9* (2), 359-378.

Ceci, S. (2000). So near and yet so far: lingering questions about the use of measures of general intelligence for college admission and employment screening. *Psychology, Public Policy, and Law, 6* (1), 233-252.
Correia, A. (2003). *A flexibilidade nas empresas*. Lisboa: Edições Sílabo.
Gardner, H. (1983). *Frames of Mind*. New York: Basic Books.
Gardner, H. (1989). *The open minds: Chinese clues to the dilemma of contemporary education.* New York: Basic Books.
Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.
Gottfredson, L. S. (1998). The General Intelligence Factor. *Scientific American*, *2* (1) 24-29.
Gottfredson, L. S. (2000). Skill gaps, not tests, make racial proportionality impossible. *Psychology, Public Policy, and Law, 6* (1), 129-143.
Gottfredson, L. S. (2002). Dissecting practical intelligence theory Its claims and evidence. *Intelligence, 30*, 1-55.
Gottfredson, L. S. (2003). On Sternberg's "Reply to Gottfredson". *Intelligence, 31*, 415-424.
Gottfredson, L. S. (2004). Intelligence: Is It the Epidemiologist's Elusive "Fundamental Cause" of Social Class Inequalities in Health? *Journal of Personality and Social Psychology, 86*(1), 174-199.
Gottfredson, L. S. (2005). What if the hereditarian hypothesis is true? *Psychology,Public Policy, and Law, 11*(2), 311-319.
Kuncel, N., Hezlett, S. & Ones, D. (2004). Academic performance, career potential, creativity, and job performance: can one construct predict them all? *Journal of Personality and Social Psychology, 86*(1), 148-161.
Neisser, U., Boodoo, G., Bouchard_Jr., T. J., Boykin, A. W., Ceci, S. J., Halpern, D. F., & cols (1996). Intelligence: Knows and Unknowns. *American Psychologist, 51(2), 77-10.*
Salgado, J., Anderson, N., Moscoso, S., Bertua, C., Fruyt, F. & Rolland, J., (2003). A Meta-Analytic Study of General Mental Ability Validity for Different Occupations in the European Community. *Journal of Applied Psychology, 88*(6), 1061-1081.
Schmitdt, F. & Hunter, J. (1998). The validity and utility of selection methods in personnel psychology: practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124*(2), 262-274.
Schmitdt, F. & Hunter, J. (2004). General mental ability in the world of work: occupational attainment and job performance. *Journal of Personality an Social Psychology, 86*(1), 162-173.
Schmitdt, F., Hunter, J., Outerbridge, A. & Goff, S. (1988). Joint relation of experience and ability with job performance: Test of three hypotheses. *Journal of Applied Psychology, 73*(1), 46-57.
Spiro, R., Coulson, P. & Feltovich, D. (1988). *Cognitive flexibility theory: Advanced knowledge acquisition in ill- structured domains*. New Jersey: Lawrence Erlbaum Associates.
Spiro, R. & Jehng, J. (1990). Cognitive flexibility and hypertext: theory and technology for the nonlinear and multidimensional traversal of complex subject matter. In Don Nix & R. Spiro (Eds) *Cognitions, Education, and Multimedia: Exploring ideas in High Technology* (162-205). Hillsdale, NJ. Lawrence Erlbaum Associates.
Spiro, R., Felttovich, P., Jacbonson, M. & Coulson, R. (1991a). Cognitive flexibility, constructivism, and hypertext: random acess instruction for advaced knowledge acquisition in ill-structured domains. *Educational Technology*, *31* (5), 24-33.
Spiro, R., Feltovich, P., Jacobson, M., Coulson, R. (1991b). Cognitive flexibility constructivism, and hypertext: random access instruction for advanced knowledge acquisition in ill-structured domain. *Educational Technology*, *31*, 24-33.
Sternberg, R. (1985). *Beyond IQ*: *a thiarchic theory of human intelligence*. New York: Cambridge University Press.
Sternberg, R. (1999). The theory of successful intelligence. *Review of general Psychology*, *3*, 292-316.
Sternberg, R. (2000). *Inteligência para o sucesso pessoal: como a inteligência prática e criativa determina o sucesso* (trad. port.; Ed. Original,1996). Rio de Janeiro: Campus.
Sternberg , R. (2003). What Is an "Expert Student?" *Educational Researcher, 32*(8), 5-9.
Sternberg, R. (2005). *Inteligência de sucesso: Como a inteligência prática e criativa são determinantes para uma vida de sucesso*. Lisboa: Esquilo Edições & Multimédia.

Sternberg, R. & Grikorenko, E. (2003). *Evaluación dinámica del potencial de aprendizaje.* Barcelona: Paidos.
Sternberg, R. & Hedlund, J. (2002). Practical Iintelligence, g, and Work Psychology. *Human Performance*, *15*, 143-160.

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Banishing Barriers and Borders: 21st-Century Classroom Technology and the Changing Face of Students and Professors

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Abstract
The 21st century celebrates the idea of education without borders. Two increasingly pressing challenges we face as we craft post-secondary education in a flattened global digital economy are: how do we reach and teach the millenials efficiently and effectively? And where and how are we going to find qualified professors to teach the 100 million students who seek college degrees in a world where only one in six humans live in a developed nation? Education, especially higher education, must leverage all that technology can provide to prepare students and professors for the challenges ahead. Using new technology, we are boldly inventing new paradigms. The Internet and distance learning are mere building blocks that have spawned futuristic technologies that erase physical borders. We are now teaching the Web 2.0 generation—where social networks, open source software, and global collaboration drive rapid and constant change. The so-called "smart" classroom is becoming a standard setting for education, and interactive video and telepresence are pushing innovation and presenting opportunities to meet the emerging complexities of 21st-century teaching and learning environments. As educators and researchers, we have an obligation to understand and utilize the best practices for teaching with technology while envisioning and developing the technologies that will be commonplace tomorrow.

Introduction

Two increasingly pressing challenges we face as we craft 21st-century post-secondary education in a flattened global digital economy are: how do we reach and teach the millenials efficiently and effectively? And where and how are we going to find qualified professors to teach the 100 million students who seek college degrees in a world where only one in six humans live in a developed nation (Sachs, Jeffery et. al., 2005)? The greatest increase in degree seekers will naturally come from students living in developing nations. As we gear up to teach these 100 million students, a number expected to reach 125 million in 2020 and as many as 200 million by 2030 (United Nations Educational, Scientific and Cultural Organization, 2003), we are inventing new paradigms and erasing old notions of geography. Existing and emerging technologies are embedded in the nascent answers to these two framing questions.

There is little question that today, students worldwide differ dramatically from the generation that preceded them. In America for the past few years we have accepted the estimate that a student entering an American college will have spent 10,000 hours playing video games, sent or received 200,000 e-mails, watched 20,000 hours of television, and talked or texted for more than 10,000 hours on their smart phones. But they will have spent less than 5,000 hours reading from the printed page (Prensky, 2004). As the president of a not-for-profit New York-based university with campuses in the Middle and Far East, as well as online, I can share that the students who enter our university in those regions or the students from 98 nations who come to us in New York are not all that different when it comes to living in a digitally connected world. This trend of constant multimedia communication and activity will only accelerate for the students who follow.

We are now teaching the Web 2.0 generation—where social networks, open source software, and global collaboration drive rapid and constant change. Consider that YouTube was founded only three years ago—and now attracts 50 million inbound links from other Web sites (Top 25 Web 2.0 sites, 2008).

Clearly, the 21st-century teaching and learning process has to evolve to reach this multimedia, multitasking, multi-linked mobile generation of students. If not, we will be committing intellectual and academic fraud by choosing channels of communications that are "so last-century" that they are ineffective and a major disconnect with our audience. A professor with his or her back to the class writing on a chalk or white board is not going to cut it. We must adopt the technology that tomorrow's students know, the technology that will allow us to connect more closely with them. And in doing so,

we will begin to see dramatic changes that will reach beyond the physical classroom. We will see a redefining of what a classroom is, and we will experience the shifting and expanding boundaries of our institutions, as technology allows us to rethink schools' and universities' role in a wired and wireless global society.

The New Classroom

In the past decade, we've seen an extraordinary change in what constitutes a classroom, as new types of communication modalities redefine the typical learning environment. The classroom today is increasingly infused with technology and devices, with the so-called "smart" classroom becoming a normal part of education.

With no definitive or clear model for what constitutes a smart classroom, many different versions exist and more lie over the horizon. As you probably know, smart classrooms run the current gamut from simple PCs and projectors—and maybe an Internet connection to rooms equipped with multiple videoconferencing connections, lecture archiving systems and to student response systems (SRS), which allow students to anonymously respond to the instructor's questions simply by pressing a button. The aggregate response from the system then allows the educator to change the course of instruction based on the general level of understanding, resulting in an intimate give and take, a session of improvisation where no lecture is ever repeated. At the more sophisticated end of the spectrum, the instructor may wield command over a rich media presentation system, and the students may each have a computer and a rapid link to the Internet. Other scenarios make use of video connections that link the classroom to the outside world. And more of us are using what has been termed by some as the "digital backpack," which allows instructors to collect homework or provide supplementary material and assignments through an electronic device, whether it be in the form of a simple thumb drive or some other highly portable device like a smart phone or iPod. This may also be achieved through tools associated with course management software, such as Moodle or Blackboard with its digital drop boxes and communication distribution applications, which many of our NYIT faculty use. At the June 2008 Worldwide Developer's Conference in San Francisco, Apple CEO Steve Jobs made it a point to demonstrate the iPhone's potential as an educational tool. Clearly, academics are not the only ones who want teachers and students to harness the marvels of new technology.

The "smartness" of the new classroom, in reality, of course, has far less to do with how much technology is available than with how it is used. To emphasize another common but important point, let me quote Lee Shulman (2000), president of the Carnegie Foundation for the Advancement of Teaching. Shulman writes "…[T]echnology is not something you simply plug in," but rather it requires much thinking about how it may best be applied to the classroom, and how the curriculum and methods of instruction should change. The greatest danger is that instructors will continue to do as they have always done, merely replacing the old-fashioned blackboard with slides on an electronic whiteboard, for example, but with little advantage to students. That is certainly a worldwide risk as we transition sometimes reluctant faculty rooted in last-century teaching and learning systems that worked to a rapidly changing new environment with unknown boundaries. Where are we going to get the faculty who can communicate with our students in the languages they speak? Retraining willing, existing faculty is only part of the solution.

Redefining the Boundaries of the Classroom with Video

One major category of technology that is truly redefining the boundaries of the physical classroom is live video. Whereas video in the classroom used to be the equivalent of television viewing, two-way video has opened exceptional possibilities for interactivity.

Some universities are now waking up to a new video opportunity, called telepresence. Though still an emerging and somewhat expensive technology, telepresence systems can potentially unite multiple classrooms and boardrooms into a single, virtual meeting room.

Through a combination of surround sound, high-definition display devices and wide connections, telepresence creates the illusion that students on different continents are seated at one, virtual table with professors or guest speakers—perhaps a corporate executive will beam into an M.B.A. seminar or a best-selling author will debate his or her own works with an English class.

The telepresence experience will eventually leap from university classrooms and corporate offices into the home, as Moore's Law is driving down costs and start-up technology companies such as LifeSize Communications are developing reasonably priced high-definition videoconferencing capabilities to accelerate interest in this emerging opportunity.

Telepresence will also move into mobile devices. At this moment, nearly three-dozen major hardware, software, and telecommunication companies are working with Google to develop an exciting mobile software technology called Android.

When it debuts on smart phones later this year and more broadly in 2009, Android promises to revolutionize—once again—how our students work, play, and learn on their mobile devices.

In some corners of Silicon Valley, Android is considered the open source alternative to Apple's iPhone. But while Steve Jobs directs the iPhone's future, thousands of open source developers across the world will help to influence how Android evolves as a mobile platform for work, play, and education.

At New York Institute of Technology, we aren't waiting for technologies like telepresence and Android to go mainstream. Since the mid-1990s, we have been using video technology in a number of ways to enhance learning. Like an increasing number of universities, NYIT's campuses are equipped with advanced videoconference classrooms that enable us to connect to other institutions around the world through sophisticated two-way video equipment and high-speed data connections.

Many institutions have merely used this technology to bring a conventional lecture to a wider audience. NYIT wishes instead to take full advantage of the interactive nature of two-way video to extend the learning experience beyond the confines of a single classroom. We have for the past decade run more than 130 courses per year simultaneously in the smartest of smart video-conferencing classrooms on our two New York campuses, one in the heart of Manhattan and the other 28 miles away on suburban Long Island, New York.

Our plans are to use this technology to further develop dialogs and true classmate relationships among students from different regions and diverse backgrounds. Beyond engaging students in discussions in individual lectures, we plan to offer full courses where students will have the opportunity to interact regularly with classmates around the world. We have already successfully conducted a real-time business management course with students in Bahrain and New York, further linked asynchronously with online course management content and tools. This fall we plan to offer a political science seminar focused on the American presidential election with students on our campus in Amman, Jordan and in New York.

This active dialog and exchange of ideas offers students highly engaging learning experiences, with the added benefit of cross-cultural connections and new perspectives on the world. In addition to redefining the boundaries of the classroom beyond its physical walls, video technology also redefines the modern university. The university no longer needs to exist as an entity with self-contained branches worldwide. Its many locations can now function as a whole, offering shared experiences and educational opportunities to all students and faculty. This redefining of the global university is at the core of NYIT's mission.

Redefining the Instructor

Smart videoconferencing classrooms can also play a wider role in meeting the increasing demand for highly qualified, highly specialized faculty, especially at the graduate level.

As has been widely publicized over the past year, India's Prime Minister Singh (2007) announced that India will establish 30 world-class universities across the country that "must become" India's "launching pads" for entry into the knowledge economy. And he has added to that plans for eight new India Institutes of Technology and seven Indian Institutes of Management, joining India's most distinguished current class of institutions of higher learning. Simple question: where are the faculty going to come from? They simply do not exist nor are they currently in the pipeline. Add the needs and desires of other developing as well as existing nations and we have an emerging faculty crisis. There are not currently sufficiently established associate or full professors who can be lured to populate so many new or emerging "world-class" institutions. And you cannot be a world-class university without a world-class faculty. MIT and NYIT are not going to surrender our faculties, nor are Harvard or NYU. We won't be outspent or outsmarted. Indeed, we are in the acquisition mode

ourselves. During the current decade at NYIT under my presidency, we have grown our faculty by more than 20 percent. We are always recruiting, always searching to build an ever-better world-class faculty, and from my perspective of 25 years in faculty recruitment, the past 10 of which has included global recruitment, it is increasingly a seller's market globally.

This past April, I participated in an invitation-only Higher Education Summit for Global Development held by the U.S. State Department in Washington, D.C. There was much talk in the hallways and in the seminar rooms of the need for qualified faculty—especially at the graduate level—at emerging universities, most notably in remote or war-torn locations. A number of university presidents from Africa articulated the need for research faculty in agriculture to help better educate a generation on how to feed a hungry population more efficiently and cost-effectively. They simply did not know where to find such faculty—there are not that many globally—and were especially appreciative of short-term visits or joint research projects with faculty from agricultural schools and programs in America and elsewhere.

What is emerging as a solution is shared faculty among universities, and live videoconferencing abetted by asynchronous Internet connections can provide access to such talent.

At NYIT—where in engineering and business we compete not just with other universities around the country for talent but with business and industry, which often have deeper pockets—we have been able to fill multiple needs for faculty with a single faculty member using our videoconferencing classrooms. On one end of the spectrum, we can have an established research professor, say in such a high-demand area as computer security, who teaches a graduate course on our two New York campuses simultaneously. In the humanities, for example, we can retain a world-class authority on Shakespeare and provide students on our two New York campuses—and soon all our sites around the globe—with the rich opportunity to study with this person.

Shared Knowledge and the Instructor

Changes in our world have caused educators to rethink where knowledge truly comes from and who has knowledge to share. In addition to the important core knowledge that has long been a part of the curriculum, modern educators have realized. there is much knowledge that can be shared by those who are not traditionally instructors. Looking for new tools to address this, educators have also realized that Web sites, while a phenomenal tool for research and information gathering, do not necessarily provide the best means for delivering this knowledge to the classroom. In many respects, Web sites mainly provide an extremely effective alternative to printed material, which, in and of itself, adds little to classroom engagement and interactivity. In light of these realizations, NYIT has sought new ways of using video technology to bring nontraditional instructors and conversations into the classroom. This need was the founding principle for NYIT's Educational Enterprise Zone (EEZ).

EEZ was created to serve both secondary and higher education and uses live video to bring experts of all kinds into the classroom to speak with students. Formed in conjunction with NYIT's Technology-Based Learning Systems department, state and local governments, and other members, the program currently brings experts from 130 museums and other cultural organizations into classrooms of all levels in New York state.

EEZ was initially based on two-way video technology that required the specialized equipment of a videoconference lab, both at the broadcast site and on the classroom end. Today, NYIT is working with a software developer to test a new product (Safari Montage Live) that will allow many institutions to adopt this model almost effortlessly, allowing nearly any educator with a computer to extend the definition of the modern instructor with virtual classroom guests.

The new software allows anyone from any location to enter into dialogue with an entire classroom. All that is needed is an Internet connection and a $30 "eyeball" webcam. All participants in the conversation will be able to see one another and can take part in the conversation. This could be a guided tour through the Smithsonian Museum in Washington, D.C., where participants can ask questions just as though they were following a docent through the museum, or a conversation with an expert from the business world. But perhaps the most revolutionary aspect of using the new software

is that it has the ability to inexpensively and easily create a virtual classroom that in physical terms may span the entire world. The system permits a dialog between one person and 400 individual students on computers equipped with a simple camera. All participants can see and speak to one another. And unlike in the past, the jittery images and lagging audio once expected from inexpensive cameras are now replaced with the crisp images and clear sound of Flash video, even when transmitted over relatively low-bandwidth Internet connections.

Borderless Collaboration

Just as video has begun to redefine the boundaries of classrooms and institutions and has created virtual classrooms, virtual workplaces in various forms are transforming work habits in and out of the classroom.

Social creatures that humans are, it is hardly surprising that the Web has in its short life quickly become a hub of meeting places and communities. Academia, just like the business world, is now moving toward wide-scale adoption of a relatively new facet of the online community: collaborative hubs. Made possible by Cloud-based tools like Google apps, ThinkFree, and Zoho Office, students can work on writing, research, and creative projects with others, regardless of where they may be located. Existing communities such as Facebook and MySpace have also been seized by this movement toward collaboration and communication, with the creation of online public meeting places where ideas and information can be exchanged.

These meeting places are powerful and compelling. More than 100 million people worldwide each month visit Facebook, the sixth most trafficked Web site in the world (Top global web properties, 2008). Not bad for a Web site that is less than five years old.

NYIT's instructors have formally and informally adopted many of these new tools that now allow them to share and develop ideas and research with newfound flexibility. In addition, NYIT has taken advantage of collaborative capabilities built into various distance-learning software packages. Elluminate Live, for example, creates a virtual classroom by connecting an instructor and students in real-time. Among its features is the ability to allow multiple students to collaborate on a single document in real time. Students, for example, may add science project data they have collected into a spreadsheet and watch as every new entry of data is instantly plotted on a graph. This kind of real-time collaboration and active participation allows instructors to provide dynamic online learning experiences that go beyond the too frequent online slide presentations of many distance-learning programs.

Borderless Information: Integrating Images and Data

Along with the expanding boundaries of today's classroom and growing possibilities for useful collaboration, technology is even beginning to transform the nature of how educational institutions will use information. It is a truism of our age that information management, not access to information, is our greatest challenge. Yet as much of this remains true, interesting advances in the area of information management are indeed emerging and promise to have a significant effect on the classroom directly and indirectly, both in the form of "mashups" and sophisticated data analysis.

The mashup familiar to most is the video mashup, of which thousands of examples abound on YouTube at any given moment. By taking two or more video clips and sometimes additional audio, mashup artists combine other artists' works to create a new artistic expression. Students are already beginning to produce multimedia art projects in this manner, and they will find ways to carry this technique into other areas as well. Working more like filmmakers, they may illustrate their understanding of political science in projects that combine historic and current-day footage to illustrate parallels between past and modern regimes and rulers, for example. With the arrival of these new and inventive techniques, however, come a number of questions. Brian Lamb (2007) contemplates this, writing: "For educators and policy-makers, already struggling with the many cultural and logistical challenges posed by digital technologies, mashups complicate the picture even while offering tremendous promise. What, exactly, constitutes a valid, original work? What are the implications for how we assess and reward creativity?"

Outside the world of artistic and visual expression, the mashup concept offers extraordinary possibilities in research. A Web mashup is a combination of two different, and often unrelated, databases. The two volumes of data are combined by a third Web application that overlays one type of data on the other. Examples of these Web applications are the Google Mashup Editor (code.google.com/gme/) and Yahoo! Pipes (pipes.yahoo.com). A mashup could, for example, combine local police data with Google Maps, and mark the addresses of crime scenes for the past year to illustrate which neighborhoods have the highest crime rates. The Web mashup, however, is still in its infancy. The business world is still trying to decide what kinds of business can be driven by this new technology, and academia has yet to see exactly how the Web mashup will serve intellectual endeavors.

A few potential academic mashups include:

- Google Maps displaying professors' office locations and hours, along with embedded links that allow students to contact professors in real time.
- Computer lab or WiFi mashups, which allow students to determine which labs have the most free computers, or which networks have the most available bandwidth at a given moment.
- Stadium mashups that allow students at large universities to select and purchase seats for the big game, preview the seating angle, and even to order food from the stadium menu to be delivered at the end of the first quarter.

The mashup's usefulness in new, inventive research projects—and particularly interdisciplinary research projects—is promising. Whatever the mashup's role will be, it does appear certain that it will soon enter the classroom. Mashups have been singled out as ripe for widespread adoption within the next two to three years by the body of technology experts responsible for *The Horizon Report* (The New Media Consortium & EDUCAUSE, 2008).

On the administrative side, the integration of data is beginning to show real benefits for students and educators. Following the business world's lead, academic institutions have begun to create vast data warehouses that combine information from many areas and departments, such as student housing, financial aid, and the registrar's office.

NYIT continues to use and build such a data warehouse and grants access, as appropriate, to administrators, faculty, and students through a single Web portal. To improve educational outcomes, administrators will increasingly be able to mix and match information and perform complex data analyses that will reveal meaningful patterns in student performance.

In the corporate world, these software tools are known as business intelligence and business analytics. In the academic world, we'll use these tools to vastly improve student service.

To better understand what causes engineering undergraduates to drop out or switch majors, for example, an analysis of registrar records, student housing records, and financial aid records could, in combination, reveal what no single data source could. Engineering students who drop out might be found to be those who do not live on campus, who take part in the work-study program, or had difficulty in Calculus II. Targeted tutoring in Calculus II for students who meet this profile could dramatically improve performance. Administrators and educators at NYIT will soon be able to locate these types of patterns to actively improve the educational experience of our students.

As we learn to adopt the technology that tomorrow's students are most familiar with and thrive on, the physical classroom and even our institutions will undoubtedly be transformed. But beyond these shifting concepts and boundaries, we will for certain gain an even greater advantage: it will change the nature of how we think and communicate in all areas of our work and lives.

In a recent article in the *New Yorker,* Malcolm Gladwell (2008) shares an interesting question posed by former Microsoft executive Nathan Myhrvold: "Why is it that a physicist and a brain surgeon meet only when the physicist is about to be cut open?"[i] As head of a think tank that brings

together experts from unrelated disciplines, Myhrvold has seized on the powerful relationship between interdisciplinary thought and exchange and the spark of innovation. The surgeon and physicist—and members of every discipline—should indeed be talking to one another. As we adopt the rapid paced and borderless communications of the young and invite experts from all parts of life into the classroom, we will be moving toward this goal. As we combine data from disparate sources and unrelated domains, encourage collaborative efforts, and make collaborative practices and tools our own, we open the doors to new avenues of communication and interaction throughout academia and the world. With the help of new technology that foster new ways of thinking and learning, we move toward the ideal of interdisciplinary learning and thought that will shape and typify the 21st century.

References

Gladwell, M. (2008, May 12). In the air. *The New Yorker*. 59.

Lamb, Brian. (2007, July/August). Dr. mashup; or, why educators should learn to stop worrying and love the remix, *EDUCAUSE Review, 42* (4)*,* 14.

The New Media Consortium (NMC) & Educause Learning Initiative (ELI). (2008, Jan. 29). Data mashups. *The 2008 Horizon Report,* 20-22.

Prensky, Marc. (2004, Spring). Use their tools! Speak their language! *Connected, 10*, 8.

Sachs, Jeffery, et. al. (2005). U.N. millennium project overview, *Investing in Development*, 9.

Shulman, L.S. (2000). Inventing the future. In P. Hutchings, *Opening Lines: Approaches to the Scholarship of Teaching and Learning,* p. 101. Menlo Park, California: The Carnegie Foundation for the Advancement of Teaching.

Singh, M. (2007, June 22) Prime minister's speech at the 150th anniversary function of the University of Mumbai. para. 11. Retrieved June 12, 2008 at the Prime Minister of India web page: http://www.pmindia.nic.in/speech/content.asp?id=555

Top global web properties. (2008 February). Retrieved June 10, 2008 from the ComScore Web site: http://www.comscore.com/press/data/top_worldwide_properties.asp

Top 25 Web 2.0 sites. (2008, June 9). Retrieved June 10, 2008 from the eBizMBA Web site: http://www.ebizmba.com/articles/user-generated-content

United Nations Educational, Scientific and Cultural Organization [UNESCO]. (2003 June). *Synthesis Report on Trends and Developments in Higher Education Since the World Conference on Higher Education (1998-2003),* 8**.**

About the Author

Since becoming president in 2000, **Edward Guiliano** has led New York Institute of Technology (NYIT) to broad recognition as a distinguished institution of higher learning with firm national, global, and digital recognition in the fields of architecture, medicine, communications, engineering, and educational technology.

Under Guiliano's leadership, NYIT has been consistently ranked as one of America's best colleges by a number of publications. It was recently listed by *U.S. News & World Report* among "America's Best Colleges," and *The Financial Times* ranked its online division, Ellis College as one of the top 10 online programs worldwide. In addition, NYIT has received the praise of specialized accrediting agencies familiar with the institution. During his presidency, NYIT has significantly increased the

size and quality of its diverse student body of more than 15,000 students from all 50 U.S. states and 98 countries; recruited seasoned administrators and distinguished faculty members; and added campuses and sites in North America, South America, the Middle East, Asia, and online to complement NYIT's hub campuses in Manhattan and Long Island.

Most recently, Guiliano spearheaded the development of a bold 2030 strategic plan, designed to position NYIT over the next 25 years as the model for a 21st-century global university. Guiliano has already overseen a major renovation and construction of campus facilities and has implemented comprehensive branding and marketing programs that have enhanced the college's national and international reputation.

An eloquent spokesman and advocate for global higher education, Guiliano is a frequent presenter at major conferences around the globe. In 2007, Guiliano was elected chairman of the Long Island Regional Advisory Council on Higher Education (LIRACHE), a consortium of 19 regional colleges and universities. He has also been a board officer of the Council of Independent Colleges and Universities (New York), which represents the chief executives of New York's 100-plus private, not-for-profit colleges and universities on issues of public policy, and serves or has served as a board member and officer for several nonprofit and educational organizations.

Guiliano began his NYIT career as an English professor in 1974 and continues to teach one course a year. In 1988, he was the youngest person in NYIT history to be promoted up the ranks to full professor. Prior to his presidency, he served as vice president for academic affairs and provost. He holds a bachelor's degree from Brown University and a doctorate from the State University of New York at Stony Brook. In 2001, he received the prestigious Ellis Island Medal of Honor for his personal accomplishments, social compassion, and outstanding contributions to American society.

He is married to best-selling author Mireille Guiliano and maintains homes in New York and France.

Developing In-House Software: Seeking for Excellence, Facing Challenging, and Exploiting Opportunities

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Abstract
This paper presents some recent initiatives in implementing e-services to meet administrative and academic needs at Al-Hussein Bin Talal University in Jordan. The university is facing a set of *challenges* while empowered with a set of *opportunities*. The crucial challenge is the limited fund and capital investments. While the availability of highly-skilled IT programmers and technicians represent an important opportunity. From an IT perspective, the paper conducts SWOT analysis to identify Strength, Weaknesses, Opportunities, and Threats. Based on the results of the analysis, the university attempted to achieve success by exploiting strength and opportunities to minimize the impact of Weaknesses and threats. The result is a set of in-house, e-services oriented to meet the increasing demand of students so that to attract more of them.

Keywords: In-house development, SWOT analysis, e-service, customized Software

Introduction.

As the higher education in Jordan is significantly growing [1, 2], the need to support this vital sector with e-services is increasing. In the academic year 2007/2008 the Ministry of Higher Education reported that the number of students enrolled in Jordanian universities and two-year colleges, public and private, is 254,752. This number represents 4.6% of the Jordanian population enrolled in 25 higher education institutes.

One of the Jordanian universities is Al-Hussein Bin Talal University (AHU). AHU was established in 1999 to serve one of the largest governorates in Jordan, namely Ma'an. The governorate represents 37% of the total area of Jordan. The governorate is also located in the far south of Jordan and about 210 Kms from the capital of Jordan, Amman. The university's location places great responsibility on its administration since the demand for all specialization is available and increases. The university, however, is facing many challenges such as limited budget and lack of funds, increased number of students, relatively low tuition fees, out dated degree plans, and scarcity of qualified faculty members in many majors. However, some of the challenges may be of AHU alone such as the university is located in the far south of the country away from the capital Amman, low population density in the governorate, low individuals income, the university is newly established therefore most of its budget is consumed in establishing new buildings and infrastructure. It is important to note that more than 66% of the students of AHU are from outside the governorate of Ma'an. Therefore, the university has to build its strategic plan so that the main stakeholder, mainly students, is provided with all possible satisfaction means to compensate for the weaknesses such as far location and harsh environmental factors.

With all the previously mentioned challenges, opportunities arise. The university has well-trained and highly motivated IT programmers and technicians who contributed to alleviate the impact of the challenges. These programmers have been actively involved in designing and implementing e-services to achieve academic and administrative goals.

This paper presents an undergoing effort to in-house develop necessary applications at AHU to fulfill academic and administrative needs. The paper is organized as follows. Section 2 performs environmental scan on AHU by performing SWOT analysis. In Section 3 the challenges facing developing effective ICT are thoroughly discussed. Section 4 touches upon how to bridge the gab. In Section 5, the SIS software system is described. Section 6 concludes the paper.

SWOT Analysis.

Organizations seek for success which is typically attainable by building concise strategic plans. To build such plans, organizations typically start by conducting SWOT analysis. The goal of this analysis is to identify strength, weaknesses, opportunities, and threats. Strength and weakness are related to the

internal environment while opportunities and threats are related to the external environment. Organizations take advantage of strength and opportunities to overcome weakness and challenges.

Strength

- Newly established university;
- The only university in the governorate;
- Wide campus area and the availability of space for extension;
- The availability of well-trained employees, even though it was reported in [3] that the developing countries lack of technical expertise which results in hindering implementing and maintaining effective ICTs;
- The availability of highly-qualified academic staff with variety of majors;
- The availability of new, distinguished academic programs that is able to full fill the national and regional needs;
- Many students has been sent to esteem educational institutes around the world to pursue their higher education; and
- The Infrastructure is good.

Weaknesses

- The high price of sending students abroad to pursue their higher education and the scarcity of available academic staff in some majors;
- Low tuition fees;
- Scarcity of local qualified faculty;
- Low school graded of the accepted students compared to other universities; and
- High cost of suggested and available academic programs.

Opportunities

- The availability of natural resources in the government such as phosphate and pure silicon;
- The diversity of the students of the university;
- The location of the university among historical and tourist location such as Petra, one of the new Seven Wonders of the World;
- The co-operation with esteem international institutions;
- The potential of good fund opportunities as the university hold the name of his late majesty king Hussein and as the university is the first one to be established under his majesty king Abdullah II rein; and
- The fund from international cultural organizations.

Threats

- The harsh weather environment;
- The distant from the capital Amman,
- Low population density;
- The initiatives to establish new universities in the near and adjacent governorate;
- The local community is conservative and traditional;
- The low income in the governorate and the area; and
- The low acceptance of new majors in the governorate and the area.

Challenges

- Moving from conventional universities to excellent universities;
- Moving toward quality controlled universities;
- Moving toward ICT age;
- The dramatic increase in the number of students in the higher education sector. When established in 1999, the number of students at AHU was about 1250. Nine years later, in the academic year 2007/2008, the number has substantially increased to become 7000 student. Thus, the increase in the number of students is in a factor of 4.5;

- The need for human recourses both in academia and administration;
- Lack of group work spirit;
- Coping with globalization, utilizing new communication media and exploiting ICT revolution;
- High expectations of high level management and the change in their needs; and
- The development in competition among universities nationally and worldwide.

Bridging the Gab

ICT employment in organizations, especially higher education ones, can result in positive impacts. The availability of well-established computer network, state-of-the-art software development tools, and highly qualified IT staff represents the main components. This recipe-for-success is available in Jordan and at AHU. ICT also contributes to improve the outcomes of the educational process and enhance and improve the teaching process [4-6].

In-house Software development at AHU

AHU is progressing to develop e-services for academic and administrative activities. The employment of technology in academic activities has been proven to enhance education outcomes [7, 8]. Moreover, the benefits of employing technology in administrative activities have positive impact on the quality of the offered services. The e-services at AHU were almost fully developed by the IT staff of the computer and information technology center at AHU under the direct supervision from the authors. The challenging point was to utilize a software development process that fits the university's needs. The process should deliver e-services of good quality but under tight schedules. Thus, a decision was made to an agile process such as Extreme Programming [9, 10] which was proven to reduce time-to-market [11]. The process relies on the collaboration of highly qualified staff and skipping most of the time consuming, yet uncritical documentation process. The application is constructed incrementally where the process starts by the development team soliciting few requirements from the customer. Then the team proceeds in the well-known development activities: planning, analyzing, designing, implementing, and testing the corresponding artifacts. Thus, the software product is built incrementally. The process is repeated until the whole application is constructed.

1. Administrative applications

The administrative category can be further divided three categories: *student briefcase (or SIS)*, *instructor briefcase*, and *employee briefcase*.

1.1 Student Briefcase (or SIS)

The students briefcase consists of applications to facilitate students' activities such as course registration, course add / withdrawal, online payments, inquiry about grades of a certain semester, inquiry about all the grades the students has achieved, inquiries about the courses the student has registered, calculating the fees the student has to pay, inquiry about library books in the student possession, and inquiry about library fines. Students, through the SIS, can also have access to Claroline [12], a Learning Management System that is explained next in the academic applications.

The e-registration and e-payment applications emerge as main services in the SIS. These systems are web-enabled so that they facilitate in- and off- campus for students. As 66% of the students live relatively far from the university's location, these components provide students with substantial flexibility. The e-registration has been fully implemented in house while the e-payment involved customizing freely available software.

1.2 Instructor Briefcase

The instructor briefcase encompasses many services that help the instructor in his job such as inquiry about rosters of the courses the instructor teach, choosing the distribution of the grades, analyzing the grades of any of the exams or the final grade, and inquiries about the students who did not perform the final exams, and reports of the final grades rosters with and without the names of the students.

1.3 Employee Briefcase

The employee briefcase consists of the corresponding application related to the employee work and any forms the employee need to fill or receive. For instance, the brief case of a human resources employee should contain inquiries about the employee records.

2. Academic applications

The academic category can be divided into two categories: the Learning Management System Claroline and computer-aided instruction.

2.1 Claroline

A wide range of Learning Management Systems (LMS) [13] have been employed by many educational institutions to facilitate providing means of communication between instructors and students. Claroline is an open-license LMS that can be installed for freely installed. The technical staff of the Computer Center at AHU has downloaded and customized the application. Trough this application, the instructor can post the syllabus of his or her course and the corresponding PowerPoint presentations, handouts, and homeworks. The student is provided with an interactive and visual learning environment where he or she can browse available material and upload the corresponding solutions of the homeworks. Claroline is accessed from two brief cases, namely student briefcase and instructor briefcase, aims at supporting e-learning.

2.2 Computer-aided software

Blended learning employs ICT in face-to-face instructions. It involves the incorporation of Web-based activities, multimedia simulations, virtual labs, and/or online testing in traditional teaching sessions [14, 15]. In particular, employing web-based teaching has shown to improve learners' abilities to reflect the knowledge they acquire in novel, real-life situations [16]. At AHU, there is an ongoing project to computer-based visual software application. The project is called SFRL [17] and aims at providing means to aid teaching a mathematics course. The application presents the topics of course in two modes: non-interactive and interactive and is planned to be available in two languages Arabic and English. The ultimate goal of the project is to develop a computer-aided supported educational framework.

The framework will be constructed so that it will be easily used even by instructors with limited IT skills. The instructor role is just to type in the course material into a text file; divide it into small files such that each file has one simple concept, then upload the files into the frame work. The instructor is also responsible to develop a graphical version for each course concept using familiar software applications such as Microsoft PowerPoint and upload it. Finally, the instructor is responsible to prepare a database of examples and test questions and upload them.

Conclusion.

Al-Hussein Bin Talal University is one of the Jordanian universities that is striving for success in an environment full of challenges. The university has performed good utilization of its available resources to meet the various, demanding students' need. The result is a collection of e-services oriented toward academic and administrative activities. By the increasing number of universities in Jordan, the competition seems to start among the universities in attracting more students and gradating good quality. The university administration believes that achieving excellence in e-services can provide good competition advantages.

References.

[1] Al-Jaghoub, S. and Westrup, C. (2003) Jordan and ICT-led Development: Toward a Competition State?, Information Technology and People, Vol. 16, No. 1, pp. 93-110.

[2] The Road Not Traveled: Education Reform in the Middle East and North Africa, Mena Development Report, the World Bank, Washington, D.C., 2008

[3] Bakari, J.K., Tarimo, C.N., Yngstrom, L. and Magnusson, C. (2005) "State of ICT Security Management in the Institutions of Higher Learning in Developing Countries: Tanzania Case Study," Paper presented at the Fifth IEEE International Conference on Advanced Learning Technologies (ICALT'05). pp. 1007-1011.

[4] Wagner, A. D. (2001) IT and Education for the Poorest of the Poor: Constraints, Possibilities, and Principles. TechKnowLogia, July/August, 48-50.
[5] Garrison, R. & Anderson, T. (2003) E-Learning in the 21st Century: A Framework for Research and Practice. Routledge Falmer, London.
[6] Jiménez, J. M. (2000). Towards a school in the information society. Proceedings of the EDEN fourth Open Classroom Conference, Barcelona, Spain, November 19-21.
[7] Flecknoe, M. (2002) How can ICT help us to improve education? *Innovations in Education & Teaching International*, 39, 4, 271-280.
[8] McCormick, R. & Scrimshaw, P. (2001) Information and Communications Technology, Knowledge and Pedagogy. Education, Communication and Information, 1, 1, 37-57.
[9] K. Beck, Extreme Programming Explained, Embrace Change, Addison-Wesley Longman, New York, NY, 2000.
[10] K. Beck and M. Fowler, Planning Extreme Programming, Addison-Wesley Longman, New York, NY, 2001.
[11] Rogers, D., Lambert, D. and Knemeyer, A. (2004) The Product Development and Commercialisation Process, The International Journal of Logistics Management, Vol. 15, No.1.
[12] www.claroline.com
[13] http://www.isopia.com/ILMS/ILMS.html.
[14] Arabasz, P. and Baker, M. B. (2003) "Evolving Campus Support Models for E-Learning Courses". http://www.educause.edu/ir/library/pdf/ERS0303/ekf0303.pdf accessed 11 November, 2006.
[15] Mortera-Gutierrez, F. J. (2005). "Faculty best practices using blended learning in e-learning and face-face instruction". http://www.uwex.edu/disted/conference accessed 2 March, 2007.
[16] Lim , B. & Yu, B. M. (2000). Effects of learning via Web Design approach on the students' perception. In K. E. Sparks and M. Simonson (Eds.). 22nd Annual Proceedings of selected research and development papers presented at the National Convention of the Association for Educational Communications and Technology. Sponsored by the Research and Theory Division. Long Beach CA.
[17] Fares Fraij, Visual and Interactive Computer-Based Software for Teaching a Mathematics Course: An Approach, Proceedings of the IEEE Conference on AI Tools in Engineering, Pune, India, 2008.

(A.38)

From dream to reality (2): Best practices for gifted learners (10 – 18 years of age)

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Abstract

Best practices for gifted learners (10 -18 years of age) Greet de Boer, Karen van den Broek Dutch National High Ability Consultancy Centre CPS educational development and consultancy In the Netherlands the demand for suitable education and care for gifted learners is a current topic. The Dutch National High Ability Consultancy Centre, a division of CPS educational development and consultancy has a major role in the realisation of national developments, such as a covering network of schools with programmes for gifted learners. As intermediary between experts, policy makers and the field (schools and parents), CPS educational development and consultancy has taken initiative to realize suitable provisions for students from 10 to 18 years of age. In this presentation we show you how a number of schools, participating in the national project "Schools with programmes for gifted learners in secondary education" have given meaning and shape to suitable education and care for gifted learners. Best practices are shown with respect to: 1. Education and learning: matters such as flexibility of the organisation and timetables, realisation of individual educational arrangements, availability of ICT, teaching aids and provisions, expertise of the teaching staff; 2. Support and counselling: selection and admission policy, deployment of school psychologist, support co-ordinator, tutorship, a support structure with pupil evaluations and individual education plans, arrangements with external advice centres and in the Co-operation Platform; 3. Clear communication with parents, pupils and environment about expectations and (im)possibilities; 4. Benefit to other pupils: by means of e.g. flexible timetables and adjusted examination rules, the expansive support structure and collaboration with schools in the Co-operation Platform and schools for further education.

Introduction

In the Netherlands the demand for suitable education and care for gifted learners is a current topic. The Dutch National High Ability Consultancy Centre, a division of CPS *educational development and consultancy* has a major role in the realisation of national developments, such as a covering network of schools with programmes for gifted learners.

As intermediary between experts, policy makers and the field (schools and parents), CPS *educational development and consultancy* has taken initiative to realize suitable provisions for students from 10 to 18 years of age. Aim of the project Schools with Gifted Programmes is to realise a nation wide network of schools for secondary education that offer *high-quality education and support* to the specific target group of gifted and talented pupils, where the *continuity of this provision* can be guaranteed.

How to guarantee the continuity of development and quality?

In Schools that learn Peter Senge describes that a lot of the current problems in schools come from the assumptions of the Industrial age system of education. All learners suffer because of these problems but gifted learners are affected even more.

Most initiatives for change fail in the end. One of the major reasons of failure is the way we think. We must change our thinking and the way we believe, to achieve fundamental change.

The idea of a school that learns

Some school cultures stimulate and promote learning. Others stifle it. It is clear that creating vibrant, collaborative cultures in schools and school systems is a vital strategy for individual and school development. The suggested approach of Peter Senge is to deliberately design schools around learning. If this happens, then it would trigger a 'deep learning cycle' within the people of the organization.

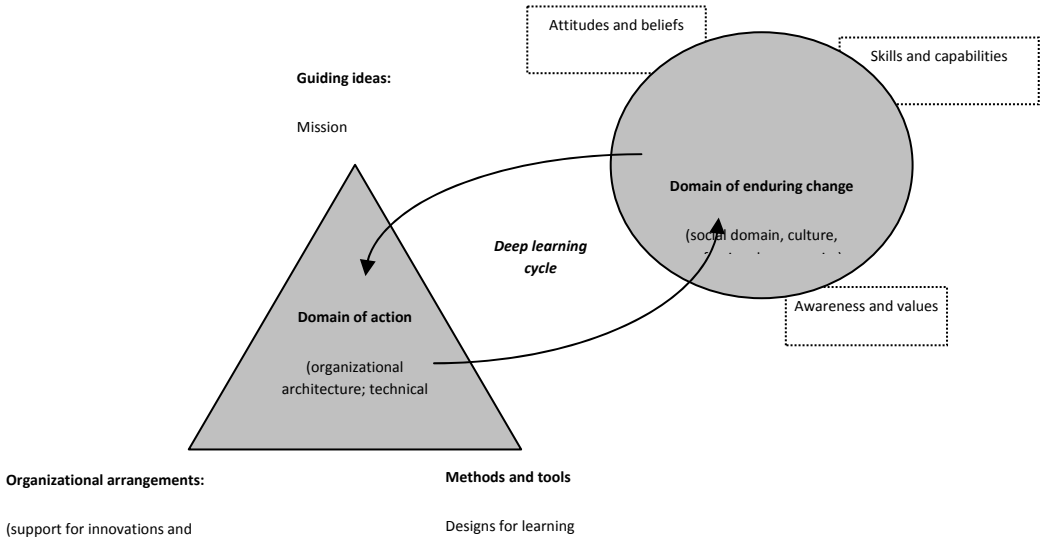

Figure 1: Triangle of design, circle of culture.

Implementation of change

Implementation of change demands for an integrated approach of change. The aspects and principles are connected to one another.

The approach is based on four elements: people, culture, structure and systems.

People and culture are social variables; structure and systems are technical variables. (Structure indicates the way the school is organized. Systems indicate the way the learning is organized.) Organization behaviour is based around these variables and therefore accountable for the results. They are drawn as the roof of the school building.

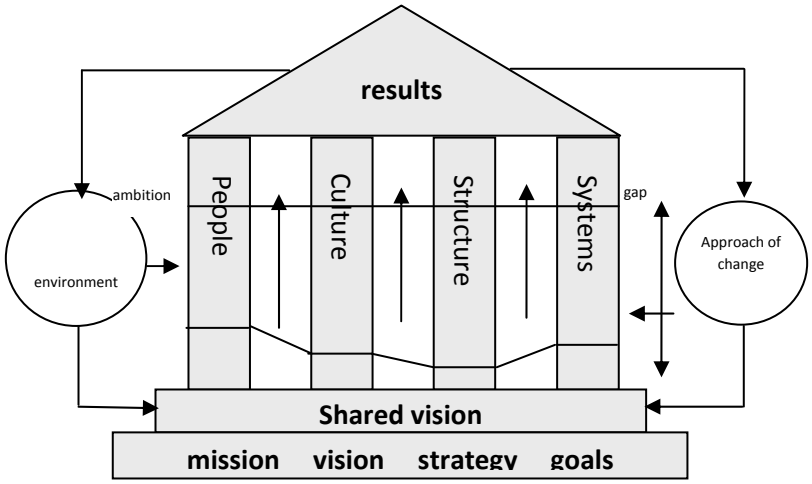

Figure 2: Integrated approach of organizational change.

In the Dutch national project 'Schools with programmes for gifted learners in secondary education' an integrated approach of development is *compulsory.* The figure explains the meaning of this.

The development of all four elements is important. Not only the organization of the school and the organization of learning have to change, the behaviour of the staff does have to change also. As well as the mental models, the way the people think about learning, teaching and the school.

The horizontal lines suggest an imaginary rope. The elements are connected by the rope. The rope can get up, but only when al four elements get up. Small differences are possible. The element which contains the lower part of the rope determines the progress of development within the other elements. It is important to create a shared vision for achieving alignment around the things people have in common: their connection to the school.

Different choices

Schools have different reasons to enter the project. As a consequence of these reasons these schools develop one or more elements more easily then other elements. Some schools have developed experience in education for gifted learners. By entering the project the managers of the school stimulate further development and acknowledge the more or less isolated experience of teaching gifted learners. These schools have to focus on commitment within the wider group of teachers and manager. Best practice show that this can be hard and take a long time. Without commitment there is no guarantee of continuity and quality.

Other schools use the project to distinguish from other schools in an effort to survive, when the amount of children entering the school is decreasing. Specializing for gifted learners contributes in the continuity of the school. The need for this is easily understood by all co-workers and will be a critical success factor for continuity and quality. Such a school starts with a solid foundation in vision and strategy. School development will succeed rather smoothly. Best practice shows that focus will en on the variables systems, structure and people. These schools attain education programmes for teachers. They develop a system for teaching the gifted learners and integrate this within the school.

References

Greet C. de Boer, Kamphof, G. J., 2005. *Schools with Gifted Programmes, Working document,* National High Ability Advisory Group, CPS *educational development and consultancy,* Amersfoort, The Netherlands.

Peter Senge, 2000. *Schools that learn. A fifth discipline fieldbook for educators, parents and everyone who cares about education.* New York: Doubleday

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(A.39)

Patrick Costello, Excellence in Education and the Teaching of Philosophy in Schools: The idea that children should engage in the systematic discussion of philosophical ideas is a relatively new one. My central aim is to offer a rationale for such an endeavour. In the USA, there has emerged what has been called 'a new branch of philosophy', Philosophy for Children. The main pioneer of this new field of philosophy is Matthew Lipman and, in the first part of my paper, I offer a critical examination of his 'Philosophy for Children' programme. Following this and drawing on my own research (e.g. Thinking Skills and Early Childhood Education, David Fulton Publishers), I outline my own approach to the teaching of philosophy to young children and examine the findings of research studies concerned with improving the quality of children\'s thinking, reasoning and argument skills. The main points of the presentation are outlined below. In the context of the conference theme, I argue that the teaching of critical thinking, reasoning and argument skills in schools makes a substantial contribution to promoting excellence in education. Main Points of the Presentation: * Excellence in education and the teaching of philosophy in schools. *The nature of philosophical thinking. * Why teach philosophy in schools? *Developing philosophical thinking skills: the Philosophy for Children's programme. * Developing philosophical thinking in British schools. * Improving the quality of young children's argument. *Assessing progress in argument. * Action research, teachers' professional development and the teaching of thinking skills. *The future of education: schools as communities of inquiry?

About the Author

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(A.40)

Innovative Changes in Education: Multi-Level System at SFU as Part of the Bologna Process in Russia

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Abstract
The National Educational Project in Russia in 2006 included creating two National Universities, which will become the biggest educational and scientific centers in the country: one in the Southern District, another in Siberian and Far East District. Krasnoyarsk was chosen among others for creating Siberian Federal University. The aim of the reform is systematic changes in higher education and training highly-qualified specialists for development of the region in future. Siberian Federal University united the four existing universities of Krasnoyarsk including Krasnoyarsk State University. Our work will describe creating Institute of Humanitarian Sciences within Siberian Federal University, the distinctive features of reforming the system of professional training of high quality specialists, coinciding with the demand of the regional labor market. We think that psychological and pedagogical field of study will become one of the most important at the Siberian Federal University. It will be based on principles of developmental psychology and project approach in training specialists for higher educational institutions and teachers - innovators for secondary schools. New system of training specialists should be based on the multi-level system of education (Bachelor, Master and Doctor degrees) and be corresponding with the European system of qualification (ESK) and take into consideration the real specific needs of the region (the deficit of highly qualified top manages for industry and social fields). Nowadays the Psychological and Pedagogical Department offers a Masterâ€™s degree in Developmental Psychology and High School Pedagogy. We have worked out the system of training Bachelors of Pedagogy and Psychology for all the forms of study. This is fairly new for Russia. Modern educational methods were introduced at our department, including projecting seminars, organizational activities, workshops in different spheres, trainings of communicative competencies, Portfolio method, etc. The Department holds regional, national and international conferences, devoted to innovations in education annually. The teaching staff of the Department takes part in large scale programs (“Informatization of Education in Krasnoyarsk Region”, “Developing the System of Civil Education”, etc.). The next step is to make our education internationally recognized. To realize the mentioned and other projects and increase mobility of our students we need to extend our international contacts with European universities and study the experience of modern quality assessment.

Knowledge Economy and Competency Approach in Higher Education

The main **challenge of modern system of education** today is development of the post-industrial forms of economic relations which are characterized by **continuous changes** in technology and knowledge. Modern society is characterized by the knowledge-based economy. Economy, based on knowledge brings new requirements to the labor market all over the world (key or basical competencies). Modern graduates have to possess both professional competencies and the basical competencies important for the knowledge-based economy. Among the second are such competencies as communicative and administrative, teamwork, reflexion, and ability to work in multicultural groups and work independently.

One of the first-priority tendencies in training highly qualified specialists is transition to competency approach in education. These competencies are necessary taking into consideration quick dissemination of the scientific and practical knowledge, shortening of the term within which the

knowledge preserves its urgency. This is the result of continuous production of the new knowledge and the growing influence of science and technology which considerably change conditions of work and life. The consequences of these changes are difficult to foresee. Reliable sociological research shows that possession of the key competencies leads to a higher quality of life in all the spheres [1].

Siberian Federal University as National Russian Project in the Sphere of Education

The system of higher education in Russia is undergoing the process of reform. The Russian Government has started several National Projects. National EDUCATIONAL Project is among them. In accord with this Project in year 2006-2007 the two big federal universities were opened. They include scientific and educational centers. One federal university (FU) was opened in the Southern District, and one – in Siberia and Far East (the Siberian Federal University). For Siberia and Far East our city of Krasnoyarsk was chosen. Why was Krasnoyarsk chosen among other cities? Krasnoyarsk is the geographical center of Russia and the biggest Siberian city. Its population is about 1 million people. It is the historical, industrial and cultural center of our big region (2339,7 square km which is 13,6% of all the country, and about 3 million people). It is also a quickly developing region.

- Within the nearest 10 —15 years the volume of investments into the economy of Krasnoyarsk region will be 41 billion dollars.
- Exploitation of oilfields in Evenkia, construction of pulp and paper mill and metallurgical works in Boguchani, investments in Lesosibirsk pulp and paper mill and Turukhansk hydroelectric power station makes Krasnoyarsk region even more attractive.
- Realization of such big industrial projects needs many highly qualified specialists and managers of different levels.
- FU attracts young specialists from other regions. The total amount of students of Krasnoyarsk Federal University is over 50 thousand people, minimum 30% of which are students from other neighboring regions.

Creation of the Siberian Federal University is closely connected *with the systematic changes in Russian higher education and professional training of highly qualified specialists for the development of the region in future*.

The Siberian Federal University in Krasnoyarsk was opened on the bases of the four existing universities according to the plan of the National Educational Project. These are the Krasnoyarsk State University, Krasnoyarsk Polytechnic University, Krasnoyarsk Architectural University and Krasnoyarsk Academy of Gold and Non-Ferrous Metals. Strategic positioning of the SFU can be described as follows: "….professional training of highly qualified specialists, creating innovative technology and making contribution to the social and economic growth of the potential in the regions which are situated in the unfavorable geographical conditions and rich in mineral resources"[2]. We all understand that creating a university offering a new level of high quality education and scientific research will not happen by means of mechanical uniting of several universities into one. Fundamentally new models of education are needed for that purpose and changes in technology of the academic process administration.

We see the following problems

- **Less than 20 %** of university graduates (average for Russia) can find a job *in their professional sphere.*
- The system of higher education does not take into consideration the needs of labor market and its regional specific character.

What is Needed

- Partnership of the state and business in the sphere of higher education.
- New standards and quality assurance.
- Changes in the academic process.

Institute of Education, Psychology and Sociology, SFU in the Cluster of Human Resources Development

Institute of Education, Psychology and Sociology (IEPS) was created within the SFU. The Institute is oriented toward the cluster "human resources development". The fact that people continue their education after graduation from higher educational institutions, that they continue their study being professionals is the new reality, it is now the norm. In highly developed countries within the nearest decade employees will have to change systematically their place and even profile within their professional carrier.

Positioning of the IEPS is connected with the growing competitiveness of the SFU in the sphere of human resources management (intellectual, social, moral, emotional resources, etc.). Psychological and educational sector is important for the Institute as scientific and educational university subdivision. This sector is based on the principles of Developmental Psychology and projecting approach. In contrast to the economics where a person is regarded as a **resource**, we at the IEPS work with the resources of **the person.** Taking into consideration the trends of development in education in future we focus our scientific and methodological research work on the development and implementation of the effective models of education FOR ADULTS. To make the focus on education for adults there are several reasons, among them:

1. The fact that there is the decrease in the young people able to work makes clear the necessity to include adults in the new types of activities.
2. There is the urgent need in continuous education and obtaining new professional education among the adults. According to the statistics 2/3 of the adult population plans to continue education.
3. Traditional education is not able to solve the problems of adult students to continue education and obtain new professional education. A new sphere of knowledge has appeared, it studies adult education.
4. New scientific and methodological tools should be worked out, new forms of organizing professional education for adults.
5. The companies cannot rely only upon the new university graduates or those who come to the labor market for the first time as the only source of new skills and knowledge. They need employees who want and are able to upgrade and perfect their skills continuously.

Thus, the institutes involved in work with adult students develop educational strategy for adult education to satisfy the needs of labor market. Except for this, adult students need professional coaching in application and development of individual resources and basic competencies for career purposes.

Changes Introduced into Professional Training for Students of Humanitarian Specialties on the Bases of Implementing the Multi-Level System (Bachelor/Master degrees)

We would like to tell about the experience of introducing innovative changes into educational practice in humanitarian field of education in our University. These changes are closely connected with the Bologna Process and transfer of the Russian traditional system into the three-level system of education with Bachelor, Master and Doctor Degrees. Why do we head for the Bologna System? Because we need specialists of a new level which corresponds to the labor market and world standards of education for university graduates. Because we need more mobile and more flexible system of higher education, aimed at realization of the personality's interests together with the demand of the labor market. Figure 1 shows the scheme by Gladkikh B.A., Tomsk State University, Russia.

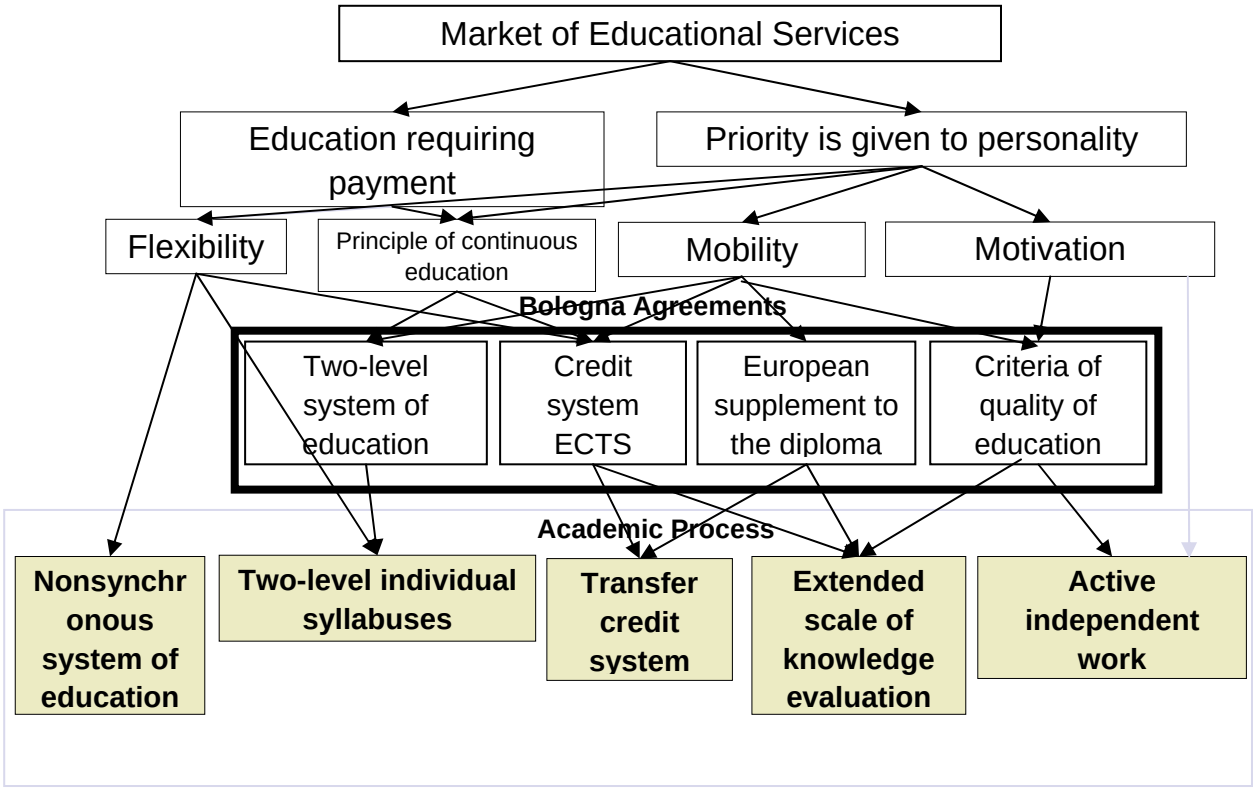

Figure 1: The Scheme of the Bologna System Educational Structure.

One level does not correspond any more to the interests either of the student or the employer. There should be several levels of education and free transition from one Bachelor degree to different Master degree programs (Figure 2).

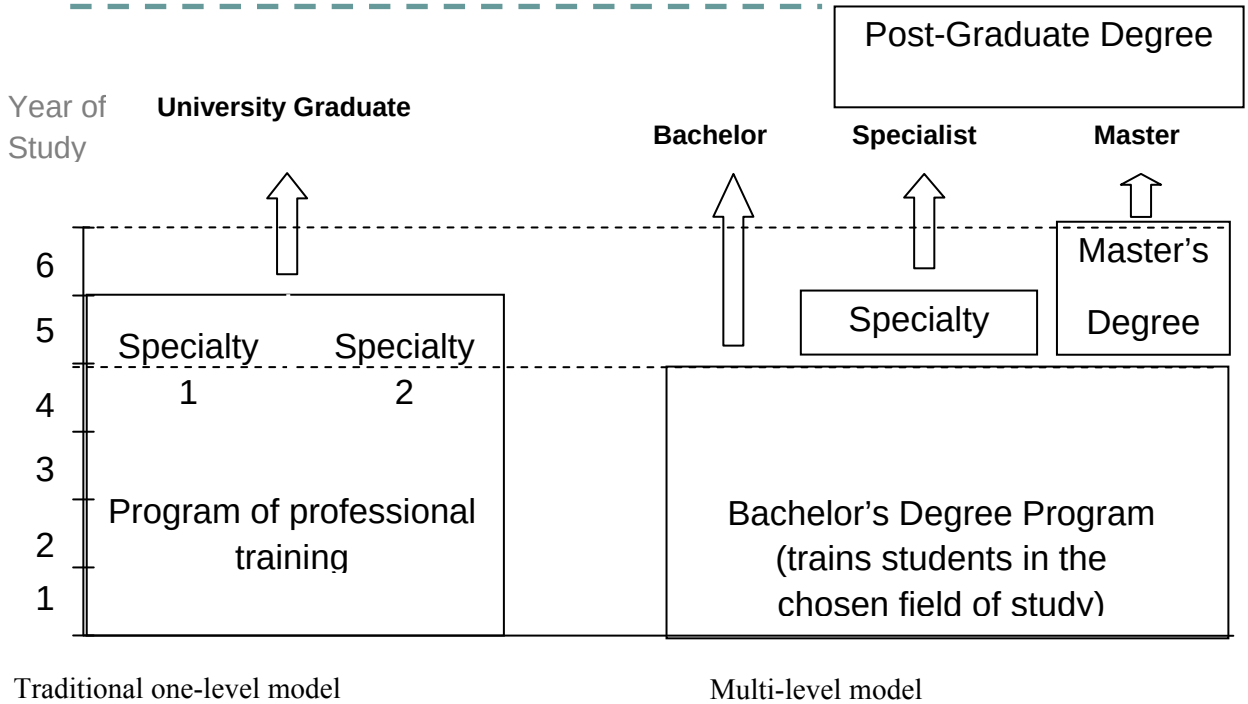

Figure 2: Traditional and Bologna Models of Education.

What is done (for implementing the multi-level system of education):

- ✓ The two-level system of education (in Psychology and Education) was started;

- ✓ Elements of the non-synchronous system of education were introduced;
- ✓ Credit system is being introduced;
- ✓ We extended students' progress evaluation scale;
- ✓ Independent students' work became more active thanks to:
    1. module-based schedule;
    2. rating system; and
    3. electronic information recourses.

Experience of Module- Rating System Application for Bachelor and Master Programs in Education and Psychology in the Real Educational Practice

We opened Bachelor and Master programs in Psychology and Education (4 years of study). We started to work out credit-rating and module system for Bachelor program in Education. At the end of the first term we obtained the information on the students' rating studying according to Bachelor and Master degree programs in Education, rating in different disciplines and total rating. The data we received (intermediate and total rating) are the valuable material for student academic achievements analysis, for the system of assessment, and for teachers within their work at developing and delivering courses in different disciplines (Figure 3).

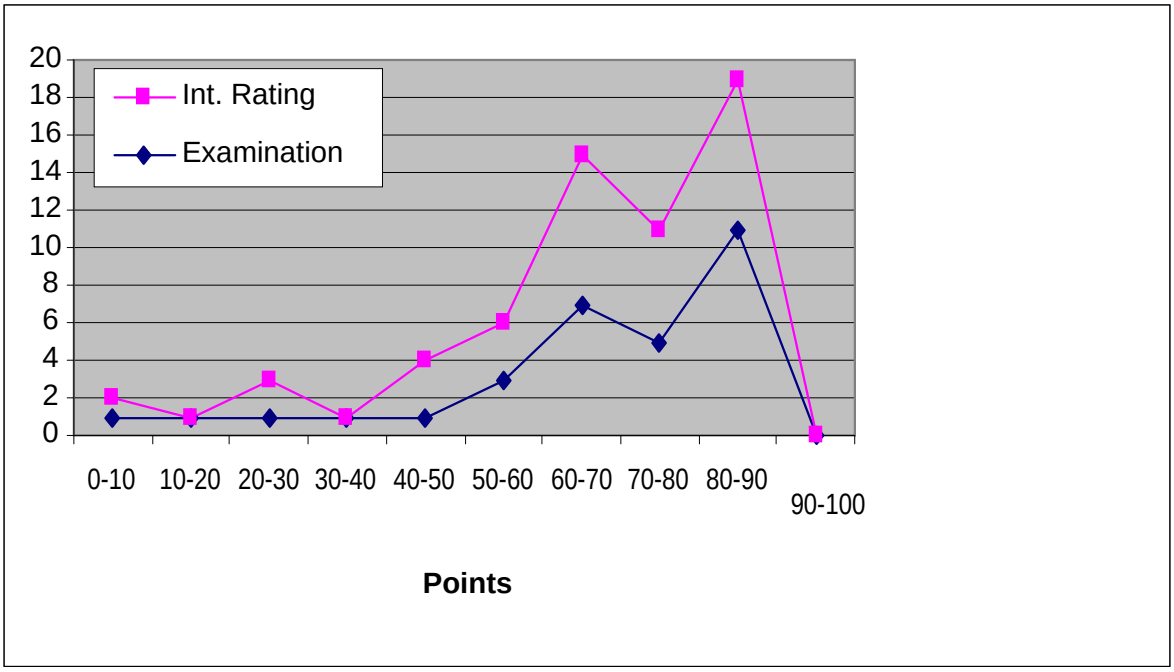

Figure 3: Course intermediate and total rating.

Totaling the results we composed the diagram based on the students' rating. As it is clear from the diagram there is the predominance of high and good results (Pic.3). We are inclined to think that this is thanks to the conservative tendencies in the assessment from the teachers' side and the influence of the social aspect – the dependence of the student scholarship on the mark. After the second module the rating came closer to the normal distribution (Figure 4).

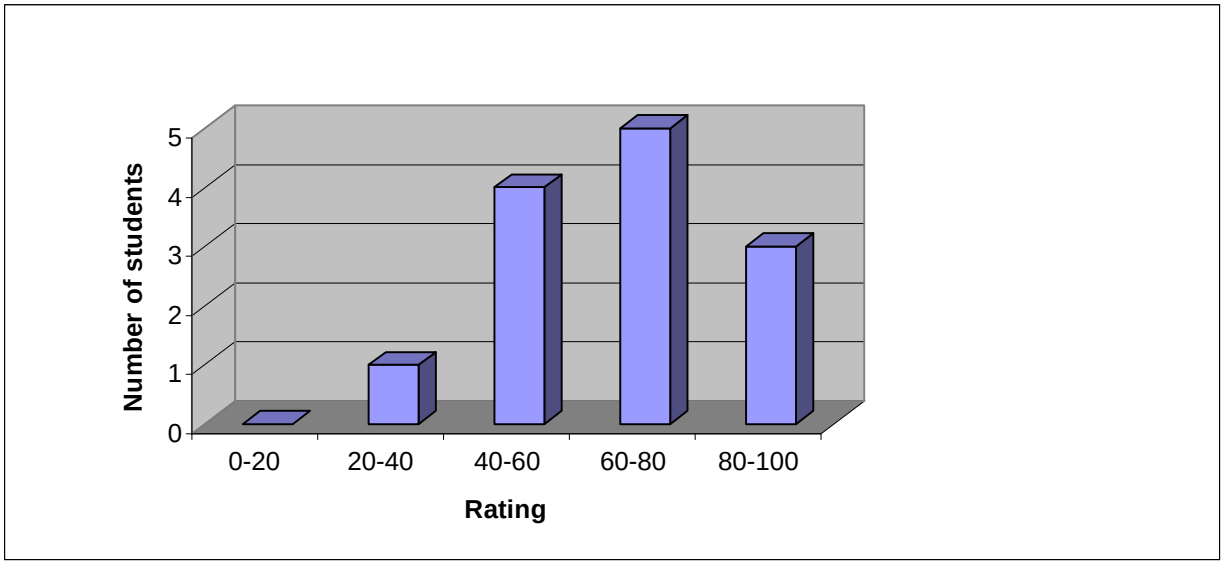

Figure 4: Final students' rating at the end of the term.

A new form of relations between the participants of the educational process was registered. A student and the university sign an Agreement. It gives the possibility of introducing differentiated fee for educational services and increases the responsibility of both sides - the University and the students – for the results of education. We also changed the organizational form of the academic process, making the credit-rating principle the bases for it. Module-based scheme of organization of the academic process makes it more flexible and convenient for students and teachers and transparent to the department administrators and foreign partners. Figure 5 contains model of module-based Master academic program in Higher Education. It includes the student input in credits.

Master Academic Program in Higher Education (Model)

1 Module (1 September- 30 October)
This Module includes the following methodological disciplines:

1. Modern problems of Science. Number of credits: 6.
2. Information Technology in Science and Education. Number of credits: 6.
3. Scientific and Research Students' Work. Number of credits: 4.

2 Module (1 November-21 December)
This Module includes the following methodological and technological disciplines:

1. Methodology of Psychological and Pedagogical Research Work. Number of credits: 4.
2. Information Technology in Education Management Work. Number of credits: 3.
3. Bases of Pedagogical Epistemology. Number of credits: 2.
4. Work at Master Thesis. Number of credits: 5.

3 Module (8 January- 18 March)
This Module includes professional training disciplines, practical work, and training in ICT. Module 2 is divided into 2 part-modules.
Part-Module 1 (8 January – 17 February)

1. Bases of Pedagogical Profession for High School Teachers. Number of credits: 2.
2. Design and Web-technologies for Educational Purposes. Number of credits: 2.
3. Scientific and Research Practical Work, 6 weeks. Number of credits: 2.

Part-Module 2 (18 February- 18 March)

5. 4. Developing Syllabuses and Materials. Number of credits: 3.
6. Multi-Media Technologies in Higher Education. Number of credits: 5.

4 Module (19 March-18 June)
This Module includes disciplines, having practical character and problematic-methodological character.

1. Modern Problems of Pedagogical Science. Number of credits: 2.
2. Portfolio Method in Education. Number of credits: 5.
3. Work at Master Thesis. Number of credits: 5.
4. Scientific and Research Students' Work. Conference devoted to Scientific and Research Students' Work, presenting a scientific work. Number of credits: 4

Subtotal number of credits: 30
Total number of credits for the first year: 60.

Figure 5: Model of Master Academic Program in Higher Education.

The Problems of Construction of the Module Based Scheme of Education

Nowadays there are different approaches toward definition and understanding of the academic modules. Glossary on the Bologna Process [3] points out that at present "*there is no document* explaining how to interpret this term in European system of higher education. There are many interpretations of the concept of module-based education, beginning from the definition of *a separate unit* (lecture, seminar, etc.) as a module and up to the complex module systems, containing *interdisciplinary elements"*.

Working out the master academic program we used successive block of disciplines as a module, which composed a knot uniting the educational content and the technology of mastering it. The Master academic program was segmented into modules:

1. Module: methodological disciplines;
2. Module: methodological + technological disciplines;
3. Module: professional training disciplines, practical work, training in ICT;
4. Module: problem and methodological disciplines, disciplines of practical and applied character;
5. Module: operational (for formation and development of methods of professional activity of a high school teacher);
6. 6-7 Modules: mixed (scientific and research work, practical work, formation and development of methods of professional activity; and
7. 8 Module: scientific and practical.

In general the Master academic program consists of 8 modules, the duration of the course of study is 2 years. Mastering the modules includes the choice in "Theory of Education" bloc of disciplines and the block of special disciplines (educational innovations, educational and administration technologies, IT in education). The content of these modules includes not only writing essays, accomplishing expertise of educational resources and making reports to actualize and generalize one's educational experience but lays the ground for scientific and methodological research, projecting work and mastering modern technologies of administration in higher education. Modules are composed out of disciplines from the federal list, having the given system of didactical units, and authors' courses. The total amount of the credits a student has to obtain during the 2 years of study (8 modules) for a Master degree is 120 credits.

During one year of study a student has to gain no less than 60 academic credits (30 credits per two modules). It is possible to draw an individual academic program choosing the disciplines among the list and having an individual trajectory of training, though mastering a certain subject within a certain period of the academic program is obligatory.

Students' assessment is carried out by means of 100 points scale. Within the course a student may gain maximum rating of 100 points. The course finishes with the test. It means that a student is given a mark "passed" or "not passed" after the examination.

In Table 1 you could see the example in the course in Information Technology in Science and Education. This discipline includes practical work and independent study. The number of credits is 7. The course ends with an examination. Duration of the Module: 5 September – 31 October. Examination Structure: intermediate rate is the result of regular work (max. 50 points), final test – examination (max. 50 points).

Table 1: Academic course in information technology in science and education.

	Content of Lectures	Hours/ Dates	Method of teaching, type of communication	Hours/ Dates	Type of activity, form of control	MAX Points
1	IT in Education	4/13.09.07	Problem lecture		Independent study of materials, analyses	
2	Didactic Models of Education Based on ICT	4/14.09.07	Workshop Discussion, presenting the existing models of education based on ICT	4/4.10.07	Writing an essay and presenting models of education based on ICT (placed in the Internet, on CD/DVD)	10
3	Methodology and Technologies of Distant Education	4/05.10.07	Multimedia presentation. Presenting experience of the Russian high school institutions in distant education	4/10.10.07	Preparing a report on distant education in higher education (on the example of a Russian or foreign higher educational institution)	10
4	Satellite Technologies in Education	4/06.10.07	Multimedia presentation Presenting regional experience in satellite technologies		Independent study, study of prospectives of ST at Russian higher educational institutions	
5	Methodology and Technology of Creating Educational Multimedia Software	4/11.10.07	Workshop: practical work devoted to different approaches towards expertise	4/13.10.07	Expertise of Russian educational interactive Multimedia software	10
6	Network Interactive Educational Resources	4/12.10.07	Presentation of one of the educational resources for Higher Education	4/17.10.07	Report and presentation of Russian/forging educational resources for Higher Education	5
7	Psychological and Physiological Aspects of ICT Application	4/18.10.07	Multimedia presentation. Presenting medical and psychological research data on ICT influence		Independent study, study of methodological and scientific sources. Control: test.	5
8	Information Technology in Science	4/13.10.07	Discussing students' reports. Students' presentations of the research work carried out on the bases of Internet sources	4/24.10.07	Essay devoted to one of scientific fields of study and ICT application	5
9	Competency Approach on the Bases of ICT	4/25.10.07	Multimedia presentation. Group discussion of key competencies.		Studying materials devoted to competency approach, independent study. Control: test.	5
	Final Test (Examination)	4/27.10.07				50
	Total					100

Electronic Support of Module-Rating System at SFU

The most important role in the module-credit system plays electronic support of the academic process. In Siberian Federal University automated computer system "Rating" was developed to support the innovative credit-rating system (Table 2).

Table 2: Structure of the electronic register.

Processes	Sub-Systems
Planning of the academic process (for the total period, for the term)	"Academic Process Planning"
Planning for separate disciplines	"Academic Programs for different disciplines"
Distributing resources for the needs of the academic process	"Rooms", "Schedule", etc.
Entrance examination	"University entrants"
Record of the student circulation	"Contingent"
Monitoring the students' rating	"Rating"
Scholarship calculation and university fees	"Scholarship", "Flagman"
Planning for University Publishing House and record of publications	"RIO"

In the database was included and is constantly updated the following:

- state educational standards;
- academic programs in credits for all the period of study;
- academic programs for every discipline, specifying how many credits are included in what modules, and specifying the types and work;
- target auditory of the courses (the contingent), about 50 thousand students.

When preparation for the starting academic year takes place the following is done:

- individual academic programs for students are composed;
- the working load for the chairs is calculated, traditionally in academic hours and in the new units – in credits (the amount of students is taken into consideration, all types of work including independent study);
- based on the calculated working load for each chair salary schedule is completed;
- electronic grade reports on intermediate/final rating on the bases of continuously updated information (specifying the student input for each module and types of academic activities);

Students have access to the data from the subsystems "Academic Process Planning" and "Academic Programs for different disciplines" (part of the data are printed as hand-I materials). The students use these materials to compose individual academic programs and to better understand the criteria of assessment (Figure 5). The automated system "Rating" allows promptly adding the points and carrying out continuous monitoring of the students' progress.

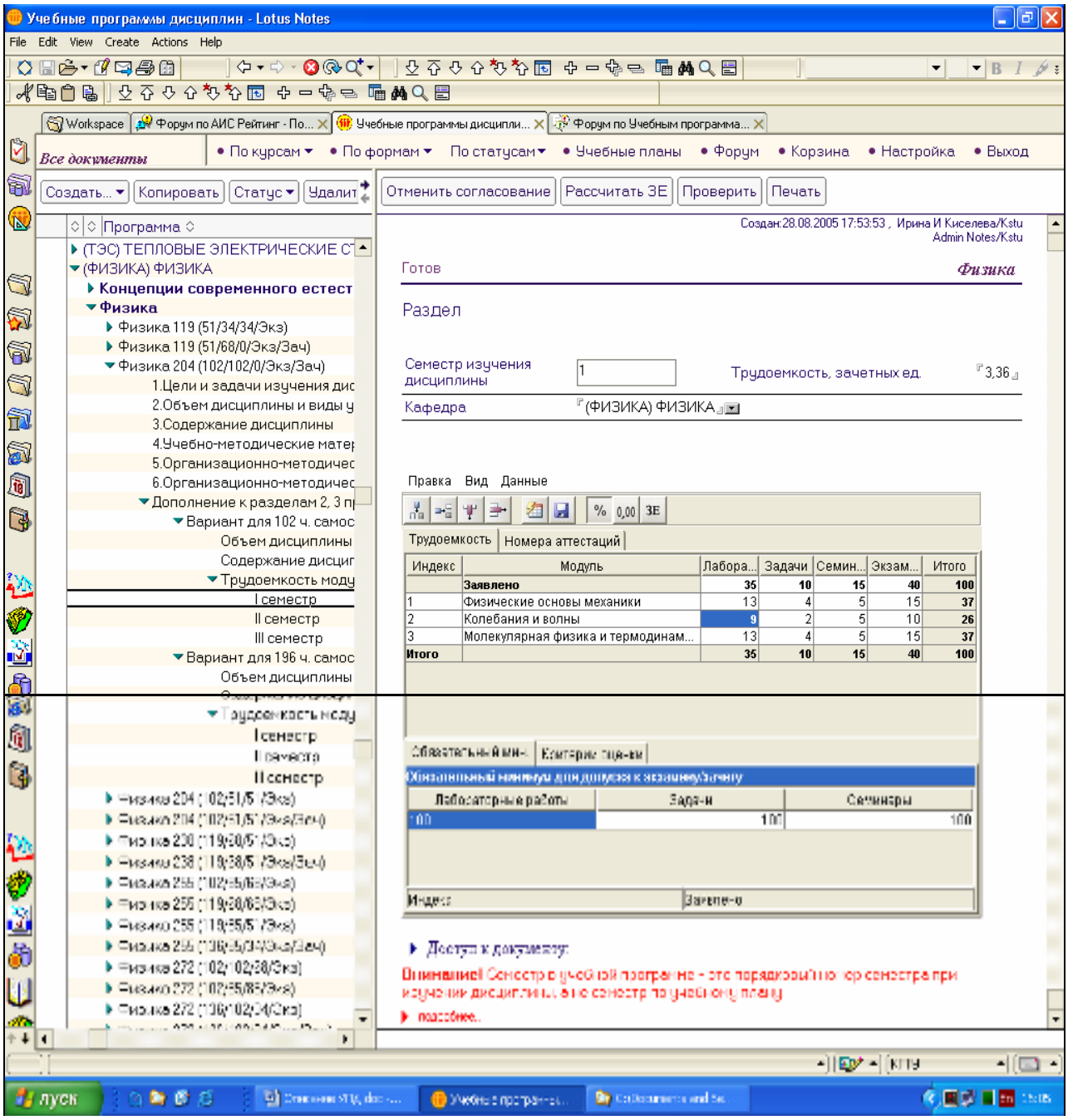

Figure 5: Access to the academic programmes for students.

Figure 6 shows electronic register for intermediary rating. It also depicts the integration character of the information system: to form grade reports the data of the following subsystem are used:

- "Academic Process Planning" – for completing the list of disciplines offered by the chairs;
- "Academic Programs for different disciplines" – to show the scheme of assessment within the discipline (modules, types of academic activities, student input)
- "Contingent" – to form the list of students.

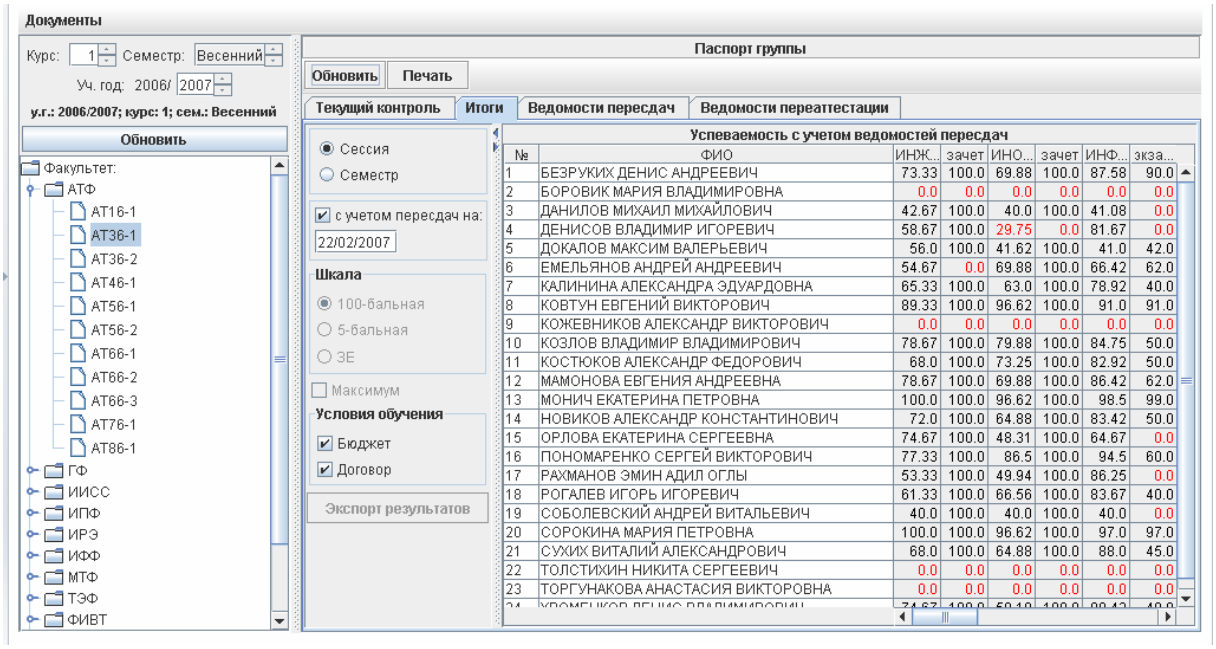

Figure 6: Electronic register of the group. Individual Rating.

Automated system of academic process administration is based on the principles allowing to integrate information of the linked documents and monitor all the interrelated processes and elements of the academic process, carry out management and administration and make up decisions taking into consideration the data analyses and redistribute the resources. The automated system also makes it easier for the teacher to monitor the academic process. The teacher having access to the university network fills in the electronic register. The students registered for the course also have access to the electronic register (Pic. 6).

In general the informational environment of the Siberian Federal University is based on different technological platforms (except for the mentioned above subsystems the University has library systems, GIS, systems for management the scientific activity and university utilities, etc. Administrators, teachers and students do not use all the modern innovative information technologies at present moment. Further development of corporate information technologies at the Siberian Federal University is planned on the bases of some high-performance integration platform, for example Intersystems Ensemble.

Electronic system of management the processes allows to make easier monitoring of the academic process (for the teacher). The teacher working within the university network fills in the electronic register. All the students, registered for this course have access to this register. Table 3 presents electronic register (Master program in IT in Science and Education). It contains the list of all types and topics of work and the maximum points a student may obtain for each.

Table 3: Electronic register. Master programme in IT in science and education.

Students' Name	13,09,06	14,09,06	4,10,06	5,10,06	6,10,06	10,10,06	11,10,06	12,10,06	13,10,06				17,10,06			18,10,06	19,10,06	Current Student's progress evaluation		27,10,06				Total	
	Information Technology in Education	Didactic Models of Teaching on the Bases of ICT	Essey+presentation devoted to Didactic Models of Teaching on the Bases of ICT(max10 points)	Methodology and Technology of Extended Education (Additional Qualification)	Satellite Technologies of Teaching (lecture)	A report on Application of Extended Education in Higher Education (max 10 points)	Methods and Technology of Creating a Multi-Media Complex	Network Educational Resources (lecture)	"Methods and Technology of Creating a Multi-Media Complex (MMC)" Presentation	"Methods and Technology of Creating a Multi-Media Complex (MMC)" Expertise of MMC	Total Amount of Points(max 10 points)	"Network Educational Resources" Presentation	"Network Educational Resources" Report	Total Amount of Points(max 10 points)	Psychological and Physiological Aspects of ICT Application (lecture) (max 5 points)	Information Technologies in Science (lecture)	max 50 points		"ICT Application in Science and Industry" Presentation (max 20)	"ICT Application in Science and Industry" Report (max 15 points)	"Competency Approach" Test (max 15 points)	Total: max 50 points	Max 100 points	Points	Mark
S1	+	+	*н*	н		*н*	н	н	н			н			н					н					
S2	+	+	*н*	+		+	+	+	н\8			н			+\5	13	**13**	**13**		н				*13*	
S3	+	+	*б\9*	б		+*9*	+	+	5	5	**10**	5	4	**9**	+\2	39	**40**	**40**	15	12	15	**42**	*82*	5
S4	+	+	*7*	н		+*0*	+	+	5	4	**9**	4		**4**	+\4,5	24,5	**24,5**	**24**	9	9	10	**28**	*52*	4
S5	+	+	*н\5*	н		*н\4*	н	н	+			+			+\4	13	**16**	**16**	10	6	6	**22**	*38*	3
S 6	+	+	*9*	н		+*8*	+	+	н\2	4	**6**	н			+\4,5	27,5	**28,5**	**28**	13	15	15	**43**	*71*	5
S7	+	+	*7*	н		+*8*	н	+	н\2	5	**7**	5	4	**9**	+\4,5	35,5	**35,5**	**35**	15	8	15	**38**	*73*	5
S8	+	+	*н\0*	н		*н\2*	+	+	5	2	**7**	4	3	**7**	+\4,5	20,5	**20,5**	**20**	19	8	4	**34**	*54*	4
S9	+	+	*10*	+		*н\4*	+	+	5	4	**9**	4	5	**9**	+\4	36	**37**	**37**		10		**10**	*47*	4
S10	+	+	*н\0*	н		*н\6*	н	н	н\-	3	**3**	н			+\4,5	13,5	**13,5**	**13**	15	8	11	**34**	*47*	3
S11	+	+	*6*	н		+*7*	+	.		3	**3**	3	3	**6**	+\3	25	**26**	**26**	8	10	12	**30**	*56*	4
S12	+	+	*7*	+		+*5*	+	+	5	3	**8**	2	4	**6**	+\4	30	**34**	**34**	12	10	10	**32**	*66*	4
S13	+	+	*8*	+		*н\8*	+	+	н	7	**7**	5	5	**10**	+\4,5	37,5	**41,5**	**41**	18	9	12	**49**	*90*	5
S14	+	+	*7*	+		+*4*	н	н	н	4	**4**	4		**4**	н	19	**19**	**19**	9	9	7	**25**	*44*	3

Thus, credit-module system of the academic process organization supported by the "Rating" system introduces innovations into the educational practice at SFU, implements elements of the Bologna system and makes the educational process transparent for all its members.

Problems and Prospects of Implementation of the Bologna System into the University Academic Process

To reach the anticipated benefit from the credit-module system we are to overcome the existing problems. Among the anticipated benefits there are:

- Increasing efficiency of education thanks to systematic control by means of rating current students' progress;
- More differentiated students' progress evaluation;
- Possibility of introducing differentiated fee for educational services;
- Support of academic mobility; and
- Possibility of issuing diplomas of international standard.

We are ready to face the following problems:

- No coincidence between the existing state educational standards and absence of mechanisms, checking correspondence of the academic programs to the standards;
- Reform of the existing system of academic process administration;
- No coincidence between the existing norms and practical approach in filling in the educational documentation;
- The number of tests and examinations within one term is limited;
- The necessity to get accustomed to the new system, both for teachers and students.

We are interested in international partner higher educational institutions for cooperative work in the following areas:

- Training for teachers, cooperative lectures and workshops, held by teachers of the two universities.
- Cooperative seminars – discussions, presenting the two scientific schools by teachers of the two universities, workshops. Exchange programs devoted to studying quality assurance mechanisms and expertise.
- Student exchange for studying 1 or 2 modules, carrying out empirical research work (in sociology, quality assurance, administration).
- Workshops for students in different fields of study.
- Participation of students and teachers of partner higher educational institutions in launching Master degree program during educational games, holding training workshops, professional orientation (1st week of September).
- Intensive workshops for students (from both universities), cooperative pedagogical research work in comparative study of educational systems; and
- Holding on-line conferences, forums for students and teachers, for presenting projects and cooperative discussions.

Perhaps someone will find our educational process boring and overloaded with formal documentation. This is not true. Every year we start a Master degree program with the game named "Professional Self-Identification". This game is held outside the university and is headed by the team of teachers; it lasts 5 days, each of them includes intensive training, discussions and game activities. We possess and actively use the unique technology of holding organizational games which allow us to set and reach educational objectives and goals of a large scale. These goals and objectives are connected with the self-determination, mastering the basic competencies, group work, problem of leadership, productive communication and critical thinking. We hold interdisciplinary workshops, consultations and discuss synopses of the students' future Master thesis. The 1st Module of the Master academic program starts after the organizational game which guides students toward the scientific work.

Beginning from this year we started to implement the **Reflexive Electronic Portfolio method** into the Game to extend the traditional method of assessment and storing of the qualitative data and this is the contribution to the method of individual progress assessment.

Students include into the electronic Portfolios their reflexive reports of the game activity, essays describing professional goals and competencies, personal principles, self-study of the educational style, and prospective career ambitions. Among the artifacts of the portfolio there are resumes, certificates, descriptions of individual progress and achievements which may help in finding a job and making a self-presentation to the prospective employers.

Thus, our educational reform is not limited by the credit-rating system only. As it was stated in the work by the Rector of Higher School of Economics, State University Kuzminov Y.I. [4] "Credit frame is only the system which provides measurability and comparability of the results of education in the context of different types of qualifications, programs and educational environments, standard (accepted) tool to compare the programs.

Credits by themselves have only one measurement – the working load, but in the Diploma appendix credits are added to the other information about the higher educational institution, the degree obtained by the graduate, its level, content, quality of the works completed by the graduate (in marks), etc.". We support this point of view and believe that in the temporary situation when the system of Russian education is undergoing the process of innovative changes it is necessary to develop qualitative methods of assessment and university brand.

Conclusions

The considerable part of our efforts we spend on extending the traditional system of student progress assessment. Beginning from the previous year elements of electronic portfolio were introduced into the academic programs for Master and Bachelor degrees in Education and Psychology. In this context the electronic portfolio is the reflexive, prolonged method of students' progress evaluation. Our University joined the experiment on reforming the system of higher education, oriented on the competency approach and knowledge society.

For realization of the new models it is necessary to fundamentally reform the existing system of education in Russia and its administration to integrate into the Bologna process.

The Siberian Federal University constructs a new system of professional training and retraining of high school teachers based on a multi-level foundation (Bachelor, Master and Doctor degrees) heading for international standards of quality in education and ECTS, taking into consideration specific needs of the region (deficit of the highly qualified top managers for mining industry, for example).

We are open for international partnership and launching joint Master programs in Psychology and Education together with the European universities and for joint educational and scientific projects.

References

1. Organization for Economic Cooperation and Development, World Bank, 2002
2. Program for Development of Federal State Educational Institution of Higher Professional Education "Siberian Federal University" for 2008, Krasnoyarsk, RIO, 106 pp..
3. Glossary on the Bologna Process, http://bologna.owwz.de
4. Y.I. Kuzminov, L.L. Lubimov, M.V. Larionova, European Experience in Formation of the General Understanding of the Content of Qualifications and Degrees. Competency Approach, http://www.rc.edu.ru

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(B.1)

Assessment of social and emotional intelligence : A study with Portuguese gifted and non gifted children

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Abstract
The study of multiple context individual variability constitutes one of the major challenges for Psychology. Recent research suggests the necessity to complement traditional intelligence approaches taking into account other "intelligences" or other cognitive functions as social and emotional intelligence (Goleman, 2006; Jones & Day, 1997). Dissatisfaction with such models requires a complementary position with socio-cognitive approaches that propose a close connection with the person's culture, learning and life experience (Sternberg & Grigorenko, 2003). Thus it is important, in psychological theories on cognition, to bear in mind the diversity of sources that can explain inter and intrapersonal differences. The present work is focused on the description of social and emotional intelligence and its relationships with social and emotional competences in gifted and non-gifted children and their relationship with abstract intelligence.
Based on a study with 32 gifted children and 369 non gifted children, we applied Bar On Emotional Quotient Inventory: Youth Version (EQ-i:YV; original version of Bar-On & Parker, 2004), Cognitive Test of Social Intelligence for Children (PCIS-6/11; Candeias et al., 2008), Social Competence Test for Children (PACS-6/11, Candeias et al., 2008) and Coloured Progressive Matrices (CPM, Raven, 1965); we examined the way in which Social Intelligence dimensions (Interpersonal Problem Solving, Familiarity, Motivation and Self-confidence), Emotional Intelligence dimensions (Adaptability, Interpersonal, Intrapersonal: Positive Impression, Intrapersonal: Expression of emotions, Stress Management) and Abstract Intelligence are related to Social Competence in gifted and non-gifted children. Regression analysis supports our analysis in order to understand the influence of abstract intelligence and emotional and social cognition at social competence in gifted and non-gifted children.
These findings allow a more specific and significant way to assess and to identify social and emotional intelligence and its relationships with social and emotional competences in general, particularly in gifted children, and are one way to promote a new look at human abilities and social competence, specially for assessment and intervention.

Keywords: Social intelligence; emotional intelligence; abstract intelligence; psychological assessment; Giftedness, Talent.

Introduction

The study of multiple context individual variability constitutes one of the major challenges for Psychology. Recent research suggests the necessity to complement traditional intelligence approaches taking into account other "intelligences" or other cognitive functions like social and emotional intelligence (Goleman, 2006; Jones & Day, 1997). Dissatisfaction with such models requires a complementary position with socio-cognitive approaches that propounds a close connection to the person's culture, learning and life experience (Sternberg & Grigorenko, 2003), bearing in mind the diversity of sources that can explain inter and intrapersonal differences.Common sense portrays a rather skewed view of gifted and talented youth as socially and emotionally ill adjusted. However, recent summary research produced by the National Association for Gifted Children and the National Research Center on the Gifted and Talented (USA) showed that high ability youth are generally, at least, as well adjusted as any other students (Reis & Renzulli, 2004; Neihart, Reis, Robinson, N. & Moon 2002) although they are likely to face sources of risk to their social and emotional development. The assessment of emotional and social functioning could support program planning in order to prevent and develop abilities and competences to cope with such risk. This work is focused on the description of social and emotional intelligence and its relationships with social and emotional competences in gifted and non gifted children and their relationship with abstract intelligence. Such analysis will allow us to identify more specific and significant ways to assess and to identify children's

socio-emotional cognitive process characteristics in general, and in gifted children particularly, and could improve a new approach to look at human abilities and socio-emotional competence.

Social and emotional intelligence in adjustment of gifted and talented children

Recent studies (Kihlstrom & Cantor, 2000; Candeias, 2007; 2008) about Social intelligence and Emotional Intelligence (Bar-on & Parker, 2004; Goleman, 2006; Mayer, Salovey, & Caruso, 2000) pointed out to a more accurate representation of what personal and social adaptability are and how subjects learn and develop their knowledge about these domains, with reference to a process of growing autonomy and awareness in managing their life projects (personal and professional). The study of such constructs could promote a new examination of human abilities and development, with reference to the social and cultural environment, as well as to the changes in the instruments used for its assessment and methods of intervention for its enrichment.

The Emotional Intelligence construct has its roots in Thorndike's (1920) concept of Social Intelligence, Gardner's (1983) concept of personal intelligence and related themes, focusing on the ability to understand and deal with others and to engage competently in social situations. Although numerous other researchers soon adopted the term Emotional Intelligence, often modifying and expanding its meaning, those researchers have devoted very little systematic and scientifically acceptable research to operationally defining and testing Emotional Intelligence and the tools they claim to have used can assess it (Amitay & Mongrain, 2007). In contrast, a methodical investigation of Emotional Intelligence led Mayer et al. (2000) to focus on what they considered to be a quantifiable conceptualization of this construct. Such abilities comprise what Mayer et. al. identified as the four branch model of Emotional Intelligence: (a) perceiving emotions, (b) using emotions to facilitate thought, (c) understanding emotions, and (d) managing emotions.

Mayer et al. (2002) reported on a number of still unpublished studies which show positive correlations between different branch scores on the MSCEIT (Mayer-Salovey-Caruso Emotional Intelligence Test) and attachment security. Different MSCEIT tasks have also been associated with perceptions of support and reassurance of one's worth within one's social network, as well as feelings of closeness and the provision of support to people in one's life. Finally, Amitay & Mongrain (2007) report that high levels of Emotional Intelligence were highly correlated with a feeling of connectedness and caring for significant others. In short, researchers have successfully used the ability-based measures of Emotional Intelligence to demonstrate that people who are more adept at perceiving, understanding, and using emotions tend to enjoy healthier self-esteem and more positive or supportive relationships. Demonstrating that Emotional Intelligence is related to social functioning would support the emerging literature on the importance of emotional abilities for building better quality relationships. As Bar-On & Parker (2004, 1) proposed "Emotional Intelligencen pertains to the emotional, personal and social dimensions of intelligence. Emotional Intelligence comprises abilities related to understanding oneself and others, relating to people, adapting to changing environmental demands, and managing emotions".

Interest in social and emotional intelligence has generally increased, particularly because schools and organizations demand new ways of understanding and assessing human performance; today's interaction settings and new work demands imply interpersonal activities which require both social abilities and the ability to live and work autonomously in both personal and group activities. These must be applied to understanding and supporting gifted and talented children and youth because they can often face a number of situations that constitute sources of risk if their needs are not met (Candeias, 2004). Three main areas represent risks to gifted and talented youth: (i) issues deriving from their academic achievements as compared with their peers; (ii) common psychological responses to talents, as underachievement and perfectionism; and (iii) their dual identification as having a learning disability or attention deficit and also having talents and gifts (Pérez, 2000; Candeias, 2005; Neihart et al., 2002; Reis & Renzulli, 2004).

Whereas intelligence and emotion were often considered in opposition, accumulating research in the 1980s documented how cognition and affection were integrated processes; affection influences many aspects of cognitive functioning, including memory, attention, and decision making (Brackett, Lerner, Rivers, Salovey & Shiffman, 2006).

This means studies of social and emotional intelligence are becoming increasingly important if one wants to understand the individuals' knowledge, thinking and behavioral processes (Kihlstrom & Cantor, 2000; Candeias, 2004). The performance of individuals on every task, clearly, involves, at the same time, types of mental processes (reasoning, memory, perception, creativity) as well as types of contents of the task to be performed (verbal, numerical, spatial, figurative, social, emotional). Thus it is important, in psychological methods, to assess cognition bearing in mind the diversity of sources which can cause and explain inter and intrapersonal differences. So, researchers have turned their attention to discovering components of effective living, in order to develop assessment tests that propose a close connection to the person's culture, learning and life experience (Candeias, 2004; Sternberg, 1998).

This is a theoretical work, supported by socio-cognitive approaches to cognition and behavior. So, the Social Intelligence and the Social Competence constructs are defined as complementary constructs which allows us to conceptualize the interaction amongst vast psychological categories (e.g., Ford 1995; Candeias, 2007, 2008; Greenspan & Driscoll, 1997; Mayer, Salovey & Caruso, 2000). In this context, the social intelligence construct can be understood through two dimensions: cognitive and behavioral (e.g., Jones, & Day, 1997; Wong, Day, Maxwell & Meara 1995). Although some recent studies have demonstrated a multidimensional nature of social intelligence, they provide no theoretical rationale for its distinct aspects. Still, another recent study (Candeias, 2001) provides empirical support to distinguish between several dimensions of the cognitive facet of social intelligence: skills for social ill/well structured problem solving and metacognitive skills for social problem solving. This study, developed with adolescents, found that the social cognitive process operates with different kinds of features and strategies, suggesting its selective use in relation to task- situation characteristics.

Given the importance of a careful understanding of psychological human complexity, we elected to focus on the role of cognition in socially intelligent behavior by examining two different dimensions of social intelligence – Cognitive and Behavioral – as a way of supporting a theoretical rationale leading to a more reliable understanding of social behavior and social cognition complexity. The Cognitive Dimension focuses on the cognitive process and contents underlying interpersonal problem solving, and the Behavioral Dimension focuses on social effectiveness in social situations.

Emotional Intelligence operates on “hot” cognitions or information processing that involve matters of personal and emotional importance for individuals and their relationships (Brackett, Lerner, Rivers, Salovey & Shiffman, 2006). Emotional Intelligence is distinguishable from other mental skills, such as verbal–propositional intelligence, which operates primarily on “cold” cognitive processes. Emotional Intelligence is also conceptually and empirically distinct from temperament and personality traits, such as neuroticism (see Mayer, Salovey, & Caruso, 2004; Brackett, Lerner, Rivers, Salovey & Shiffman, 2006).

This conceptualization about social and emotional intelligence, as well as, social competence, would support the understanding of new proposals of psychological assessment about it, based on a socio-cognitive approach to gifted an non-gifted students. Therefore, we believe that with such assumptions we could develop sophisticated assessment tools that are more valid and closer to human psychological functioning and complexity.

In summary, our study examined the way in which Social Intelligence dimensions (Interpersonal Problem Solving, Familiarity, Motivation and Self-confidence), Emotional Intelligence dimensions (Adaptability, Interpersonal, Intrapersonal: Positive Impression, Intrapersonal: Expression of emotions, Stress Management) and Abstract Intelligence are related to Social Competence in gifted and non-gifted children.

More specifically, in keeping with the results of previous studies, we hypothesized that abstract intelligence, as well as, emotional and social intelligence could predict, in a different way, social competence in gifted and non-gifted children.

Method

Participants

All participants were Portuguese children, 369 are non-gifted children from regular class (189 girls and 180 boys, with the average age of 8.64 years, SD = 9.32) and 32 were gifted children (7 girls and 25 boys, whose average age was 10.9 years, SD = 2.92), identified within special educational teams. The study was conducted from April to June, 2007.

Procedure

The administration of the tests took place during a single fifty-minute session during lesson hours and in the presence of the researcher. Responses to the questionnaires were provided on a total voluntary basis, after the authorization of parents. Collected data are analyzed through SPSS.

Measures

– Bar On Emotional Quotient Inventory: Youth Version (EQ-i:YV; original version of Bar-On & Parker, 2004).

Emotional Intelligence dimensions were measured by EQ-i:YV. This instrument is made up of 60 items and provides an indicator of perceived emotional intelligence levels. The participants are requested to evaluate the extent to which they agree with each of the items on a 4-point Likert-type scale that ranges from "Never" (1) to "Always" (4). The original scale is made up of six scales: Intrapersonal, Interpersonal, Adaptability, Stress Management, General Mood, Positive Impression (Bar-On & Parker, 2004). In Portuguese studies (Candeias et al., 2008) the questionnaire has great validity of construct, proved by factorial analyses, in which the multidimensionality of the questionnaire are shown, pointing out for five dimensions: Adaptability, Intrapersonal-Positive Impression, Interpersonal scale, Intrapersonal-Expression of Emotion and Stress Management. Candeias et al. (2008) found an internal consistency of .87 for Total EQ-i:YV (Total EQ), and .86 for Adaptability scale (EQ-AS), .83 for Intrapersonal-Positive Impression scale (EQ-PI), .81 for Interpersonal scale(EQ-IS), .70 for Intrapersonal-Expression of Emotion scale (EQ-EE) and .69 for Stress Management (EQ-SM), improving the full version questionnaire properties.

– Cognitive Test of Social Intelligence for Children (PCIS-6/11; Candeias et al., 2008):

Social Intelligence dimensions were measured by means of the PCIS-6/11. The participants are expected to analyse an interpersonal problem-situation (in a pictorial format), in three major dimensions: Interpersonal Problem Solving (PCIS-IPS), which is evaluated through a questionnaire in which the participants are requested to percept and describe the interpersonal situation, to point out the main features from the situation that contribute to understand the situation, to point out one or more solutions for that interpersonal problem, and to choose the best solution and justify it; Familiarity or Experience (PCIS-F) in similar situations, to evaluate on a 1-to-5 Likert scale, in which 1 is "Never happens" and 5 is "Always happens"; Motivation and Self-confidence (PCIS-M) toward this kind of interpersonal situation, evaluating on a 1-to-5 Likert scale, that ranges from "I strongly disagree" (1) to "I strongly agree" (5).

The test has great validity of construct, proved by confirmatory factorial analyses, in which the multidimensionality of the questionnaire is shown (Candeias, 2007). Candeias et al. (2008) found an internal consistency of .93 for Interpersonal Problem Solving, .78 for Motivation and Self-confidence, and .72 for Familiarity or Experience.

– Social Competence Test for Children (PACS-6/11, Candeias et al., 2008):

Social Competence was measured by means of the PACS-6/11. The participants are expected to analyse five interpersonal problem-situations (in a verbal format), in which the participants are requested to self-evaluate social competence performance and facility on a 1-to-3 Likert scale, in which 1 is "Poor" and 3 is "Excellent". Candeias et al. (2008) found an internal consistency of .82 for PACS-6/1, and points out a global interpretation from the dimensionality of the questionnaire, based on analysis of the validity of construct, proved by factorial analysis.

– Coloured Progressive Matrices (CPM, Raven, 1965):

Abstract intelligence was measured by CPM. The participants are expected to solve 36 items (3 series), choosing the correct solution among 6 options. We've used the Portuguese adaptation (Simões, 2000), with an internal consistency of .89.

Results and discussion

A correlation analysis was carried out to determine if Social Intelligence dimensions (Interpersonal Problem Solving, Familiarity, Motivation and Self-confidence), Emotional Intelligence dimensions (Adaptability, Interpersonal, Intrapersonal: Positive Impression, Intrapersonal: Expression of emotions, Stress Management) and Abstract Intelligence are related to Social Competence in gifted and non-gifted children (see Table 1 and 2).

Table 1: Correlations of the studied variables in the group of non-gifted children.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. CPM	1										
2. Total EQ	-,048	1									
3. EQ-AS	-,016	,829(**)	1								
4. EQ-PI	,063	,810(**)	,661(**)	1							
5. EQ-IS	-,005	,798(**)	,652(**)	,736(**)	1						
6. EQ-EE	-,078	,654(**)	,683(**)	,468(**)	,389(**)	1					
7. EQ-SM	,197(**)	,344(**)	-,094	,144(*)	,128(*)	-,070	1				
8.PACS	-,064	,239(**)	,418(**)	,209(**)	,235(**)	,260(**)	-,002	1			
9. PCI S-IPS	,277(**)	-,069	,069	,012	,006	,008	,029	,051	1		
10. PCIS-M	-,009	,062	,244(**)	,116(*)	,149(**)	,207(**)	-,020	,201(**)	-,068	1	
11. PCIS-F	-,255(**)	,130(*)	,101	,076	,019	,219(**)	-,132(*)	,214(**)	-,187(**)	,204(**)	1

(Notes: * $p<.05$; ** $p<.01$, (2-tailed)).

Table 2: Correlations of the studied variables in the group of gifted children.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. CPM	1										
2. Total EQ	-,155	1									
3. EQ-AS	-,179	,860(**)	1								
4. EQ-PI	-,184	,902(**)	,752(**)	1							
5. EQ-IS	-,335	,857(**)	,638(**)	,782(**)	1						
6. EQ-EE	-,244	,615(**)	,739(**)	,457(*)	,340	1					
7. EQ-SM	,212	,483(**)	,089	,358	,425(*)	,087	1				
8.PACS	-,240	,307	,576(**)	,651(**)	,648(**)	,424(*)	,240	1			
9. PCIS-IPS	-,276	,008	-,083	-,029	,086	-,164	,122	,221	1		
10. PCIS-M	-,232	,110	,412(*)	,389(*)	,324	,162	,012	,444(*)	,005	1	
11. PCIS-F	-,551(**)	-,062	-,127	-,262	-,206	,126	-,411(*)	-,016	,266	,090	1

(Notes: * $p<.05$; ** $p<.01$, (2-tailed)).

The analysis of table 1 and 2, indicates that cognitive dimension of Social Intelligence (PCIS-IPS) presents a significant correlation with abstract intelligence (CPM), in non-gifted group. As we can observe, in the non-gifted children's group there are some significant statistical results that demonstrate a significant positive correlation between Stress Management dimension of Emotional Intelligence (EQ-SM) and Abstract Intelligence (CPM) ($p<.01$). Likewise, Abstract Intelligence (CPM) is also positively correlated with Interpersonal Problem Solving dimension (PCIS-IPS) and Familiarity dimension (PCIS-F) of Social Intelligence ($p<.01$). In the group of gifted children there is

a significant negative correlation between Familiarity dimension (PCIS-F) of Social Intelligence and Abstract Intelligence (CPM) (p<.01).

As for Emotional Intelligence (Total EQ and scales), and for Social Intelligence (dimension Motivation: PCIS-M) correlations are positively significant (p<.05), with Social Competence (PACS), in gifted and non-gifted children. Otherwise, correlation between Social Intelligence (dimension Familiarity: PCIS-F) and Social Competence is positively significant (p<.05), for non-gifted but non-significant for gifted children.

Emotional Intelligence (Stress Management: EQ-SM) is significantly negative (p<.05), related with Social Intelligence (Familiarity dimension: PCIS-M). Adaptability dimension and Positive Impression dimension of Emotional Intelligence are positively significant (p<.05), related with Motivation/Self-Confidence dimension (PCIS-M) in gifted children. In non-gifted group we could observe the same correlation between Emotional Intelligence and Social Intelligence. In other hand, with the same group, Emotional Intelligence dimensions – Interpersonal and Expression of Emotion – have significantly positive correlation (p<.01), with Social Intelligence (dimension Motivation); and Emotional Intelligence dimensions – Total EQ and Expression of Emotions - are significantly related with Social Intelligence (Familiarity dimension).

In order to understand the influence of abstract intelligence, as well as, emotional and social cognition at Social competence (PACS: 6/11) in gifted and non-gifted children we made an analysis of regression (stepwise procedure), in order to understand how such variables could be understood as predictors of Social competence. We also considered academic variables (performance in academic tests of Mathematics and Portuguese, and in Socioeconomic level and Age) (Tables 3 and 4).

In table 3 (non-gifted children) we can see that the value of R2= .333 (F=15.952; p<.01) representing 33.3% of the variability that occurred in Social Competence is explained by the Adaptability dimension of Emotional Intelligence. In the same table we present coefficients of regression (Beta coefficient), the values of t and p for each variable which enters in the equation, as well as the values of explained variance from criteria variable (r part.).

Table 3: Analysis of regression (Social Competence: PACS: 6/11; Non-gifted children).

Variable	**Beta Coefficient**	**t**	***p***	**r part.**
EQ-AS	,577	3,994	,000	,577 (33,3%)

Table 4: Analysis of regression (Social Competence: PACS: 6/11; Gifted children).

Variable	**Beta Coefficient**	**t**	**p**	**r part.**
EQ-PI	,355	1,576	,149	,635 (34,8%)
Test of Portuguese	-,711	-4,347	,002	,826 (27,0%)
EQ-IS	,607	2,493	,034	,901 (13,1%)

In table 4 (Gifted children) we can observe that the value of R2= .749 (F=12,924; p<.01), represents 75% of the variability that occurred in Social Competence is explained by Positive impression (34,8%), the performance in academic tests of Portuguese (language) (27%) and Interpersonal competence (13,1%). In the same table we present coefficients of regression (beta coefficient), the values of t and p for each variable which enters in the equation, as well as the vales of explained variance from criteria variable (r part.).

Discussion

Results of the statistical analyses which have been carried out show a close relationship between cognitive functioning (CPM) and cognitive basis of social problem solving (PCIS-IPS), in non-gifted children, but not in gifted children, as if non-gifted children didn't use their cognitive abilities to learn,

to think, to develop strategies and to solve interpersonal and emotional problems, but rather for intellectual interests, essentially, in accordance to some results obtained by Brown, 2006; Candeias, 2004, 2005; Neihart, 2002; Pérez, 2000; and Pires et al., 2008, that point out that gifted children show preference for intellectual activity which does not favour gifted children's interpersonal and intrapersonal development and reasoning.

In our study, the results stress a close relationship between Emotional Intelligence, Social Intelligence, namely Motivation to perceive, cope and solve social situations and Social Competence, like the results obtained in other studies suggests (Bar-on & Parker, 2004; Ford 1995; Candeias, 2007, 2008; Greenspan & Driscoll, 1997; Mayer, Salovey & Caruso, 2000). Otherwise the results show a different relationship between Experience and Familiarity with social situations and Emotional intelligence and Social competence, as if in non-gifted children the experience with social tasks constituted an important way to develop social and emotional competences, but not in gifted children. Maybe this occurs because they prefer intellectual activities as we have already pointed out and other studies have shown (Brown, 2006; Candeias, 2004, 2005; Neihart et al., 2002).

When we consider the relationship between Social Intelligence and Emotional the results show a close interaction between some dimensions in both participants of our study. Social Intelligence, namely Motivation to perceive, cope and solve social situations has a close interaction with the Emotional Intelligence Adaptability, or flexibility and efficiency in dealing with everyday problems and with the Positive impression or the emotional competence to attempt and create an overly positive self-impression. Finally, in both groups, when familiarity and experience with social problems rises stress management and calmness get lower, as if participants' experience in interpersonal and intrapersonal tasks could not to be all that important to improve regulation on emotions in stressful events, or as if our participants don't have a realistic self-evaluation of social experience and familiarity. Self-evaluation presupposes a metacognitive process of analysis and most of our participants are children. In the group of non-gifted participants our results point out to a close relationship between Motivation for social interaction and emotional competences in Intrapersonal and Interpersonal competences as expression of emotions and good relationships, in situations where they could be good listeners of others' feelings. Likewise the results of the non-gifted group show a close interaction between Familiarity and experience in dealing with social tasks and Emotional Intelligence in general. So, as the study has already pointed out, these results suggest the interests of gifted children for intellectual activities seem to explain such different interactions between social and emotional competences. In future studies it will be interesting to introduce an interest and motivation questionnaire to clarify that relationship in Portuguese gifted and non-gifted children.

Finally, our study shows that Social competence is differently influenced in Gifted and Non-gifted participants. In the first group the most important predictor of social competence is adaptability or the flexibility to be realistic and to be efficient in managing change in everyday problems. For the gifted group the best predictors are positive self-impression, academic performance in language and interpersonal competence to have satisfying relationships and to understand the feelings of others. Curiously, it seems that academic performance in language enters in the model of predictors in a negative sense. Like other studies show, academic performance is not a priority for many gifted children (Candeias, 2005; Neihart et al., 2002), they prefer their own intellectual activities and extra-scholar interests with the socio-emotional consequences already mentioned in what matters adaptability and adjustment of gifted children.

To conclude, the results of this study have several implications for psychological assessment and intervention. First, they provide foundations for developing differential norms for standardized assessment instrument of social and emotional competences, which enables more reliable and ecologically valid tools in Psychology. On the other hand, this kind of assessment approach could be very useful for intervention, because it could provide us with the characterization of gifted individuals' social and emotional potentials and needs, which makes the planning and implementation of more accurate counseling intervention possible, as well as monitoring and evaluating its effects. So, this approach will provide us with more accurate and specific information about gifted individuals'

cognitive functioning, with reference to a process of growing autonomy and awareness in the management of one's life projects with allusion to the social and emotional development and adjustment.

References

Amitay, O. A. & Mongrain, M. (2007). From Emotional Intelligence to Intelligent Choice of Partner. *The Journal of Social Psychology*, *147*(4), 325-343.

Bar-On, R. & Parker, J. (2004). *BarOn Emotional Quotient Inventory: Technical Manual*. New York: MHS.

Brackett, M. A., Lerner, N., Rivers, S. E., Salovey, P. & Shiffman, S. (2006). Relating Emotional Abilities to Social Functioning: A Comparison of Self-Report and Performance Measures of Emotional Intelligence. *Journal of Personality and Social Psychology*, *91*(4), 780–795.

Candeias, A. M. (2001). Social Intelligence: Studies of conceptualization and operacionalization of the construct. PhD Thesis. Évora: Universidade de Évora.

Candeias, A. A. (2004). The influence of the psychological assessment of social intelligence on enrichment programs to gifted and talented students. In, European Council for High Ability (Ed.). Educational Technology for Gifted Education From Information Age to Knowledge Era, University of Navarra (Cd-Rom).

Candeias, A. A. (2005). Avaliação dos riscos sociais e emocionais dos alunos com altas habilidades. *Sobredotação*, *6*, 267-280.

Candeias, A. A., (2007). *Prova Cognitiva de Inteligência Social*. Lisboa: CEGOC.

Candeias, A. A., (2008). *Inteligência Social: O que é e como se avalia?*. Lisboa: Fundação Calouste Gulbenkian.

Candeias, A. A., Almeida, L. S., Roazzi, A. & Primi, R. (2008). *Inteligência: Definição e medida na confluência de múltiplas concepções.* São Paulo: Casa do Psicólogo.

Ford, M. (1995). Intelligence and personality in social behavior. In, D. Saklofske & M. Zeidner (Eds.), *International Handbook of Personality and Intelligence* (pp. 125-140). New York: Plenum Press Press.

Goleman, D. (2006). *Inteligência Social*. Lisboa: Temas e Debates.

Greenspan, S. & Driscoll, J. (1997). The role of intelligence in a broad model of personal competence. D. Flanagan, J. Genshaft & P. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (pp. 131-150). London: The Guilford Press.

Jones, K. & Day, J. (1997). Discrimination of two aspects of cognitive-social intelligence from academic intelligence. *Journal of Educational Psychology*, *89*(3), 486-497.

Kihlstrom, J. & Cantor, N. (2000). Social Intelligence. In R. J. Sternberg (Ed.), *Handbook of Intelligence* (pp. 359-379). Cambridge: Cambridge University Press.

Mayer, J., Salovey, P. & Caruso, D. (2000). Models of emotional intelligence. In R. J. Sternberg (Ed.), *Handbook of Intelligence* (pp. 396-420). Cambridge: Cambridge University Press.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *MSCEIT user's manual*. Toronto, Canada: Multi-Health Systems.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2004). Emotional intelligence: Theory, findings and implications. *Psychological Inquiry*, *15*, 197_215.

Neihart, M. (2002). Risk and resilience in gifted children. In M. Neihart, S. reis, N. Robinson & S. Moon (Ed.). *The social and emotional development of gifted children What do we Know?* (pp. 113-124). Waco, Texas: Prufrock Press, Inc.

Neihart, M.; Reis, S.; Robinson, N. & Moon, S. (2002). *The social and emotional development of gifted children: What do we Know?* Waco, Texas: Prufrock Press, Inc.

Perez, L. (2000). Educación familiar de los niños sobredotados: Necessidades y alternativas. *Sobredotação*. *1*(1), 47-64.

Pires, H., Matos, A. & Candeias, A.A. (2008). (Des)encontros de pais com filhos sobredotados. *International Journal of Development and Educational Psychology*, *1*(4). (pp.417-424).

Raven, J. C. (1965). *Guide to using the Coloured Progressive Matrices*, Set A, Ab, B. London: H.K. Lewis.

Reis, S. & Renzulli, J. (2004). Current research on the social and emotional development of gifted and talented students: Good news and future possibilities. *Psychology in the Schools*, *41*(1), 119-130.

Simões, M. M. (2000). *Investigações no âmbito da aferição nacional do teste das matrizes progressivas coloridas de Raven*. Lisboa: Fundação Calouste Gulbenkian.

Sternberg, R. J. (1998). All intelligence testing is "cross-cultural." In R. J. Samuda e colaboradores (Eds.), *Advances in cross-cultural assessment* (pp. 197-215; 274-285). Thousand Oaks, CA: Sage Publications.

Sternberg, R. J. & Grigorenko, E.L. (2003). Evaluación dinámica. Barcelona: Paidós.

Thorndike, E. L. (1921). Intelligence and its measurement: A symposium. *The Journal of Educational Psychology*, 22, 124-127.

Wong, C-M., Day, J., Maxwell, S. & Meara, N. (1995). A multitrait-multimethod study of academic and social intelligence in college students. *Journal of Educacional Psychology*, *1*, 117-133.

About the Author

Adelinda Araújo Candeias has a Ph.D. in Psychology since 2002. She is Auxiliary Professor at the Department of Psychology in University of Evora – Portugal. She is a member of the Coordination Council of Research Center on Education and Psychology. In 2005, she received the first prize from CEGOC for the Cognitive Test of Social Intelligence (PCIS). Her research interests include: Psychological assessment, cognitive psychology, intelligence, creativity and cognitive potential. Dr. Adelinda was the editor of a number of books about intelligence, creativity and social intelligence in Portugal and Brazil.

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(B.2)

Fred A. Bonner; Aretha Marbley; Michael Jennings; Lesley-Ann Brown, Capitalizing on Leadership Capacity: Gifted African American Males in Secondary School.

(B.3)

Jong P. Lee, Challenging and Cultivating Mathematically Talented Students: How do we meet the needs of mathematically gifted students to nurture their talent with creative problem solving activities that are the fundamental reason for studying mathematics and sciences? In this highly technological world, students greatly benefit by studying high level mathematics and developing their full potential in the mathematical sciences. Yet many promising gifted students lose their mathematical talent because it is uncultivated. The Institute of Creative Problem for Solving Gifted and Talented Students in Long Island, New York provides interesting workshop sessions in mathematical problem solving to gifted students in grades 5-10. These classes are given on Saturdays as an extension to their regular study during the academic year. Each session is divided into three sections by grade groups; one for students in grades 5 & 6, another for students in grades 7 & 8 and a third for students in grades 9 & 10. The Institute's activities include studying topics not usually covered in standard school curricula, such as devising creative problem-solving strategies and approaches; sharpening mathematical and scientific intuition, motivational lectures and discussions, cooperative teamwork, research-oriented activities, counseling and mentoring. The presentation covers the pedagogical strategies for developing critical thinking and creativity, and the issues of learning in an encouraging environment and the role the parents play in cultivating the gifted child.

About the Author

Professor Jong Pil Lee is an innovator and leader in mathematics education. A Distinguished Service Professor at the State University of New York at Old Westbury, he has mentored thousands of students and teachers in mathematics. He joined the faculty of the State University of New York in 1973. The need for improving math skills among young people has been well publicized nationwide. Working to meet the national need, Professor Jong P. Lee, in 1987, founded LIMACON, among the nation's largest one-day regional mathematics conferences. Each year more than 500 mathematics educators from the metropolitan New York area participate in this forum for innovative ideas and common goals, improving the effectiveness and vision in mathematics education nationwide. He has a long history of dedicated service and pioneering groundbreaking programs. In 1986, Dr. Lee founded and became project director of the Institute for Leadership Training for Teaching Mathematics and Technology, which provides in-service training for hundreds of teachers from the Metropolitan New York area. In keeping with his objective of helping the United States maintain and improve its leadership position in a technological world, in 1992 he founded the Institute for Creative Problem Solving for Gifted and Talented Students. Each year, school districts on Long Island nominate approximately 1000 gifted students to take the selection test for admission to the Institute, but only 75

are accepted. Many of the Institute's graduates go on to become gold medal winners of national and international academic competitions and more than 100 alumni have received Intel awards. For these efforts, in 2006 he became an inaugural inductee of the Long Island Mathematics Educators Hall of Fame established to recognize individuals who have made extraordinary contributions to mathematics education. In 2005, he was one of ten professors nationwide and one of two mathematics professors to be honored at the White House with the U.S. Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, an award jointly administered by the White House and the National Science Foundation. This award recognizes efforts to enhance and promote mathematics education among all people. He has designed more than a dozen programs enhancing mathematics education, with support of various grants from the National Science Foundation, the U.S. Department of Education, private foundations, corporations, and the State University of New York Research Foundation. Dr. Lee has published extensively in the area of topology, has made numerous presentations at professional conferences, and given many invited talks. His educational background includes a B. S. from Chonbuk National University in Korea, an M.A. from Bowling Green State University in Ohio, and a Ph.D. from the University of Alberta in Canada, which honored him with the Distinguished Alumni Award in 2006.

(B.4) Poster

Jolana Laznibatová, Alternative educational program of talented/ gifted children in Slovakia: The principle of "unified school" in our educational system meant, that all pupils learned practically by the same speed, from the same books and by the same procedures. The need of different school approaches led to the fact, that in year 1993 started verification of alternative education of talented children in Slovakia. This verification was under the author Project of alternative care of talented children. Due to considering of acceleration of these children in preschool age, the education started in the first class of primary school. The children who were able to read, write, count and at the same time fulfilled specific talent criteria were implemented into educational program. The model of talented child education was step by step completed and fulfilled. By this process was developed the whole continual educational program of talented children from the first class to maturita exam. In 2007 was finished experimental verification of talented children by alternative method. This verification includes offer of the whole educational cycle for talented pupils in age from 6 to 18. In the process of 14 years verification were step by step created new forms of work with talented children, new learning methods, but also new approaches to the personality of talented children. New folders of materials and new learning materials were created for individual classes. Identification and diagnostic framework for choice and implementation of talented children into educational program was completed. But especially on the basis of specifications of talented children was developed new educational program APROGEN, which is different from educational programs of standard schools. The whole program is based on such basic principles as differentiation, individualisation and personalisation in educational process with talented children. For this program is typical role of significant psychological approaches and concentrating of psychologists and pedagogues not only one the process of teaching, education and obtaining information, but especially on developing of personal power/ potentional and inclinations of talented children in the sense of thesis: From developing of talent to developing talented personality. Our 15 year experience with education of talented children confirms, that only this way is optimal for developing and applying of talent in praxis, respectively to use it in real life.

About the Author

Dr. Jolana Laznibatova is a research psychologist. She works on issues with gifted children, especially their mathematical abilities and their general intellectual talents. In the past she has provided psychological and educational counseling to gifted children and their parents. Dr. Laznibatova was a principal cofounder of the Association for Gifted Children and is a contributing member of the Association for Gifts and Talents in Prague. In 1993 she developed a successful treatment Project of alternative ways of assisting gifted children. The results of this Project were verified and revealed unique possibilities for providing alternative education for gifted children. On the 1st of January in 1998 a School for Gifted and Talented Children was opened that is based on the results of that Project. Dr. Laznibatova has been the Principal of this school since it's foundation. She is also the author of the APROGEN program for gifted children. Concurrently, Dr. Laznibatova also provides psychological counseling and methodological expertise for other school districts that are part of the APROGEN program for educating intellectually gifted children. Dr, Laznibatova is focusing her current research on the specifics of holistic development of gifted children that includes personality, emotional and social aspects of children with ADHD or Asperg syndrome. She is a monographer of "Gifted children, their growth, education and support". She collaborates with Slovak and other international Universities in addition to partner schools on a global basis.

(B.5)

eLearning as an integrated element of everyday life in school: an empirical study

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Abstract

This paper deals with the implementation process of diverse eLearning applications in secondary modern schools in Austria. It will establish different criteria which should be taken into account so that every school benefits from these results.

An empirical study, which took place in a selected Austrian secondary modern school, takes centre stage in this work. This school is one of the first schools in Austria experimenting in this domain.

Attention should be paid to the adoption process of eLearning in schools, because not every situation yields the same benefits as expected. One of the greatest problems of applying this modern teaching method is the acceptance lacking on the part of the headmasters, the teachers and the pupils. In particular, the lack of readiness/acceptance and enthusiasm by all involved is one of the main causes of this problem.

Based on the results of the empirical study, these serious problems should be reduced. One part of this study is descriptive, which will illustrate the problem of the lack of acceptance in one selected school in Austria. In consideration of acceptance models, new eLearning adaptation factors should be acquired.

The surveys were held on two dates. The first one was at the beginning of the schoolyear, in September. The second one took place at the end of this project year, in July. The goal of the latter survey is to determine factors which increase the acceptance by the users. Furthermore, these findings should support other schools in the process of adopting eLearning.

The goals of this study can be defined as:

- The adoption of eLearning in schools should systematically be analysed in order to document the basic conditions for using eLearning in education.
- The continuous changing of educational processes and their methods should be documented in this pilot project.
- How and to what extent eLearning is used in the educational process in schools.
- What the causes for the lack of acceptance by teachers and pupils are and how can they can be decreased.
- Based on a case study the acceptance of adjustment and the acceptance of attitude should be checked. Interaction factors should be worked out.
- What the positive effects are and how they could be made accessible to sceptics.
- What the critical disadvantages are and how they could break down.
- These acquired factors could be the guideline for a smooth adoption of eLearning in schools.

This paper addresses all the factors eLearning, starting with the adoption of eLearning. It deals with educational methodes and the changing situation of the acceptance process. Based on investigations dealing with the acceptance of eLearning, a change in educational processes should be demonstrated.

Keywords: eLearning, blended learning, acceptance, education, school.

Introduction

Essentially school systems often consist of four layers which can be visualized through a pyramid (see Figure 1). The two topmost layers represent a federal ministry for education and the headmasters of schools. Both parties mainly deal with strategic issues. The next two layers are made up of teachers and pupils, which can be seen as the operational part of the system.

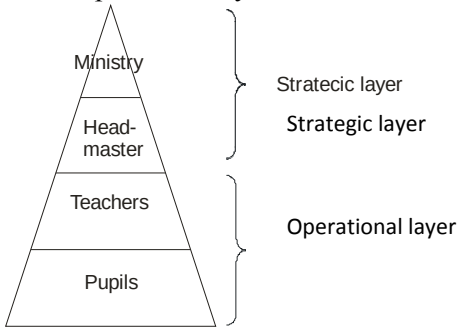

Figure 1: School system.

eLearning can only be effective in education if all parties in theses four layers commit to it and contribute their part to form a strong chain.

Federal ministries can bring forward eLearning by launching projects and by supporting research activities in this domain.

Headmasters are able to facilitate the use of eLearning by taking several actions. One essential issue is to provide the technical infrastructure in schools. Furthermore, eLearning training courses have to be provided for the teachers. Headmasters may also offer incentives for adopting eLearning. Such incentives could take shape as simple compliments to teachers which enhance their prestige and may extend to financial benefits like in the eBuddy program which will be discussed in section "eBuddy".

All strategic guidelines and efforts take no effect if they are not executed on the operational layers.

An interesting interrelation between teachers and pupils can be identified and is shown in Figure 2. This relation can be seen as a circle having positive or negative back coupling.

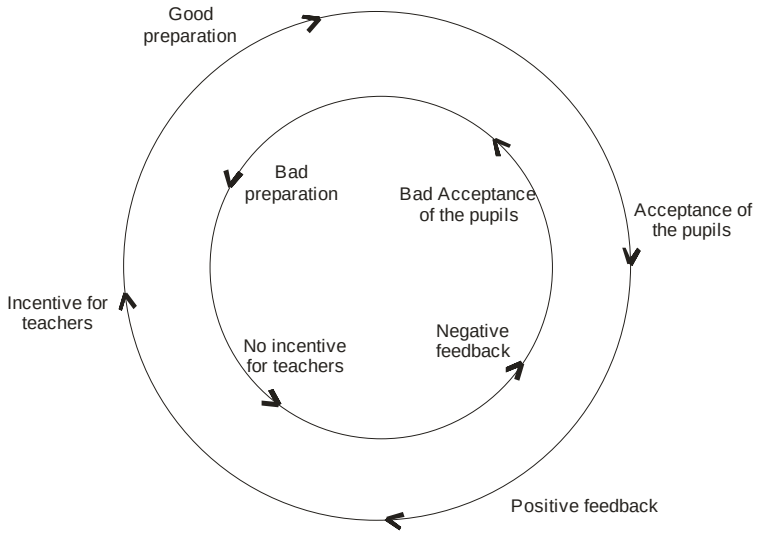

Figure 2: Positive and negative back coupling.

One entry point into this circle can be identified at the pupils. The feedback they provide regarding the eLearning sequences is very important. According to the attitude towards eLearning and the quality of the sequences, this feedback may be motivating or demotivating for teachers. Positive feedback will only be given by pupils with a positive attitude attending good eLearning sequences.

Teachers become proud of the positive results of their work and become motivated to intensify the use of eLearning sequences.

Negative feedback leads to a contrary result. Preparing an eLearning sequence implicates extra work for teachers. If this time-consuming process goes unappreciated, teachers fall back into their conventional teaching methods and eLearning hardly gets a second chance to be introduced.

ELearning elements in school

eBuddy

Of course teaching is also possible without information and communication technology (ICT), but why shouldn't the conventional educational process be supported by this new teaching method? Teaching with computers and the internet is such an enrichment in everyday life in school. Nevertheless there are still some teachers who shrink away from this way of teaching, because they feel less competent to handle the technical part. Exactly these teachers look forward to asking persons who are very confident with these methods to enhance their learning process in this sector. On the other hand, some teachers are using information and communication technology constantly in their lessons. Isn't it possible that one of the colleagues, who is very accomplished in this sector, can support some of the unsure teachers? This is the strategy of the eBuddy project. One teacher acts for a few weeks as a coach (eBuddy) to support his or her colleagues at the following areas:

- Watching live some sequences in the lessons of the coach;
- Getting support from the eBuddies for preparing eLearning lessons; and
- Using support from the eBuddies for wrapping-up the lessons.

On one hand, every teacher who is accomplished in the sector of information and communication technology is able to became an eBuddy. On the other hand, all teachers who want to use eLearning in their lessons but need some experience, can rent an eBuddy. The persons who act as an eBuddy can also be rented from another school. The eBuddies receive a small sum of money for their work.

Associate partner school

Next to the eBuddy project, assistance can also be executed at a higher level. It is possible that teachers from one school can look over the shoulders of accomplished teachers in another school. One school acts as a school where some teachers present samples of their lessons. Some teachers of the school where the presentation takes place provide an opportunity for the teachers of the quest school. Because of the good preparation of materials, for example a list of the presented subjects, the questteachers are able to decide which lessons they will attend.

Both schools agree on one date when this project day will take place. The aim of this project is a good transfer of knowledge from teachers in exchange for a small sum of money from the Federal Ministry of Education and Research.

ePortfolio

Teaching and learning methods in schools have changed a lot in the last few years. One focal point in education is an increased support of the constructivism. Pupils should be able to design some new knowledge on their own. Self-directed learning is one keyword in this changing process. The concept of the ePortfolio is based on this method.

An ePortfolio is identified as a folder for collecting achievements and documents.[23] Different documents which reflect individual learning processes and the learning biography are collected in an ePortfolio. These documents could consist of different certificates, awards, or educational materials.[24]

An ePortfolio provides the opportunity to observe the whole process of learning by the pupils and offers to reach the greatest milestones of one's individual career.

[23] Gläser-Zikuda, M.; Hascher, T.: (Hrsg.) Lernprozesse dokumentieren, reflektieren und beurteilen. Lerntagebuch und Portfolio in Bildungsforschung und Bildungspraxis; Bad Heilbrunn; Klinkhardt; 2007

[24] vgl.: Stangl W.: Portfolio; http://arbeitsblaetter.stangl-taller.at/PRAESENTATION/portfolio.shtml; 2006

Basically the content of an ePortfolio can be divided into three parts, which can also contain sub-categories. As previously mentioned, an ePortfolio could be a collection of different data and facts. On one hand, there could be collected text files or HTML files. On the other hand, it is possible to collect all types of multimedia files, like audio and video files. The third category provides the opportunity to save graphic files, which are very important for pupils with a "pictoral" talent. One further category is references, such as awards or certificates. But they do not refer to a school sector. These references could also be located in the private sector of the pupils. The third category could contain a list of learning links, like links to dictionaries or educational communities. In this category links to one's personal web page or information could also be posted.

The following Figure 3 shows some possible categories of an ePortfolio:

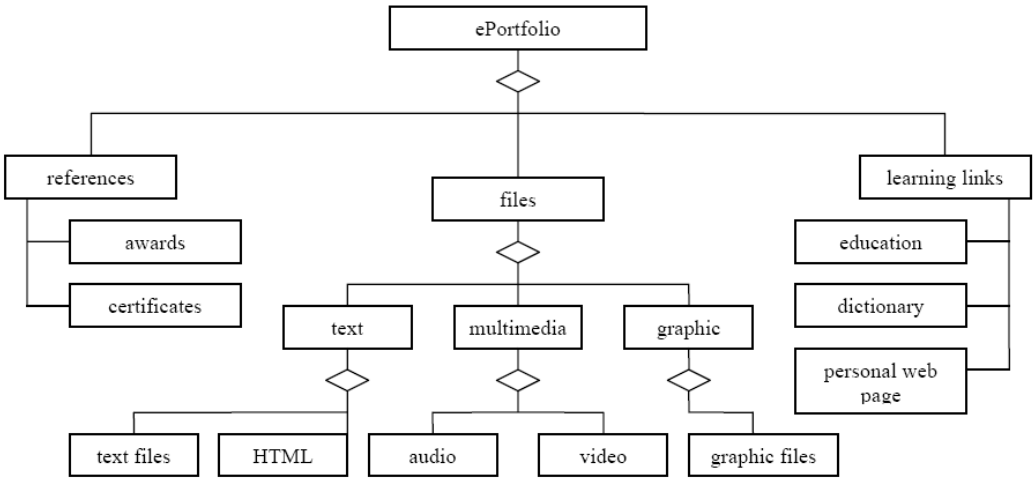

Figure 3: Possible contents of an ePortfolio.

Beside these categories, an ePortfolio could be divided into different sectors. ePortfolio types and categories could consist of different elements because these elements could overlap with elements of other categories. Because of the different types of schools in Austria, the choice of the ePortfolio elements could be made individually by each school. According to these categories, some examples of ePortfolio types are listed bellow:

- **Prestentation portfolio**
  - Application portfolio
    - Curriculum vitae
    - Personal references
  - Exhibition portfolio
    - Exhibition of own collected work (music, images….)
    - Visualisation and reflection of pictures (other artists)
  - Language portfolio
- **Learning portfolio**
  - Reading portfolio
  - Examples of successful work
  - Collection of common mistakes
- **Reflection portfolio**
  - Reflections of conflict situations
  - Impressions of events
  - Learning diary
- **Teaching portfolio**
  - Learning links
  - Learning files

- **Process portfolio**
  - Documentation of one's career
- **Culture portfolio**
  - Documentaton of emotions about culture
- **Assessment portfolio**
- **Language portfolio**
- **Project portfolio**
  - projects (e.g. Exercise company)
  - documentation of learning contents

Podcasts

Podcasting describes the process of using audio files to deliver syndicated website content to a digital audience.[25] The term podcasting specifies the production and the distribution of media files such as audio and video files on the internet. In school it is possible to provide different subject areas for the pupils so that they are able to reapply their new knowledge anywhere and anytime. Alternatively, pupils could also prepare some material for their colleagues. For example, in school it is common that pupils presentinging presentations in different subjects. These presentations are often augmented with PowerPoint or overhead transperancies. But the audible presentation is just for one time only. In some cases, the documents from the presentation get lost or misplaced. To find a remedy, the presentation (images, videos, etc.) combined with the voice of the pupils could be converted to a digital lecture which could be stored at the ePortfolio portal.

One big ambition using podcasts is that pupils and teachers are able to observe the learning process of each person. This opportunity is especially fundamental for language study because, in this case, the continual progress could not be noticed. Even in other subjects the presentations could be saved in different languages.

Empirical Research

The secondary modern school BORG Birkfeld, which can be seen as a pioneer school in the eLearning sector in Austria, conducted a project in the school year 2006/2007 where teachers, regardless their subjects, had to apply eLearning in their lessons. Consequently, all pupils of this school made contact with eLearning.

This project provided the opportunity to investigate the adoption process of eLearning and related issues. After the project two surveys directed at teachers and pupils were conducted. The first survey took place at the beginning of the school year, whereas the second was held at the end of this project year.

The aim of the investigation was to identify key aspects which determine the acceptance of eLearning.

Questionnaire and Measures

Web-based questionnaires were used to conduct the survey. Compared to traditional paper- and-pencil based surveys the web-based surveying may require sophisticated programming expertise, but the analysis of the questionnaires can be done more efficient by the use of computer aided tools. Twenty-four teachers (100%) and 245 pupils (100%) were participants of this survey. The headmaster was also treated as a teacher. The survey focuses on the operational layer, so the Federal Ministry of Education. and the headmistress did not participate.

The survey was conducted using two different web-based questionnaires which were made available for all teachers and pupils of this school. This school is a member of the eLearning-Cluster, which consists of interconnected secondary schools, organisations and institutions in the fields of education and science. This consolidation was an initiative by the Federal Ministry for Education, Science and Culture in Austria. The aim of this cooperation was to build model schools which act as

[25] Susan Ward: Podcasting & Podcasts: http://sbinfocanada.about.com/od/onlinebusiness/g/podcasting.htm

partners of an eLearning Cluster and for exchanging eLearning know-how among each other. This school offers three different concentration areas, which the pupils can choose before starting their careers. There is a branch in music, a branch in art and one branch in computer science.

Furthermore, the branch of computer science is divided into a regular class and a laptop class. Information about the questionnaires for the two different survey groups (teachers and pupils) was distributed by me. The questions for teachers were mainly aimed at finding out more about the acceptance of this new learning method and to provide an insight into the educational structure of preparing an eLearning sequence. To find out the acceptance and the rejection of using eLearning was a main goal of the pupils' questionnaire.

Evaluation of the questionnaires for teachers:

Twenty-three teachers with different subject combinations took this survey including eleven teachers in the subjects of natural science, in mathematics, computer science, physics, chemistry or geography. In contrast to that, fourteen language teachers, for example English, German, French, Italian, or Latin, were surveyed. The remaining fourteen teachers teach the humanities. The number of the participants did not change form the first part to the second part of the survey.

Table 1: Constitution of teachers concerning their subjects.

	quantity
natural science	11
languages	14
humanities	14

The good development of the teachers' positive approach to the computer work is especially important in this evaluation. At the date of the first survey, more than 37 percent of the teachers specified that they like to work with the computer. In the space of this project year the percentage rate increased to 42 percent. In the category "gladly", a huge increase in the percentage rate was also achieved. In a more detailed analysis, the result shows that mainly teachers in the natural science sector like to work with the computer to aid their preparation and their lessons.

Table 2: work with the computer.

questionnaire item		Definitely	Probably	Possibly	Probably Not	Definitely Not	**Total**
Work with the computer							
Date of survey I (N=24)		37,50%	20,83%	25,00%	16,67%	0,00%	100%
Date of survey II (N=24)		41,67%	37,50%	16,67%	4,17%	0,00%	100%
Date of survey I (N=24)	natural science	45,45%	18,18%	18,18%	18,18%	0,00%	100%
Date of survey II (N=24)		50,00%	30,00%	20,00%	0,00%	0,00%	100%
Date of survey I (N=24)	languages	28,57%	28,57%	21,43%	21,43%	0,00%	100%
Date of survey II (N=24)		23,08%	46,15%	23,08%	7,69%	0,00%	100%
Date of survey I (N=24)	humanities	28,57%	28,57%	21,43%	21,43%	0,00%	100%
Date of survey II (N=24)		57,14%	42,86%	0,00%	0,00%	0,00%	100%

Experienced work with the computer

The pupils as well as the teachers were asked to rate their experiences working with the computer on a scale. The changing situation from the beginning of the project year until the end is presented in Table 3, below. In this instance, the analysis was specific to the particular subjects of the teachers.

Table 3: Experiences working with the computer.

Questionnaire Item		Definitely	Probably	Possibly	Probably Not	Definitely Not	**Total**
experiences working with the computer							
Date of survey I (N=24)		20,83%	25,00%	25,00%	29,17%	0,00%	100,00%
Date of survey II (N=24)		33,33%	37,50%	25,00%	4,17%	0,00%	100,00%
Date of survey I (N=24)	natural science	36,36%	9,09%	27,27%	27,27%	0,00%	100,00%
Date of survey II (N=24)		50,00%	10,00%	40,00%	0,00%	0,00%	100,00%
Date of survey I (N=24)	languages	7,14%	28,57%	28,57%	35,71%	0,00%	100,00%
Date of survey II (N=24)		15,38%	46,15%	30,77%	7,69%	0,00%	100,00%
Date of survey I (N=24)	humanities	7,14%	28,57%	28,57%	35,71%	0,00%	100,00%
Date of survey II (N=24)		28,57%	57,14%	14,29%	0,00%	0,00%	100,00%

At the first date of the survey, 21 percent of the teachers asked mentioned that they feel very experienced and confident working with the computer. This percentage rate increases until the end of the school year to more than 33 percent. Also the second category "probably" documents a rapid growth. In addition to the common results Table 3 gives a subject-specific overview. Teachers in the sector of natural science feel especially experienced in their work with the computer. A big growth could be documented in the first category "definitely." In contrast to these results, a low growth of the percentage rate could be listed from the teachers in the language sector.

When these results are compared with the results of the question concerning "teachers in notebook classes," interesting results are achieved. At the first date of the survey, one-third of the teachers instructing in notebook classes felt very experienced in the work with the computers. In contrast to this, no teacher instructing in a traditional subject votes for this category. Much more diversified are the results at the end of this project year. More than half of the teachers in notebook classes voted for the first category "definitely," whereas no teacher in traditional subjects voted for this category.

Excessive demands with more learning skills

Table 4: Excessive demands with more learning skills.

Questionnaire Item	Definitely	Probably	Possibly	Probably Not	Definitely Not	**Total**
excessive demands with more learnig skills						
Date of survey I (N=24)	8,33%	25,00%	16,67%	25,00%	25,00%	100%
Date of sruvey II (N=24)	0,00%	8,33%	25,00%	25,00%	41,67%	100%

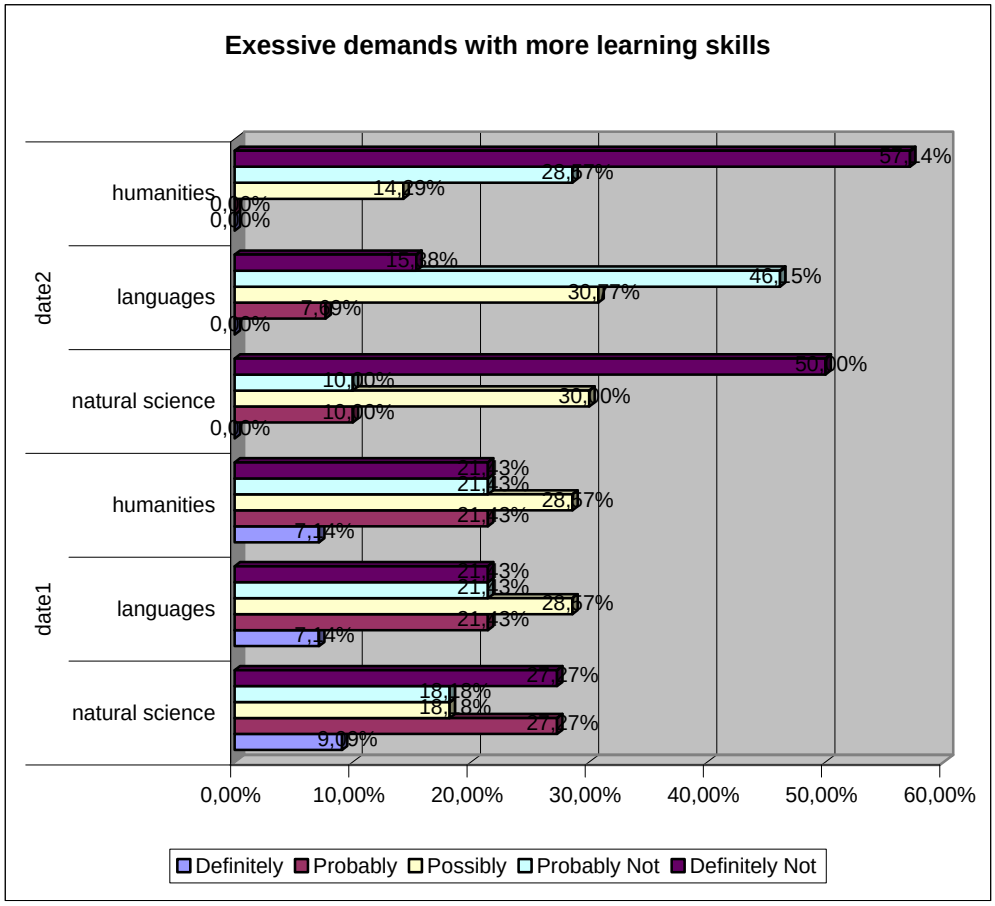

Figure 4: excessive demands with more learning skills.

According to some teachers, it is a huge hindrance to teach with eLearning elements because it is an excessive demand to work with different and varied learning skills, such as a learn platform in combination with the traditional books.

At the first date of the survey, 25 percent of the teachers asked voted for the category "probably." By the second point of the survey, the percentage rate decreased to 8 percent. At the beginning of the project year, 25 percent of the teachers voted for the category "definitely Not."

At the end of this year, the percentage rate grew to 42 percent. When these results were compared with the different subjects of the teachers, the following results were achieved. 27 percent of the teachers in the natural science sector said at the first point of the survey that they felt no excessive demand working with different learning skills. Also in the sector of languages (21%) and in the sector of humanities (21%) there were lower percentages.

But a remarkable growth of the percentage rate could be listed until the end of the project year. 50 percent of the teachers in the natural science sector and 57 percent of the teachers in the humanities sector voted for this category. In the second point of the survey, no teachers voted for the category "definitively not." These results are due to the regular routine of working with the computer.

Evaluation of the questionnaires for pupils:

On the whole, 245 pupils completed the survey. The number of the pupils and the makeup of the classes are not different form the first survey to the second one. The number of female pupils is 162, whereas the number of male pupils is only 83.

The distribution of the pupils by concentration area is very homogeneous. 96 pupils attended the music concentration, 76 attended the computer science concentration and 73 attended the artistic concentration.

Table 5: Distribution of pupils in reference to different concentration areas.

Music emphasis		96
Computer science emphasis	Pupils without notebooks	45
	Pupils with notebooks	31
artistic emphasis		73
		245

Personal attitude towards the computer work

An important aspect concerning the acceptance of eLearning is the positive attitude towards schoolwork with the computer. Before the survey, all pupils were informed that the questions are only related to school and not to personal use. The results of this question show that the positive responses have increased considerably and the responses to the categories "probably not" and "definitely not" have decreased very much. The category "definitely" supports this trend. On the first date of the survey 33.5 percent of the pupils claimed that they definitely like working with the computer, whereas for the second survey this percentage rate rose to 46 percent.

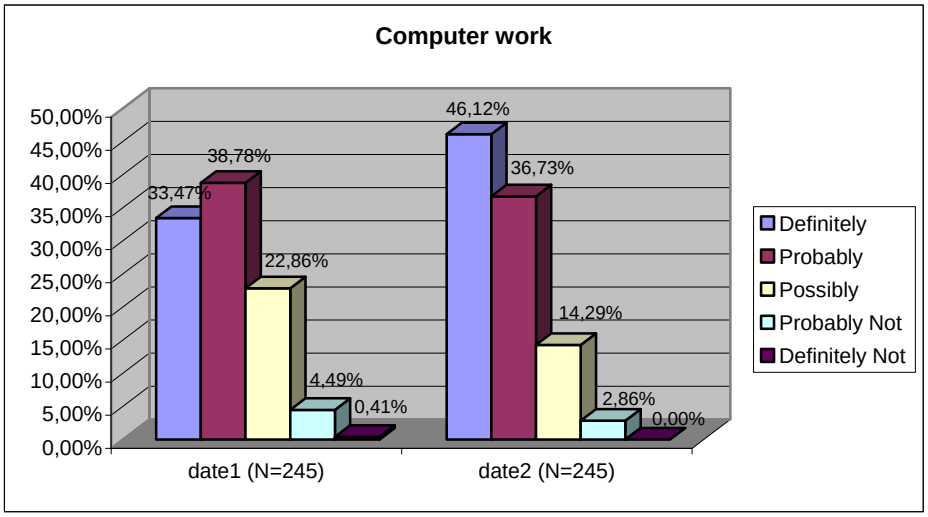

Figure 5: Computer work.

The following table 6 shows the personal attitude given in the survey according to gender. Pupils are divided into different groups (age sectors). In the first group are pupils between the ages of 14 and 15, in the second group are pupils in the ages between 15 and 16 and so on. Female pupils especially show increasing acceptance in the first group. On the first part of the survey 43 percent voted for the first category, whereas on the second part of the survey almost 80 percent of the female pupils voted for this category. This trend could be seen as far as the third group.

Table 6: Computer work.

Questionnaire Item			Definitely	Probably	Possibly	Probably Not	Definitely Not	**Total**
Computer work								
Date of survey I (N=24)			33,47%	38,78%	22,86%	4,49%	0,41%	100,00%
Date of survey II (N=24)			46,12%	36,73%	14,29%	2,86%	0,00%	100,00%
Date of survey I (N=73)	groupI	female	42,86%	38,78%	14,29%	4,08%	0,00%	100,00%
		male	70,83%	16,67%	12,50%	0,00%	0,00%	100,00%
Date of survey II		female	79,59%	18,37%	2,04%	0,00%	0,00%	100,00%

(N=73)		male	66,67%	25,00%	8,33%	0,00%	0,00%	100,00%
Date of survey I (N=48)	groupII	female	12,50%	43,75%	34,38%	9,38%	0,00%	100,00%
		male	12,50%	31,25%	50,00%	6,25%	0,00%	100,00%
Date of survey II (N=48)		female	37,50%	37,50%	18,75%	6,25%	0,00%	100,00%
		male	31,25%	43,75%	25,00%	0,00%	0,00%	100,00%
Date of survey I (N=56)	groupIII	female	29,41%	41,18%	23,53%	5,88%	0,00%	100,00%
		male	22,73%	40,91%	27,27%	9,09%	0,00%	100,00%
Date of survey II I (N=56)		female	23,53%	61,76%	8,82%	5,88%	0,00%	100,00%
		male	18,18%	59,09%	18,18%	4,55%	0,00%	100,00%
Date of survey I (N=68)	groupV	female	27,66%	44,68%	25,53%	2,13%	0,00%	100,00%
		male	47,62%	42,86%	4,76%	0,00%	4,76%	100,00%
Date of survey II (N=68)		female	34,04%	36,17%	25,53%	4,26%	0,00%	100,00%
		male	61,90%	23,81%	14,29%	0,00%	0,00%	100,00%
	Total (N=245)							

Excessive demands with more learning skills

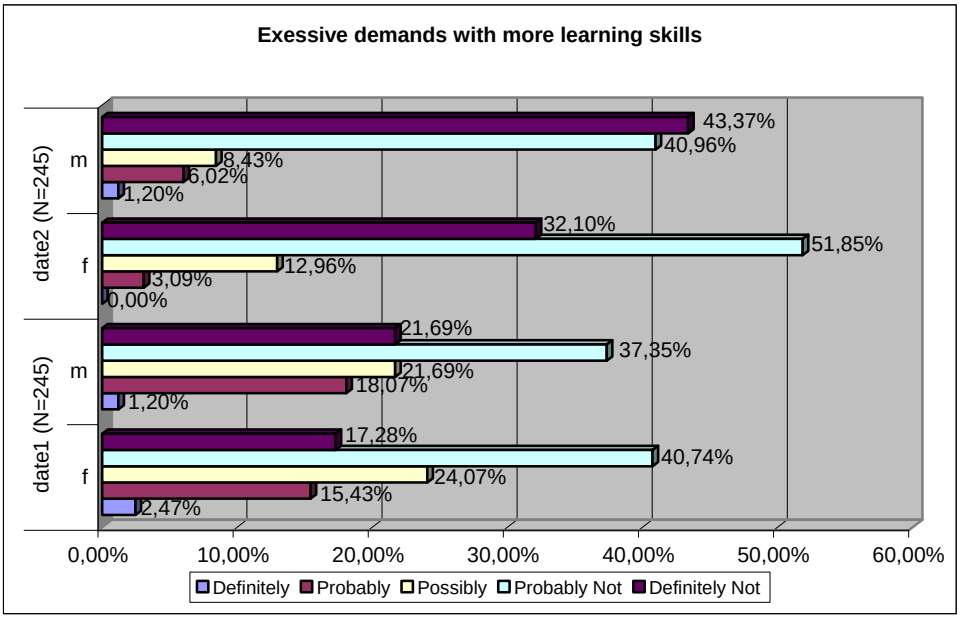

Figure 6: Excessive demands with more learning skills.

Figure 6 above specifies the results of the possibly excessive demands for those with more than one learning skill. When pupils work with different learning skills the attention span decreases, and furthermore, the effectiveness of learning is lowered.

These results show particularly gender-specific components. On the first date of the survey, 17 percent of female and 20 percent of male pupils felt no excessive demands. On the second date of the survey, one-third of female and more than 40 percent of male pupils voted for this category. A correlation with the question "experienced work with the computer" shows that mainly pupils who feel very experienced feel no excessive demands.

Improvements of learning results

The following Figure 7 shows the results of the evaluation in relation to the increased success of working with eLearning in the school lessons. On the first date of the survey only 2 percent of the pupils asked voted for the first category "definitely."

On the second date of the survey 29 percent specified that their learning results have “definitely” improved with the support of eLearning.

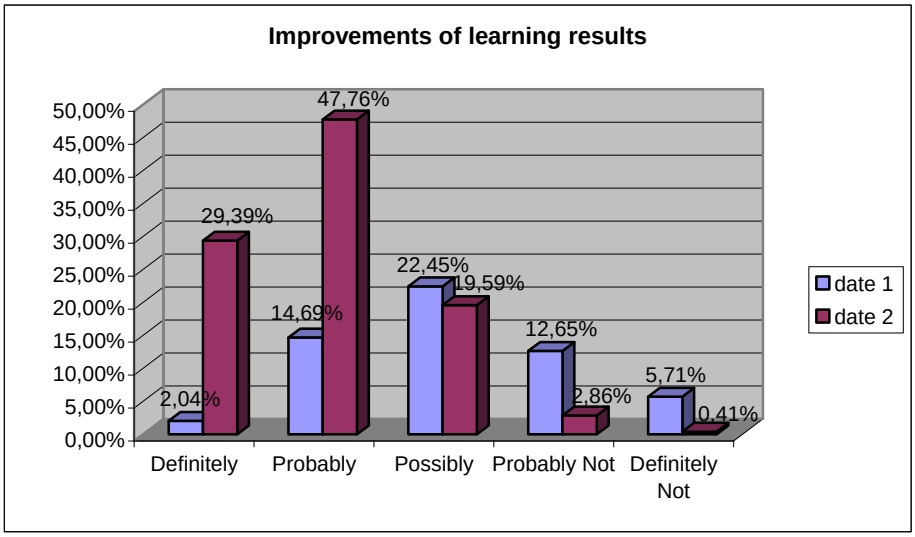

Figure 7: Improvements of learning results.

It is important that teachers and students feel confident with new methods so that the efficiency of the learning-process can be increased and the obstacles of acceptance can be eliminated. Based on the results this survey it can be concluded that eLearning in schools faces a positive future. The teachers as well as the pupils want to broaden eLearning sequences in education. Based on this survey, the use of eLearning in education will not decrease in value, even in the future.

However, the conventional method will not be displaced completely. eLearning will take an important supplementary position. It can serve as an good enrichment to traditional education.

Results

A first evaluation has identified the following 11 key aspects which are determining the acceptance of eLearning:

- Technical affinity
- Readiness for further education
- Advantages
- Disadvatages
- Preparedness to Implement
- Success
- Experience
- Quality
- Cooperation
- Future
- Learning types

Future work

It is planned to order these key aspects according to their significance. Furthermore, the impact of these key factors on the school lessons will be evaluated. Based on these two investigations, practical suggestions for increasing the acceptance of eLearning will be formulated for each key factor.

About the Author

Ines Binder studied computer science for teaching profession at the University of Klagenfurt (Austria). Now she also is an assistant lecturer at the University of Technology in Graz (Austria). Her current research interests are eLearning in education, ePortfolios and acceptance models of eLearning.

(B.6)

Lilian del Valle & Luz Pérez, The twenty-first Century: the technological age: It is time to search for technological talents. An experience in Spain: It is time to search for technological talents; the Spanish model. The twenty-first century is here. Technology surrounds us. We live in an IT society. Every human activity has some relation with technology, however there is little research related to technological talent. There are different tests to search talents, especially academic talents but the search for technological talent by using tests is something new. This technological talent search is part of a global model for the detection of talents (mathematical, linguistic, social and technological). This project was developed in Spain with the support of the Ministry of Science and Education. The project was developed in three phases. In the first screening phase 1500 students from different parts of Spain participated. They completed collective tests for every talent and one test for general aptitude. In the second part, an individual computerized test was applied to those students who were part of the top 5% of the screening. Finally WISC IV will be applied to the top 10% of the students located at the top in the second part. The construction of the test, the results of the screening and the correlations between technological talent and other talents will be presented.

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Internet-Based Education in IT Hardware

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Abstract

This paper examines the background and offers a model of an Internet-based electronic textbook (i/e-textbook) on IT hardware. The textbook includes fundamental and applied knowledge dealing with technology, device design, measurement and testing techniques, specifications of new products and results of industrial benchmarking. An i/e-textbook is designed to provide sustainability, adaptability to a user educational basis and instructional needs, integration into a wider educational and information context, and can be used in different professional education settings offering university degree programs, continuing education courses, distance education.

Keywords: IT hardware, electronic textbook, web-based resources, Internet, utility, usability.

Introduction

Since the role of IT is increasingly growing in all spheres of the contemporary society, a curriculum gives more attention to this subject in most educational settings. However high emphasis has been traditionally placed on programming skills, and for a while now rapidly emerging IT services with their diverse opportunities are not set aside either. On the contrary, not much time is devoted to IT hardware because its reliability is considered perfect, and a common user is not supposed to interfere in. But PCs were developed as a tool easy to customize by a user without assistance of software/hardware professionals. In current practice, sometimes a user wants to upgrade a PC or check if its configuration is optimal to user's tasks. Apparently, this requires in-depth knowledge of how hardware is designed and works.

Some advantages to learn how PC hardware works

Modern IT hardware is getting more and more resembling Aladdin's Magic Lamp which fulfilled any wishes of its owner as soon as he touched the lamp. In a PC, this action is a mouse click that in general corresponds to Bill Gates's intentions. In 1990th he prognosticated that all programs would be developed with this same method. Then for what sake an average man should know how a PC works?

First and foremost we can't neglect human curiosity. A programmer was asked why he needs to

know how his PC stuff operates. “I belong to that kind of rabbits” he replied, “that would not eat grass if they have not learned photosynthesis”.

Apparently this type of “rabbits” is becoming a rare one in a contemporary society. Often and often a person using IT equipment gets into difficulties when a PC is slow or unable to do required tasks. IT commercials give a single advice – your hardware is deadly out-of-date, it is a time to buy a new one! However it may be worth PC testing to analyze how it works before visiting the nearest shop. You may find out that there is only one problem area, i.g. RAM. It also may happen that your testing will show that the RAM operating mode is not good, so you needn’t new RAM modules because changing RAM settings will solve your problem. In other cases PC components don’t have necessary time for data exchange – the so-called “bottleneck”, that also can be removed without buying new hardware.

No matter how effective is your antivirus protection you should suggest that sudden slowdown of a system may be caused by a virus attack. This easily can be cured by PC scanning.

Finally, there is a specific professional reason – there is no better way to make students interested in physics than to show them how physics research contributes in further IT progress. The most recent example is the Nobel Prize in Physics 2007 for the discovery of Giant Magnetoresistance which made possible a tremendous increase of HDD data recording density.

Designing an electronic textbook on IT hardware

Fortunately, it is IT hardware that the Internet provides unprecedented opportunities to get educational materials. Especially valuable and reliable information is available on web-sites supported by leading high-tech companies.

Designing a quality electronic textbook involves planning and considering several structural and functional key factors carefully to ensure its utility (how well it functions) and usability (how effectively students can navigate it).

The main stages of the designing process are shown in Figure 1. A textbook should have a core of fundamental knowledge, which forms an unchanged basis of teaching a particular course.

Other parts of a textbook deal with an increasingly growing range of topics like technology, device design, measurement and testing techniques, specifications of new products and results of industrial benchmarking which form applied knowledge. To be successful in learning the IT hardware students need to learn how to use different educational technology components, including those available on the Internet, i.e. professional forums and lists, benchmarks and tests, glossaries.

In contrast to a printed format, an electronic format provides better opportunities of maintaining its sustainability. It can be ensured by (1) linking the Internet resources being updated on a regular basis by their designers and (2) author-driven updating the content and checking linked resources to delete inactive links.

An electronic textbook format has good adaptability. Some textbook sections can be indicated as optional, and a teacher/instructor decides whether to use or discard such materials taking into account an educational basis and instructional needs of students.

Textbooks of this kind are easy to integrate into educational environment by linking it to other networked resources if further explanation seems appropriate though being outside the main topic of the textbook. Additionally, any cited materials or reference sources are provided in the same way.

How to determine which trends of hardware development are the most promising

Thorough knowledge of hardware is becoming critical when you choose PCs or PC components. Making a proper choice of hardware with good prospects is not an easy task because IT hardware is used to be upgraded every 5 years.

Of course, choosing a new processor is the easiest case. A history of Intel Celeron without L2 cache which the Intel company presented at the market only due to its low price is unique.

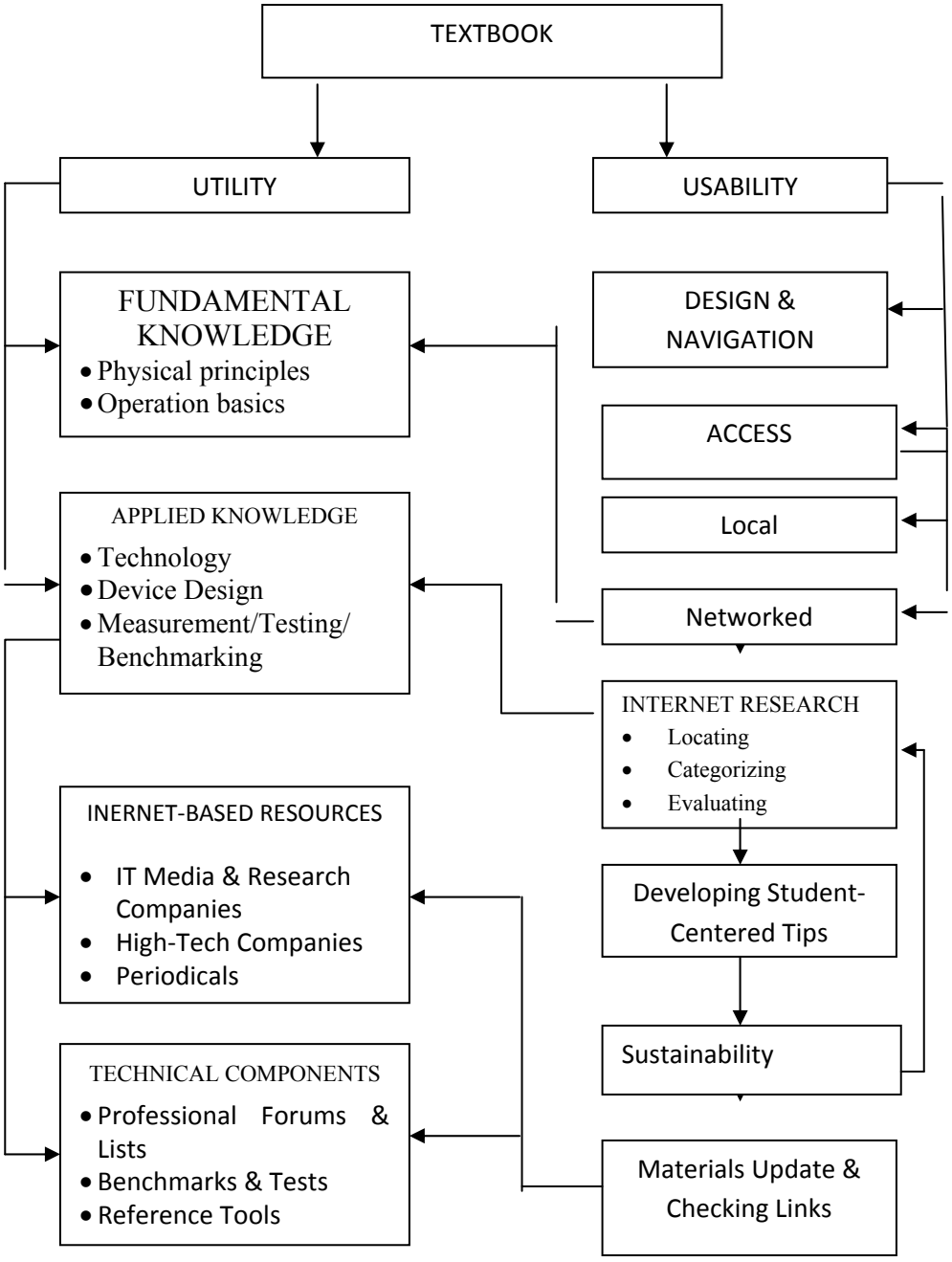

Figure 1: Main stages of designing Internet-based electronic textbook.

Instead, while buying a new processor now we are most likely to be at a danger of purchasing an extremely "advanced" model which would run our old software slower than our old PC. The same can be stated regarding RAM devices. Everybody involved with IT can remember another Intel's failure – forced promotion of RAMBUS technology which then was completely driven out from the market by SDRAM technology. Unfortunately, we can't refuse to face these realities because the Intel being a "trendsetter" in IT will keep its commitment to solutions favorable to its sustainable development first and foremost**.**

Mass storage devices are more complicated to make a long-term choice. Do anybody remember Jomega zip, that alternative to a floppy disk designed in 1990th or other similar "brand-news"? All of

them having been superseded by flash drive systems as well as rewritable CDs and DVDs.. This situation seems to be reproduced again with holographic and fluorescent disks, polymer memory, “Millipede” technology – these are only few candidates to substitute CD and DVD.

We make this historical digression to explain why we allocate a fair portion of the IT hardware course to study future trends in three fields we believe crucial to IT progress – CPU, memory technologies and buses.

CPU

Obviously, further progress in IT depends on the growth of CPU performance. We should remember that several ways go to this goal. A cache volume has been growing, a pipeline is getting longer, and producers suggested an idea to a common user that a CPU clock speed determines an overall system performance. On February 2, 2003 Intel announced a release of and offer for sale a new P4 processor previously known by its code name - Prescott. Its maximum clock speed was 3.4 GHz. Intel stated that the clock speed of Prescott would reach 4.5 GHz in the next year. However that never happened because the growth of frequency involved a rapid growth of heat release.

Then Intel said, “Don’t judge a CPU only by its GHz”, and offered a new equation for performance based on Energy per Instruction (EPI) value. Consuming less energy per instruction became the primary goal then. According to new strategy of Intel it does not matter what clock speed the device actually is running at and it does not matter how long the processor pipeline actually is. All that matters is to deliver maximum performance at minimum power requirements.

It was found that a dual core CPU is a way out of the situation seemingly deadlock. This makes pretty clear that: increasing clock speed and voltage by 20% would improve performance only a little, but power draw would increase by three-fourths. Instead, in dual core CPUs decreasing clock speed by 20% allows a substantial growth of performance at the same power. Sale of dual core CPUs began in 2001, but only Intel moved it on a mass scale.

We have two cores and quad-core processors from IBM, Intel, and AMD now. And the number of cores on a chip will continue to multiply in the coming years, launching an era of vastly more powerful computers. For example, the Intel® Tera-scale Computing Research Program promises tens or hundreds of cores working together in one system. To be ready, Intel must make advances in:

- Microprocessor research, by developing scalable multi–core architectures and new types of individual cores and interconnects;
- Platform research, by optimizing I/O, communications, memory, and caching for parallel architectures and increasing virtualization and platform energy efficiency; and
- Software research, by studying future workloads to direct architectural designs and develop programming tools and techniques to make highly threaded software.

“Tera-scale” refers to the terabytes of data to be handled by platforms with teraflops of computing power—a thousand times greater than today’s “giga-scale.” Intel is bringing teraflop performance to servers, desktops, and other future platforms. Today, tera-scale computing is limited mostly to supercomputers. However, these supercomputers are composed of separate processors interconnected with cables, which have limited bandwidth and relatively high latency—i.e. it takes a relatively long time for a signal to travel from one point to another. Intel is working on connecting many cores on a single chip using much shorter, low-power, low-latency interconnects.

On February 11, 2007 it was informed that Intel Corporation researchers have developed the world's first The Teraflops Research Chip within the Intel® Tera-scale Computing Research Program. It is the first programmable chip to deliver more than one trillion floating point operations per second (1 Teraflops) of performance while consuming very little power. This research project focuses on exploring new, energy-efficient designs for future multi-core chips, as well as approaches to interconnect and core-to-core communications. The research chip implements 80 simple cores, each containing two programmable floating point engines—the most ever to be integrated on a single chip.

The chip features an innovative tile design in which smaller cores are replicated as "tiles," making it easier to design a chip with many cores. With Intel's discovery of new and robust materials to build future transistors and no immediate end in sight for Moore's Law, this lays a path to manufacture multi-core processors with billions of transistors more efficiently in the future.

The Teraflops chip also features a mesh-like "network-on-a-chip" architecture that allows super-high bandwidth communications between the cores and is capable of moving Terabits of data per second inside the chip. The research also investigated methods to power cores on and off independently. Table 1 summarizes the results from the research chip

Table 1: Summary of results from the research chip

Frequency	Voltage	Power	Aggregate Bandwidth	Performance
3.16 GHz	0.95 V	62W	1.62 Terabits/s	1.01 Teraflops
5.7 GHz	1.35 V	265W	2.92 Terabits/s	1.81 Teraflops

To compare it is worth remembering ASCI Red supercomputer which was the first computer to benchmark at a teraflops (1996). That system used nearly 10 000 Pentium® Pro processors running at 200MHz and consumed 500 kW of power plus an additional 500 kW just to cool the room that housed it. This Teraflops Research Chip delivers 1.0 teraflops of performance and 1.6 terabits aggregate core to core communication bandwidth, while dissipating only 62 W. Further Tera-scale research will focus on the addition of 3-D stacked memory.

Memory

Tera-scale computing will operate tera-scale memory arrays. Future data storage densities will soon need to exceed one terabyte (10^{12} bytes) per square inch. Mass storage devices of such volume will be based as before on HDD, where the growth of record density is still controlled by Moore's Law. Transverse recording which tends to substitute longitudinal recording seems a main factor of growing record density during the recent period. Patterned media will continue supporting this progress in the nearest future. In conventional media, the magnetic recording layer is a thin film of a magnetic alloy, which naturally forms a random mosaic of grains which behave as independent magnetic elements. Each recorded bit is made up of many of these random grains. In patterned media, the magnetic layer is created as an ordered array of highly uniform islands, each island capable of storing an individual bit. This technique is expected to achieve (10^{12} bytes) per square inch.

RAM poses a greater challenges since tera-scale operation requires both a larger volume and higher speed. We observe now DDR3 DRAM changing DDR2 DRAM, and this evolution has its limits. There are several alternatives to DRAM, but all of them still exist as laboratory prototypes. Nevertheless we are going to discuss one of these novelties and introduce it to students. This development is too fresh to be a candidate for industrial application, but it provides a great instructional potential. We learn at school that there are three fundamental two-terminal elements used for circuit building: resistors, capacitors and inductors. These are “passive” elements, capable of dissipating or storing energy — but not, as active elements are, of generating it.

Almost four decades since its existence was first proposed, a fourth basic circuit element joins the canonical three. The memristor first appeared in a 1971 paper published by professor Leon Chua, a computer scientist from the University of California Berkeley. Mr. Chua described and named the memristor (short for “memory resistor”), arguing that it should be included along with the resistor, capacitor and inductor as the fourth fundamental circuit element. The memristor has properties that cannot be duplicated by any combination of the other three elements. A memristor would change its level of electrical resistance if charge were applied and retain or “remember” that resistance until another charge were applied.

Only recently Hewlett Packard researchers (Strukov 2008) set out to invent one memristor (Figure 2). They created a deceptively simple structure: two layers of a semiconductor, titanium dioxide, sandwiched between electrodes. The bottom layer contains the standard material, which is virtually

useless for conducting electricity. The top layer is missing a few oxygen atoms, creating positively charged "holes" that make it a conductor. Running a positive charge through the electrode above this layer pushes some of the charged holes into the lower layer (where they stay, until another charge is applied), allowing it to conduct electricity and lowering the electrical resistance of the entire cell. A computer can read information in a memristor cell by measuring how much resistance it has. Stan Williams, of HP research team, expects memristors to first show up in the next few years as "cache" that sits between a hard drive and the DRAM memory in PCs. The hard drive could load key data, like the instructions to start up Windows, into the memristor cache, which can dump it into the DRAM far faster than transferring it straight from the hard drive—resulting in lightening-fast boot-ups and quick opening of large files. But Williams hopes to replace both the hard drive and the RAM with one memory system that eliminates the need to store data on a relatively slow hard drive and then load it into fast DRAM before the PC can use it. He thinks a memristor can hold much more data than a hard drive and access about as fast as DRAM. But it is a long path between proving something in the lab and producing it on a mass scale.

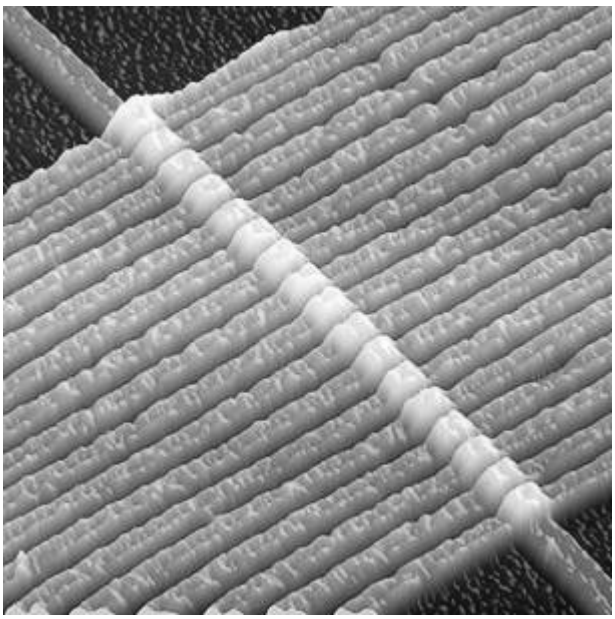

Figure 2: Memristor close-up: An atomic force microscope image shows 17 memristors in a row. Each has a bottom wire that contacts one side of the device and a top wire that contacts the other. The wires are 50nm, or about 150 atoms, wide. Photo by J. J. Yang, HP Labs.

Interconnects

Moore's law has enabled the current trend toward multi-core computing that is dramatically increasing performance and power efficiency. I/O interconnects are on a similar growth path of increasing performance and efficiency. PCI Express (the Scalable I/O System Interconnect PCI Express - PCIe) seems developed not long ago as the next generation I/O system interconnect after PCI, designed to enable advanced performance and features in connected devices while remaining compatible with the PCI software environment. The PCIe definition is layered to allow connection to copper, optical and emerging physical signaling media. Its versatility as an attach point is readily apparent: it supports chip-to-chip applications, adapter cards, and graphics I/O bandwidth enhancements, as well as interfacing with other interconnects like USB 2.0, InfiniBand™ Architecture and Ethernet. Its embedded clocking scheme enhances frequency scaling, provides advanced features and enables new physical configurations.

As computing requirements become more complex, new strategies evolve to provide the performance necessary for data- and calculation-intensive applications. Such strategy is based on using specialized accelerators to enhance the performance of specific tasks or functions. Broadly

speaking, an accelerator is a device that attaches to a computing system, providing optimal performance at reduced cost and/or power for a specialized task.

Examples of emerging applications for which accelerators may be suitable are photorealistic graphics, financial simulation, and climate modeling. The development of specialized application accelerators is happening today. A joint initiative between Intel and IBM, codenamed Geneseo, supports PCIe as the attach point of choice throughout the next generation of accelerator technologies.

Geneseo Technology provide improvements in available bandwidth, latency, efficiency and hardware/software interaction sufficient for the foreseeable future.

It should be noted that tera-scale computing involves great difficulties in software development because it is hard to identify and manage parallelism to write efficient multithreaded code quickly. Main tera-scale programming directions are data parallel programming, speculative multithreading and transactional memory.

Speaking at the Intel Developers Forum in Shanghai on 9 April 2008, Wu Gansha said that the model, called Ct, will let developers use their C++ programs for parallel computing applications "without having to modify a single line of code". With Intel and others seeking to push chips with an ever increasing number of cores, code now needs to be rewritten in ways that allow tasks to be split up and handled in parallel, a significant technical hurdle. Wu said Ct is "pretty mature now for quadcore and eight core", but did not give a timeframe on when Ct will be ready for programmers. Another speaker, Jerry Bautista of Intel, said, "There are no technology hurdles that are show-stopping," predicting terascale systems will become more common within seven to 10 years. To be ready to meet these challenges, more than 45 US universities have included multi-core programming in their curriculum.

Conclusions

Progress in IT will never allow teaching IT hardware based on preconceived ideas. To keep pace with current trends educators can't afford waiting till new science concepts and technological solutions will prove their vitality and will be implemented in new generation products. Instead, we have to select and add new topics in our curriculum well in advance. Since nobody is an ideal forecaster we may make poor choices, but it is an acceptable risk and an acceptable price for a chance of timely introducing students to new IT environment. The more so that unsuccessful IT solutions often hide good instructional potential to improve basic knowledge in a particular field.

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References

D. B. Strukov, G.S. Snider, D. R. Stewart, R. S. Williams (2008) The missing memristor found. Nature 453, 80 - 83 (01 May 2008), doi: 10.1038/nature06932, Letter.

Note: authors used materials published on the Internet:

- Jim Held. Beyond Multi-core: The Dawning of the Era of Tera (www.cs.utexas.edu/users/cart/arch/spring08/TeraScaleUTAustinJan2008.pdf)
- Teraflops Research Chip (http://techresearch.intel.com/articles/Tera-Scale/1449.htm#)
- Daniel J. Radack. 3D Microsystems (www.darpa.mil/mto/programs/3dic/presentations/3dhdislides%5B1%5D.pdf)
- George Bourianoff. Nanoenergetics, Nanomaterials, Nanodevices, Nanocomputing –Putting the pieces together (www.emrs-strasbourg.com/files/pdf/2004_SPRING/MINIA2.pdf)

- Joe Schutz. The Future of Computing IDF 2006
  (www.ee.ucr.edu/~stan/seminars/w07/TCR001_terascale_intel07.pdf)
- Jo Best. War on tera: Intel picks C for parallel computing. ZDNet.com.au, 09 April 2008
  (http://www.zdnet.com.au/news/software/soa/War-on-tera-Intel-picks-C-for-parallel-computing/0,130061733,339288038,00.htm).

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(B.8)

A case study of semi-structured eLearning for high ability students across countries

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Abstract

This paper explores the use of online technologies to bring a group of 10 students across Australia, Malaysia and UK to engage with learning under the broad theme of "Global warming: Where to from here?" The learning was progressively structured from (i) whole group learning to (ii) team work where the group was split into two virtual teams to debate solar vs nuclear energy to (iii) individual work or in teams of 2 to create a product to demonstrate their understanding of global warming and opinions about the way forward. The online learning system was Moodle and the learning involved both synchronous and asynchronous discussions. Examples of rich discussions and the learning outcomes produced (a game, a cartoon, a website and powerpoints) will be presented in the session. Benefits and issues associated with this type of learning will also be presented.

Introduction

We live in a society where an enormous amount of information is readily and cheaply accessible via the World Wide Web (WWW). For the learner, this knowledge can be engaged with anytime and anywhere providing that there is access to the Internet. With the exception of highly specific areas, there is no limit to how much the learner can learn in a relevant area, or when the learner can learn it. There are, however challenges associated with knowledge construction using the WWW as a learning tool. These include the non-systematic, unstructured path and different document structure affecting how students retain information that they have viewed (Brown, 1998), leading to cognitive overload (Kirschner, 2002; Warschauer & Kern, 2003). Other challenges with using the WWW as a research tool includes the time-consuming nature of doing a search, difficulty in locating appropriate information, understanding the information on the Web, critiquing the validity of the information source and using the information found to construct understanding or synthesising new ideas (Ng & Gunstone 2002; Wallace, 2002). McKenzie (1998) describes today's students as 'free range' students grazing the Net, who need to be able to sieve through massive amounts of information on different websites, authenticate them and synthesise new information out of them. For gifted students, the suitability of engaging them in independent, research-based learning with WWW information is demonstrated in characteristics that these students posses (for a review see, Silverman, 2007). These characteristics include good problem-solving and reasoning abilities, rapid learning ability, excellent memory, perseverance in interested areas and being creative. Feldhusen (1998) has found that the capacity for self-directed learning in gifted children working individually and in small group work grew rapidly and became very high if teachers provided initial directions and good instructional materials.

Besides providing the knowledge base for learners on the WWW, there are other associated technologies of the Internet (such as emailing, MSN and online management systems) that provide the tools for exchanging and sharing that knowledge. Educators should be capitalising on the abundance of information on the WWW and online communication tools to cater to the learning needs of gifted students.

This paper reports on an exploratory research project that sought to capitalise on Internet technologies to extend the learning of a group of 13-15 year old high ability students who attended a four-day Sun, Science & Society camp at an Australian university. Often, students' learning stops after short enrichment programs of this kind end. The objective of this research study was to investigate how online technologies (online management system, email and Web-based resources) are able to influence additional open learning for these students, situated in a virtual community consisting of other students of similar ability and familiar facilitators, for a further six months. The study seeks to find out what the capacities and limitations are of using online learning technologies for extending high ability secondary students' learning. Since no particular tests of giftedness was used to select the students in this study, the term 'high

ability' will be used in this paper to generally characterise the learners since the term could include students of various degree of giftedness.

Theoretical Framework for the Online Learning of High Ability Students

The theoretical model for the online learning of high ability students is based on Ng & Nicholas' (2007) socially immersed learning model. The model is an adaptation of Mayes' (1995) cognitive approach to learning online and Garrison, Anderson and Archer's (2000) 'community of inquiry' online learning model. The key features central to knowledge construction in Ng & Nicholas' (2007) model include:

1. Providing a learning space for 'like-minded' students. Studies including meta-analysis studies (Kulik & Kulik, 1982, 1984; Kerchkoff, 1986; Liu, Wang & Parkins, 2005; Roger, 1991) have found that grouping gifted students into programs where they spend parts of their learning with others of similar interests and ability has positive benefits for the students.

2. A socially-immersed learning environment where the students create a virtual 'thinking' community, together with other students and their teacher, enabling them to construct knowledge in an interactive and iterative process as they explore concepts and construct and reconstruct their varied interpretations of those concepts. Discourse within the virtual environment will be largely asynchronous but can assist students to reflect critically on their learning (Anderson, 2004; Lipman, 1991; McConnell, 2000; Palloff & Pratt, 1999). The social presence in asynchronous discussions in online courses at the tertiary level has been reviewed by Swan (2003) who found that asynchronous discussions are a significant factor for success with online learning. It was found that the social presence in an online environment correlates significantly with students' perceptions of satisfaction with and learning from online courses. Students' perceptions of benefits in such an environment include a more equal and democratic setting for learning as all voices can be heard with much less dominance by the teacher or any single group of students. Students are able to project their own presence in an online environment and are provided with opportunities to digest peer and teacher's contributions in their own time as well as write their responses and reflect on them before posting. In this regard, an online learning environment does not deprive gifted students of social interactions.

3. The recommendation of open online tasks for gifted students, rather than coursework learning, where students (individually or in small groups) select, pursue and evaluate an area of interest without standard curriculum materials. In this regard, it provides the students with the opportunity to learn in depth their gifted area. Open tasks also provide challenges for these students who will need to draw on their higher order thinking and problem solving skills to pursue with learning.

4. The critical role of the teacher or facilitator. The central role of the teacher in facilitating the learning process is to (i) provide presence (ii) maintain continuity and guidance both overall and at critical points where the conceptualizing and constructing of knowledge needs to be highlighted (iii) be a motivating force for the students to persist with the learning, particularly with these adolescent students who may not yet have developed the emotional maturity to work in an essentially physically lonely environment and (iv) assist students with seeking expert help (mentors) in areas of uncertainty or lack of knowledge.

5. The production of artefacts for show. The learning outcomes could be displayed in a newsletter, on a website or in a peer-for-peer conference.

In a learning environment described in this paper where the teacher does not define or structure the content (unlike in a regular classroom), attributes of giftedness: task commitment, creativity and above average intelligence (Renzulli, 1978) play an important role in ensuring the success of the learning. Together with other characteristics of giftedness described in the Introduction section of this paper, online learning will allow the students to explore and learn in-depth. The learning theories supporting the online learning framework of this study are those that support effective computer supported collaborative learning (CSCL) (for a historical perspective of CSCL, see Stahl, Koschmann & Suthers, 2006). These learning theories include social cultural (Vygotsky, 1978), constructivist (Brunner, 1966; Piaget, 1955, 1972) and dialogic (Bakhtin, 1981, 1984 & 1986; Hicks, 1996) theories. In addition, the online learning

model for gifted students include Papert's (1991, 1993) constructionism theory where he suggested that children are more engaged in learning when constructing a public artefact that others will see, critique and use than if they are only required to produce something to be handed in to the teacher.

Method of Study

Participants

The learners in this research project were 13-15 year old students, nearly all from different school sectors (government, Catholic and Independent) and different regions of Victoria. The one exception was Mf, who was being home-schooled and hence added to the diversity of learners. They had applied to come together during summer for a 4-day Sun, Science & Society camp for gifted students. Selection was based on (i) teachers' nomination and description of the students as being gifted or of high ability and (ii) students' reasons for attending the camp.

The 4-day camp was advertised as a project for gifted students that consisted of 2 phases: phase I was a four-day residential camp of activities at the university and phase II was a follow-up online-learning phase. Students were asked to indicate their interest to continue with the learning online in the application.

Setting up the Learning Environment

Stage 1: Camp learning environment

During the camp, the students were engaged in workshops that related both directly and indirectly to the Sun. The activities in the camp were a joint effort between the School of Educational Studies and the Faculty of Science, Technology and Engineering. The topic of the Sun provided a context for learning, and was a basis for making connections between varied lectures and workshops. No matter how remotely related the topics of the lectures were to the Sun, the students had to think about the connections that linked them back to it. As part of their activities, they constructed a variety of solar-based devices and sometimes made use of these devices in other activities. They listened to experts speak on fields such as nanotechnology, the synchrotron, biotechnology, sun science, space science, neuroscience and robotics. The themes addressed varied from the narrowly technical to larger moral and ethical issues to do with topics such as experimentation and environment.

Stage 2: Online learning environment

The online learning space was provided by the online management system, *Moodle*. The learning environment in *Moodle* was safe as students were required to log into the system with individual usernames and passwords. *Moodle is* an open source e-learning platform that is freely available on the WWW and was downloaded onto the university's server. Students were able to access it anywhere where Internet access was available. The tools that were set up for learning in this virtual environment were:

- Discussion forums were set up by the two facilitators according to topics individuals or groups of individuals nominated. The list of topics is shown in Table 1. Participants had free access to all discussion forums and were encouraged to explore the totality of the experiences that their peers had created.
- Chat rooms for formal (interview) and informal chats.
- In the resource area, general information or reading materials were posted.
- Private messages could be sent to facilitators or individual students without making it public to the whole group.
- The facilitators were able to track students' activities on *Moodle*. The frequency of individual students' logging into the system and the pages they visited could be monitored.

Learning online for these students was open-ended. A general guideline about what the students should be doing and the expectations of the learning outcome was provided. The learning was not structured in terms of topic choice, reading materials, groupings or the format for demonstrating their learning. A list of examples of topics and tasks that students could undertake was provided, and this ranged from extension of topics learnt at the camp to novel projects that they could undertake individually or in small groups. Table 1 indicates the spread of topics selected by the students, who initiated the topic and the extent of engagement with that topic as measured by the number of contributions.

Table 1. Forums based on topics nominated by students.

Discussion topic	**Postings**
Cloning	51
Introduction and choosing a topic to learn	64
General Notices: Please read this forum and notices above forum titles each time you log in.	33
Philosophy [are we all related?]	15
Munga National Park	33
Downfall of Man	38
Nanotechnology	20
Eugenics	32
Fuel Cell technology discussion	15
Science of Sports	17

Data of the students' learning experiences was collected through analysis of the discourse on discussion forums and through an online interview conducted in the chat room by a research assistant about two months into the project to reinforce reflection on the process, as well as providing ways in which the students could comment on areas where they were experiencing difficulties so that facilitators could intervene to support them. A focus group interview was also conducted at the end of the project during the vacation. The students were contacted by phone and email to arrange times for their online interviews. Letters were sent out to invite them to the focus group interview.

The teachers who nominated the students for the camp were contacted to administer the Torrance Creativity Test to the students, to monitor the students' progress and provide support where necessary. The creativity test was conducted as part of building up a profile for each student and to enable connections to be made between their creativity and their approach to their topics. At the end of the project, one of the teachers who worked with the *Mungo National Park* group of students was interviewed over the phone. In this study, the facilitators of the online study were also the researchers.

Results

Profile of Participants

There was a high level of interest expressed for the camp. About half of the 60 applications were rejected with 32 students selected. Of these, 16 expressed interest in undertaking the online learning phase of the program. A group of eight students from Singapore also attended the camp but none nominated to participate in the online learning.

The students nominating participation in the online learning came from metropolitan and rural areas of Victoria, as well as from private and government schools. The higher number of male students reflected the much higher proportion of males nominated by school co-ordinators to attend the summer camp (ratio of males to females was about 2:1 for the camp). Tables 2 and 3 provide a profile of the 6 female and 10 male students participating in the online learning. Gifted or Excellence Coordinators of these students described these students as gifted or high achievers (several of them were in acceleration programs), possess combinations of the characteristics of being motivated, committed, independent learners,

knowledgeable, good communicators, liking challenges, good thinkers and possessing pleasant dispositions.

Table 2 also shows the reasons why the students applied to come to the camp. The five main reasons are a desire to (i) increase knowledge and an interest in the topics advertised in the brochure (ii) make new friends (iii) learn with like-minded peers (iv) experience university life and (v) explore concerns with societal issues such as energy conservation, global warming and the ethics of science. Lm1 and Bm1, demonstrating possibly what Gardner (1999) classifies as *existential intelligence* indicated the desire to answer a range of 'big picture' questions such as:

> Lm1: Everyday I think of life, the universe and everything else, how they work and how to improve them. I would like to learn in-depth reasoning behind the big issues, such as the approaching problem of global warming and efficient energy sources a s well as ponder the really big issues such as how to harness sunlight properly.
> Bm1: How is it that nature can make something as extraordinary as plants, animals, land, water, sound, smell and us? And how can we follow nature's example?

Performance of Students at the Camp

All the students in this study participated actively in the hands-on component of the camp and differed in their willingness to contribute to discussions or ask questions. Many of this group of students were articulate and raised intelligent questions to the lecturer. The camp provided an opportunity for the students to get to know each other even though there were different friendship groups formed.

Learning Online

Choosing a topic. Students were encouraged to select topics that were not traditionally classroom learning topics. By about the third week after the commencement of the online learning, most students knew which area they wished to pursue and who they would be working with. The only exceptions were Mf1, Af1 and Kf1, who were still undecided. Af1 only ever participated on her own. Mf1 and Kf1 sought to join a group with other students, but the group never developed a successful dynamic.

Most of the students chose to work individually. The nominated topics (see Table 2) shows wide-ranging topics suggested by the students. They ranged from information topics of *Nanotechnology* and *Eugenics* to investigative topics such as *What do sports people think about during training?* to more philosophical topics such as *The downfall of man* and *Are we all related?* Lm1, Sm3, Am2 and Jm1 chose to work on the topic *Downfall of man*. In the online and focus group interviews with the students, it was revealed that most of the discussions for this group took place on MSN chats. The distribution of the group work for this topic was captured in the unedited online interview below:

> 20:33 Sm3: I'm doing 'Television and Novel Theories on Downfall of Man"
> 20:34 Am2: ok i have to research other extinct mammals and relate these reasons back to human beings
> 20:34 Lm1: I'm making biological theories based on previous history
> 20:34 RA: What about J?
> 20:34 Sm3: ok Lm1 and Am2 are different
> 20:35 Jm1: and im ressearching how different religions have 'predicted' man will fall
> 20:35 RA: SO ur all doing different topics but then ur gonna put everything together because they're related?

Table 2: School Coordinators' nomination and students' reasons for attending the "Sun, Science & Society" camp

				School Coordinators' reasons		Students' reasons					
Student	Gender	School attended	Home location	Academic achievement	Personality	Interest in topics Desire to increase knowledge	Personality	Interest in/ concerned with societal issues e.g. global warming, ethical issues	Make new friends	Learn with like-minded peers	Interested in university life
1. Jf1	Female	Government	Metropolitan		Motivated, enthusiastic Leadership		High achiever		Yes		Yes
2. Gf1	Female	Private	Metropolitan	Very high maths and science standards	Motivated, committed, good team member	Yes			Yes		
3. Mf1	Female	Home	Home schooler	Assessed in top 0.1% of population.		Yes	Participant in various other gifted programs			Yes	
4. Af1	Female	Government	Metropolitan		Organised, committed, friendly and well spoken	Yes			Yes	Yes	
5. Kf1	Female	Government	Rural	Very bright				Yes	Yes	Yes	
6. Af2	Female	Government	Rural	High achiever in maths and science	Independent learner Maturity beyond own age	Yes					Yes
7. Lm1	Male	Private	Metropolitan	Highly gifted in science	Committed, likes challenge in science	Yes	Asks big picture questions	Yes			
8. Sm1	Male	Private	Metropolitan	Highly gifted in science	Committed	Yes	Likes challenges				Yes
9. Am1	Male	Government	Metropolitan	Amazing prior knowledge	Curious, conscientious and focussed, helpful towards peers	Yes					
10. Jm1	Male	Private	Metropolitan	Very knowledgeable	Polite, caring, cooperative, willing to learn	Yes	Motivated; Committed to learn	Yes		Yes	
11. Bm1	Male	Private	Metropolitan	Outstanding in science and other subjects		Yes	Asks big picture questions				
12. Sm2	Male	Government	Metropolitan		Inquiring mind, thirst for knowledge	Yes		Yes			
13. Lm2	Male	Private	Rural	Acceleration program	Friendly Good communicator	Yes		Yes			Yes
14. Am2	Male	Government	Rural	Gifted and talented program	Logical and lateral thinker, diligent enjoys challenges	Yes			Yes	Yes	

15. Jm2	Male	Government	Rural	Acceleration program Excellent science results	Committed	Yes				Yes	
16. Jm3	Male	Private	Rural	Top achiever – perfect score and high distinction in national maths & science competitions; acceleration program	Learns quickly, independent learner, good communicator	Yes	Likes learning; Enjoys challenge			Yes	Yes

Table 3: Profile of students and participation in activities at camp and in discussion forums, online and focus group interviews

Student	Gender	School attended	Home location	Participation at residential camp	Participation in the planning & discussions of topics on Moodle	Evidence of having conducted research	Stage of work at end of project	Participated in online interview	Participated in focus group interview	Creativity test index (Torrance test) ND-not done
1. Jf1	Female	Government	Metropolitan	Active, vocal*	Active	Yes	Completed	Yes	No	ND
2. Gf1	Female	Private	Metropolitan	Active, quiet	Active	Yes	Started	Yes	No	79
3. Mf1	Female	Home	Home schooler	Active, very vocal	Active	No	Could not decide on topic	Yes	Yes	123
4. Af1	Female	Government	Metropolitan	Active, quiet	Inactive	No	Undecided from beginning	Yes	No	119
5. Kf1	Female	Government	Rural	Active, very vocal	Inactive	No	Could not decide on topic	Yes	Yes	ND
6. Af2	Female	Government	Rural	Active, quiet	Active	Yes	Started	Yes	No	123
7. Lm1	Male	Private	Metropolitan	Active, very vocal	Active	Yes	Started	Yes	No	ND
8. Sm1	Male	Private	Metropolitan	Active, vocal	Active	Yes	Started	Yes	No	ND
9. Am1	Male	Government	Metropolitan	Active, very vocal	Active	Yes	Completed	Yes	Yes	113
10. Jm1	Male	Private	Metropolitan	Active, quiet	Inactive	No	No	Yes	Yes	92
11. Bm1	Male	Private	Metropolitan	Active, very vocal	Active	Yes	Completed	No	No	110
12. Sm2	Male	Government	Metropolitan	Active, quiet	Active	Yes	Designed q'nnaire and collected data	Yes	Yes	116
13. Lm2	Male	Private	Rural	Active, vocal	Inactive	Yes	Completed	Yes	No	102
14. Am2	Male	Government	Rural	Active, quiet	Inactive	Yes	No	Yes	No	
15. Jm2	Male	Government	Rural	Active, vocal	Active	Yes	Wrote to and collected information from Chrysler. Draft of Powerpoint slides	Yes	No	92
16. Jm3	Male	Private	Rural	Active,	Active	Yes	Started	Yes	No	103

*vocal: students contributed enormously to discussions and asked many questions at the camp
Students who completed tasks are highlighted.

20:35 Sm3: yep i gave him that one
20:35 Jm1: mainly like armagetton mumbojumbo
20:35 Sm3: and i also helped Am2 with that one
20:35 Sm3: thats my work for the year
20:35 Sm3: Lm1 does the rest
20:35 Lm1: Yep. Each pursuing a different theory
20:35 Jm1: pf u didnt give me that one i sed it n ur like
20:35 Jm1: hey thats a good idea
20:36 Lm1: We'll probably do it as a presentation
20:36 Sm3: powerpoint
20:36 Jm1: mmm
20:36 Sm3: i said that loser boy
20:36 Am2: oik
20:36 RA: That's good so do u talk about it often or just do your separate things?
20:36 Lm1: I think Sm3 will be the first human to fall
20:36 Sm3: each do separate presentations and join them together
20:36 Lm1: We talk at random intervals
20:37 Sm3: lol Lm1 made a funny
20:37 Sm3: he should do it more often
20:39 Lm1: Well, my theory is that newer cells will out last our current, eukaryotic cell base
20:39 Am2: has evry1 at least started som research and got a lil bit ritin down
20:39 RA: eukaryotic cell base?
20:39 Sm3: because i have a more complex cell, its called the s#####karyotic cell
20:39 Am2: thats the animal cells atm
20:39 Lm1: Yeah, membrane bound organelles like the nucleus and mitochondrian
20:39 Sm3: durr... RA

The other group topic was *Mungo National Park.* Af2 and Jm3 worked with 4 other students from the same school to research different aspects of this National Park, which is located near their school in a rural township. The students were helped by a teacher who took them on an excursion to the Park. This park is notable for its archeological remains, in particular the remains of the Mungo Man, the oldest human remains discovered in Australia, and Mungo Lady, the oldest known human to have been ritually cremated.

As the choice of these topics indicates, the students relished the open-ended nature of the challenge that they had been set and were willing to engage in topics that can not be considered 'safe' or 'closed'. This approach is consistent with their generally higher scores on the Torrance Creativity Test. The individual topics *Eugenics*, *Nanotechnology*, *Cloning* and *Fuel cell technology* were science-based and all proposed to focus not only on content but also the ethical and societal issues associated with each. Am1 who completed the topic *Are we related?* looked at it from historical, scientific and philosophical viewpoints. Even though many students worked individually, they were also willing to challenge and share their own thinking. For example, Sm2 undertook an investigative project on the psychology of sports:

 Sm2:

I have decided to concentrate on the Psychological side of sports, mostly running and athletics. I am researching by doing a survey on athletes at my athletics club on what they think while they run, as well as before a race and during training ect. I found it is more a researching project then say, finding out how muscles work out of a textbook.

While i was researching sports psychology i found an article about two different ways people should think when running. I found it amazing that everything he said i had experienced in my own training and competition. I know from experience that what he says is true. If your interested the article is here. http://www.pponline.co.uk/encyc/0991.htm It is writen by Lee Crust.

Behaviour in Discussion Forums

The initial interest in asynchronous discussion participation in *Moodle* was frequent with most of the students. There were a few students who logged on frequently to read rather than post opinions in these forums. As the school term progressed, the frequency of logging into the system and posting dropped off. However, the online interview about two months into the project caused a burst of activities around that period.

The nature of the discussions was mixed. Not all discussions were focused on the topics as sometimes the students were side-tracked with humour such as:

 Sm3

Maybe.... we should believe that I, Sm3 will become ruler and banish Lm1 to a pool of mud.

 Am1

ruler of what? a flea circus ha eh heeh hee

The students' ability to come up with, individually or in groups, the topics listed above was a first achievement. For example, Jm2's interest in fuel cell technology led him to:

 Re: Fuel Cell Technology by Jm2

Conatcted Daimler Chrysler yesterday. They emailed me last night and I should be getting some info. Will continue reaserch on internet till it arrives. If others want copies can email electronic files. Contact me at xxxxxx@xxx.com if you want a copy.

 Re: Fuel Cell Technology by Jm2 (two weeks later)

Have contacted BMW. They weren't interested! Told me to go away. Hope to have better luck from Ballard. Am planning to look at standards for fuel cell vechiles

This topic however, generated little discussion among the participants with most direct support coming from the facilitators so that Jm2 worked on his own most of the time. In addition to the information sent to him by the car companies, he made use of online resources, including multimedia materials.

The bulk of the students who participated in the online discussions could demonstrate high levels of thinking for their age group. They were confident with their postings and the dialogue revealed that several of them had read widely and had a very broad general knowledge. For example Sm2 undertook a research investigation where he surveyed the members of his sporting club about what they think when they are training. He had read about various psychological theories of sports training:

 Re: Science of Sports by Sm2

When training i find that i use dissociation thinking when running a long distance at the same speed as i get into a rythem and am then free to let my mind wonder. When running faster in shorter runs or when im trying to really push hard, i use assosication thinking and concentrate on my breathing, my stride length and rate, and sometimes the person im trying to keep up with's stride length and rate. To perform better i use assosication thinking and through concentrating on my opponents' (or training partner's) stride length and rate i can change mine to match it and so keep up easilly.

Other students were either imaginative and predictive or well informed, for example Lm1:

 Re: Downfall of Man by Lm1

Machines taking on the role of humans may not lead to the highly popular belief that humans will eventually succumb to the power of the machines themselves. AI, while theoretically possible, ignores the problem that machines are still no more capable than their creators in that any machine too far out of hand can still be switched off or destroyed. What's more, lacking a natural method of recycling would restrict machines to the amount of available resources. While carbon, nitrogen and other bases needed for organic reactions are readily abundant, metals aren't so the machines will be limited to a much lower population than humans.

Another issue to consider is the limitations of the planet; there is only so many humans Earth can support after which the population would change from exponential growth to equilibrium.

> The obvious answer is that humans will be their own undiong, it certainly is the notion most widely entertained by those I've asked, but I was looking into other areas. Insofar as Biology is concerned, Eukaryotic cells have outdeveloped Prokaryotic but have never outpopulated. Perhaps a new cell structure will form, using Eukaryotic cells' diveristy with Prokaryotic cells' robust qualities and reproduction rates. The simple truth is that nothing lasts forever. For all we know, humans may develop the transport to abandon the damaged Earth and make for a new paradise, leaving another organism's dominion in their wake.

There were lengthy, intelligent dialogues on the topics of *Eugenics*, *Nanotechnology* and *Downfall of Man*. However, in some instances the discussions went off-track somewhat but facilitators felt it unnecessary to pull them back on track. The diverse creative aspects of the work of the students are obvious from the extracts of their exchanges.

An advantage of asynchronous online discussion is the time that students have to reflect and react, and to manage discussions that allow for deep thinking to be expressed in writing (Markel, 2001; Poole, 2000; Lim and Tan, 2001). The conversations in the forums in this study demonstrate this further. However, despite the opportunity to reflect, many of the students did not edit their writing in the forum, and grammatical and spelling errors are found throughout most forums. Many students used mobile phone text-based language in their expressions in these forums and especially in the chat rooms. This reflects their engagement in the tasks using forms of English that were comfortable for them and appropriate for the medium, where the focus was on the exchanging of ideas rather than the rehearsal of the formal presentation.

Discussion

Table 3 summarises the students' participation in the various components of the project and their achievements or lack of achievement. The table shows that three of the female students, while still demonstrating interest in the project until the end of the project, did not make a start with the task. For Af1, the online interview revealed that school work took priority and that there needed to be more structure in this type of learning. The other two students, Mf1 and Kf1 were undecided students. If does not appear that the Torrence creativity test score can be used as predictor of task commitment since Mf1 and Af1 scored amongst the highest in the creativity test. At the focus group interview, Kf1 and Mf1 provided reasons for their lack of commitment:

> Mf1: I've lost my password a few times and the website
> Kf1: I like having a topic, that's always useful.
> Interviewer: So you'd like somebody to help you decide on that?
> Kf1: yes, that'll be very good.
> Interviewer: If you went to your form teacher or somebody else and said "hey would I be able to do something like this in school?" do you reckon they'd let you do it?
> Kf1: Probably they would but they'd also want me to do stuff in class as well, but I think that'll be a bit too much

Gf1, Af2 and Jf1 were all 13 year olds. All demonstrated good thinking skills at the camp. Jf1, who completed the online task logged into *Moodle* regularly and contributed substantially to forum discussions. She worked independently to complete her essay on the different types of cloning. She was committed to the learning.

For the male students, the majority provided evidence of having started on their research through implicit and/or explicit statements made during the interviews or in discussion forums. Jm1's contribution to the group task of *Downfall of Man* was choosing his topic for investigation – the religious aspect of the downfall of man, but he failed to show evidence that he had started on the research for the task. Like Kf1, he would have liked school time to do some of the research and write-up:

> Jm1: If I had to do it as an extra thing, I'd have to do it after school and because of my other commitments it would have been a lot slower and it would have been less efficient than doing it in science (focus group interview)

The rest of the boys showed varying degrees of task completion, but few actually completed the tasks. This was despite reminders and encouragement from facilitators.

Limitations of the Online Learning Demonstrated in this Study

A number of reasons have been identified for the limited success of the online learning in terms of task completion by this group of students:

1. Lack of commitment to the task. The students demonstrated varying degrees of success within the online learning framework they were exposed to even though most of them were clearly engaged with and exposed to a variety of ideas and sources of information. The non-compulsory nature of the online learning, in terms of attendance or assessment was a contributing factor to the final outcome of the research study. As the teacher who was monitoring the Munga National Park project said: "The camp was great, all the students learned a lot from it, and while the (online) idea is great, the enormity of it is a bit much for these very young kids." This was particularly so when the learning was over and above their normal school work. She also commented that the time provided was too long, as the more time the students were given, the more they dragged the project. It was reasonable to suggest that for optimal learning of this type to take place, it is important that schools commit some time within the high ability students' curriculum to pursue the learning.

2. Competition for time with school work. Through online or focus group interviews or email, Gf1, Af1, Lm1, Sm1, Jm1and Jm3 have indicated the competition for time between homework, part-time work, extracurricular activities and this project.

3. Unstructured nature of the learning. Several students indicated in the interviews that the very open and unstructured nature of the learning made it difficult for the learning to take place. The open nature of the learning produced too many topics for a small group of students to focus. Hence the 'critical mass' of students for each topic was not there to support each other to study the topic in depth.

4. Not all the students are gifted. As the students in this study were not tested for giftedness, it is possible that the failure to start and/or complete the tasks is a result of the students' academic inability.

5. Dislike writing or formalising learning. For many of the students who did not complete their tasks, there was demonstration of a willingness to contribute intellectually to dialogue. But the commitment and motivation to translate thinking and researched material into an organised, formally formatted piece of work did not occur. There could be discrepancy between intellectual ability and producing a concrete piece of work in some of these high ability students.

Capacity: What Online Learning Can Offer

The online learning as described in this study can provide 'like-minded' students with an opportunity and a space to communicate and learn from each other things that are not normally covered in the classroom. It can provide challenges to the students to take up open tasks that challenge their highest levels of thinking and their independence with learning in a non-traditional environment and their organisational and management skills such as remembering to login to read postings, planning the content to be researched and placing the knowledge gained in a format that could demonstrated their depth of understanding of the topic. The variation in learning online can enrich their learning experiences. For all the students in this study, this is their first experience of virtual classroom learning, searching for information online, developing and displaying decision making, analytical and social skills in discussion forums. As they get used to this format of learning, the output should improve.

Implications for further research

The research findings from this study will inform the next phase of researching in the use of online technologies to cater to the learning needs of high ability students. For secondary school students where instruction is still very much conducted in the traditional way, it is beneficial to ease the students into a very different learning environment online. Although there was no indication from this paper's research study that the students were apprehensive in any way in using *Moodle,* a couple of closed tasks to allow students to explore the new learning environment and become familiar with it

might be useful. Hence it may be more appropriate for the instructional design to have more structure at the beginning followed by the open nature of the learning that this study has reported.

Being aware of the changing culture and expectations of the younger generations growing up with computers and computer-associated devices, and who use these devices creatively to communicate and to seek, access, and process information for educational and recreational purposes is necessary when considering online learning for adolescents. Prensky (2003) terms these young people 'digital natives' who use Information Communication Technology (ICT) to engage themselves in and out of schools. The students who worked in groups in this study reported difficulty in getting everyone in their group to meet online in a *Moodle* forum at the same time. As the extract below from the focus group interview revealed, *Moodle* takes a special effort to log into whereas MSN, SMS or email could be more useful and quicker, requires less effort and could be more productive because the students were already in communicative relationships based in MSN.

Jm1: Look it's good but it's not enough. We use MSN a lot more than we use moodle because MSN is a more reliable chat. I find that I don't get kicked out of there compared to moodle. It's more of a forum type thing, while MSN you'll go on anyway if you've got spare time just to chat to friends and if they're on then you'll talk to them as well. I just find it more efficient then saying "we'll go on at 8:30 on the 21st July on moodle" MSN is a lot better because you'll go on.

Am1: it's a separate program

Jm1: Plus it's a lot more reliable. You can have voice conversations and video conversations and you can actually show work and present it easily.

Sm2: MSN is made to do that; it's got a certain version of it

Interviewer: so MSN, even though it's computer based, it's more flexible. Whereas moodle relies on setting up a time and…

Jm1: because your not just going to go on moodle and expect to see Am2 on there. So I'll say I'll go on moodle and chat with Am2

Am1: You have to stay there until someone comes on

Jm1: If you're on MSN you can chat for about an hour and then [x] comes on. He can chat to his mates and that's when you'll talk. But the chances of you guys going on at the exact same time, to see if you guys are there, is not going to happen.

Interviewer: But for us, Moodle is good because we can put things on there and have resources you can't do that on MSN

Jm1: That's right, it's more a closed forum, which is a lot better. It keeps track of things. We do our discussions on MSN and then we go back to Moodle and finalise things

The comments also reflect the metacognitive approach of this group of students. They reflected on and generated reasons for the different behaviours that they observed. The option of using other online technologies should be encouraged.

Finally, schools should take a more active part in supporting students' engagement in online learning by allowing class time and access to computers in the school. Tools that are frequently stigmatised as 'Chat' have a clear role in creating contexts in which relationships have already been established, but through which new thinking can be encouraged. There are places around the world that offer online learning courses for gifted and high ability students. For example, Stanford University eLearning Education Program for Gifted Youth and The Cambridge School Classics Project at Cambridge University. However, the approach outlined in this paper can both provide advantages and avoid some of the economic and social/organisational disadvantages of other possible responses to providing for high-ability students. Like-minded high ability students from within a school or a cluster of schools can be brought together into a 'virtual classroom' to pursue a specific area of interest or 'gift' or to work on projects identified by the teacher as extending their passion for learning. Ongoing research into the pedagogy of online learning for school-aged students and means of assessing learning conducted online will inform best ways of using the technologies that support this type of learning.

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References

Anderson, T. (2004). Towards a theory of online learning. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning*. (pp. 33-60). Canada: Athabasca University Press.

Bakhtin, M. (1981). Discourse in the novel (M. Holquist & C. Emerson, Trans.). In M. Holquist (Ed.), *The dialogic imagination* (pp. 259-422). Austin: University of Texas Press.

Bakhtin, M. (1984). *Problems of Dostoevsky's poetics*. Minneapolis, MN: University of Minnesota Press.

Bakhtin, M. (1986). The problem of speech genres (V. McGee, Trans.). In C. Emerson & M. Holquist (Eds.), *Speech genres and other late essays* (pp. 60-102). Austin: Univ. of Texas Press.

Brown, I. (1998). The effect of WWW document structure on students' information retrieval. *Journal of Interactive Media in Education, 98* (12). Retrieved March 20, 2007, from
http://www-jime.open.ac.uk/98/12/brown-98-12-01.html

Bruner, J. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.

Gardner, H (1999) Intelligence Reframed: Multiple Intelligences for the 21st Century, New York, Basic Books.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical thinking in text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2(2)*, 87-105.

Hicks, D. (1996). Contextual inquiries: A discourse-oriented study of classroom learning. In D. Hicks (Ed.), *Discourse, Learning, and Schooling* (pp. 104-141). New York: Cambridge University Press.

Kerchkoff, A. V. (1986). Effects of ability grouping in British secondary schools. *American Sociological*
Review, 56(6), 842-958.

Kirschner, P. (2002) Cognitive load theory: implications of cognitive load theory on the design of learning. *Learning and Instruction*, **12**, 1–10.

Kulik, C. L. C., Kulik, J. A. (1982). Effects of ability grouping on secondary school children. A meta-analysis of findings. *American Educational Research Journal, 19*, 415-428.

Kulik, C. L. C., Kulik, J. A. (1987). Mastery testing and student learning: A meta-analysis. *Educational Technology Systems, 15*, 325-345.

Lim, C. P., & Tan, S. C. (2001). Online discussion boards for focus group interviews: An exploratory study. Journal of Educational Enquiry, 2(1), 50-60.

Lipman, M. (1991). *Thinking in education.* Cambridge: Cambridge University Press.

Lipponen, L. (2002), Exploring foundations for computer-supported collaborative learning. Retrieved March 20, 2007 from http://newmedia.colorado.edu/cscl/31.html

Liu, W. C., Wang, C. K., & Parkins, E. J. (2005). A longitudinal study of students' academic self-concept in a
streamed setting: The Singapore context *British Journal of Educational Psychology, 75*(4), 567-586.

Markel, S. L. (2001). Technology and education online discussion forums: It's in the response. Retrieved 20 March, 2007 from www.westga.edu/~distance/ojdla/summer42/marke142.html

Mayes, J. T. (1995). Learning technology and groundhog day. In W. Strang, V. Simpson, & D. Slater (Eds), *Hypermedia at work: Practice and theory in higher education*. Canterbury: University of Kent Press. Retrieved March 20, 2007 from http://apu.gcal.ac.uk/clti/papers/Groundhog.html

McConnell, D. (2000). Implementing computer supported cooperative learning (2nd ed). London: Kogan Page

McKenzie, J. (1998). "Grazing the Net." *Phi Delta Kappan* 79 (September): 26-31. Retrieved March 20, 2007, from http://fno.org/text/grazing.html

Ng, W. & Nicholas, H. (2007). Conceptualising the use of online technologies for gifted secondary students. *Roeper Review, 29* (3), 190-196.

Nixon, H., Atkinson, S. and Beavis, C. (2006). New media pathways: Navigating the links between home, school and the workplace in Tan, L.W.H. and Subramaniam, R. (Eds). *Handbook of Research on Literacy in Tehnology at the K1-2 Level.* (pp 118-136). Hershey, USA: Idea Group Publishing.

O'Mahony, C. (2006). The emerging use of e-learning environments in K-12 education:Implications for school decision makers. in Tan, L.W.H. and Subramaniam, R. (Eds). *Handbook of Research on Literacy in Technology at the K1-2 Level*. (pp 596- 603). Hershey, USA: Idea Group Publishing.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective* Lipman, M. (1991). *Thinking in education.* Cambridge: Cambridge University Press.
Papert, S. (1991). Situating constructionism. In I. Harel & S. Papert (Eds), *Constructionism: research reports and essays, 1985 – 1990*, (pp 1-12). Norwood, NJ: Ablex Publishing.
Papert, S. (1993). The children's machine: Rethinking school in the age of the computer. New York: Basic Books.
Piaget, J. (1955). *The construction of reality in the child*. London: Routledge & Keegan Paul.
Piaget, J. (1972). *Psychology and epistemology*: *Towards a theory of knowledge.* London: Penguin University Books.
Poole, D. M. (2000). Student participation in a discussion-oriented online course: A case study. *Journal of Research on Computing in Education, 33*(2), 162-177.
Prensky, M. (2003). Engage me or enrage me: what today's learners demand. *On the Horizon* (9:6) NCB
University Press. Retrieved January 16, 2006, from http://www.educause.edu/ir/library/pdf/erm0553.pdf.
Renzulli, J. (1978). What makes giftedness? Re-examining a definition. *Phi Delta Kappan, 60*, 180-184.
Stahl, G., Koschmann, T., & Suthers, D. (2006). *Computer-supported collaborative learning: An historical perspective.* In R. K. Sawyer (Ed.), Cambridge handbook of the learning sciences (pp. 409-426). Cambridge, UK: Cambridge University Press
Vygotsky, L. (1978). Mind in society: The development of higher psychological processes. Cambridge: Harvard University Press.
Warschauer, M., & Kern, R. (Eds.). (2000). *Network-based language teaching: Concepts and practice.* Cambridge: Cambridge University Press.

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(B.9)

A Virtual Parents' School As Means of Promoting Giftedness

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The Austrian Research and Support Centre for the Gifted and Talented (özbf)

Abstract

The Austrian Research and Support Centre for the Gifted and Talented has adopted a virtual parents' school from Universidad Complutense de Madrid (Spain) and adapted the contents to the Austrian, German and Swiss contexts of gifted education. The virtual parents' school will give parents the opportunity of gaining information on topics of gifted education in order for them to provide the best education and provision possible for their children. The following topics will be dealt with in the virtual school: giftedness and development of giftedness; intelligence, talent and creativity; developmental psychology – A general introduction; the child's development; identification of giftedness; promoting together – cooperation in the provision of gifted children; What to do – How to promote gifted children?; double exceptionality; the gifted child within its family; provision programs and legislation in Austria and other countries. The school is enlivened with cartoons, little quizzes and practical case studies. Furthermore, the parents have the opportunity to pose questions to a psychologist in an online forum as well as share their experiences with the other parents in the forum. A face-to-face meeting at the beginning as a social warm-up will ensure active participation in the virtual room. The presentation will include a description of the main objectives and the ten modules and will list the advantages and disadvantages of a virtual parents' school.

The Austrian Research and Support Centre for the Gifted and Talented (özbf) is currently developing a virtual parents' school. This paper will try to answer the following questions:

1) What is the Austrian Research and Support Centre for the Gifted and Talented?
2) What are the objectives of our virtual parents' school?
3) What are the advantages of a training based on e-learning?
4) What are the disadvantages of a virtual parents' school?
5) What factors should be taken into consideration when planning e-learning?
6) What are the contents presented and methods applied in the virtual school?

(1) What is the Austrian Research and Support Centre for the Gifted and Talented?

The Austrian Research and Support Center for the Gifted and Talented (özbf) is a registered association. It was established in 1999 and is financed by the Ministry for Education, Arts and Culture and the Ministry of Science and Research. We are a national centre and act as a think tank for innovative enterprises in the field of talent support in Austria. We set up national and international networks and collaborations. We create a link between science and teaching, and we provide information through a website, a journal - "news & science" -, brochures, a web-based databank for Best-Practice Models, a web-based teaching resources pool and so on. Other activities include the development of national strategies, research, the support of school improvement, teacher training and training for children and parents.

Every two years we organise an international conference. The next conference will be held in November and will focus on the qualities of educators for the gifted.

(2) What are the objectives of a virtual parents' school?

Parents are a child's first and most important educators. Even when other persons such as friends or teachers grow more important, parents still continue to be central figures – as teachers, educators, role models, mentors, counsellors, evaluators, etc.

Many parents themselves see their roles as pivotal and want to fulfil them as well as possible. Especially parents of gifted children are often willing to continue their own education – e.g. by reading books or attending conferences and courses – in order to be able to provide the best education and provision possible for their children.

The Austrian Research and Support Centre for the Gifted and Talented aims at providing parents with the information they need to foster the talents of their children. We have therefore adopted a virtual parents' school from the Universidad Complutense de Madrid in Spain and adapted the contents to the Austrian context of Gifted Education.

With the virtual parents' school we are pursuing the following four objectives:

- **Providing information for parents**: At present there are hardly any offers for parents to get instruction on Gifted Education in Austria. While teachers can attend special teacher training courses, in-service training or a master course at a university, parents do not have this opportunity. Even conferences on Gifted Education often do not include parents in their target group and, as a consequence, do not offer presentations which are of special interest to them.
- **Providing parents with the necessary social skills**: Parents who are trained in the various aspect of parenting gifted children are more likely to support their off-springs when there are problems at home, at school or with friends.
- **Individual counselling of parents of gifted children**
- **A change of attitude**: We do not want parents to see their gifted children as different or even as a burden (as some parents do) but as special and a joy. The main objective of the virtual parents' school therefore is to teach parents to accept and appreciate their gifted child's individuality.

(3) What are the advantages of a training based on e-learning?

- Individual counselling is rather time-consuming. With a virtual parents' school **more parents** of gifted children **can be reached**, even those that live at a great distance to the counselling or training center. The school comes to their homes.
- At a virtual school parents can learn at their own speed and depth, which reflects the **individualising approach** of Gifted Education in general. The parents autonomously decide how much effort they will invest in the modules, how fast they want to finish a topic or how much time they will spend in the discussion forums.
- A virtual school is more **interactive** than individual counselling. Parents get the opportunity to talk to each other – in the on-line rooms as well as in the face-to-face meetings. Parent clubs and parent organisations have shown that it is very important for parents to exchange their experiences and ideas. They learn that there are other parents out there who have similar problems, and often parents can give advice to each other.

(4) What are the disadvantages of a virtual parents' school?

- A certain proficiency in dealing with an on-line platform is necessary in order for the participants to find their way through the virtual school. It is therefore crucial that the learners get a step-by-step **training on how to use** the platform at an initial face-to-face-meeting.
- Even though e-learning has the advantage of offering information regardless of the parents' whereabouts, in order to be successful, it is necessary to organise **face-to-face-meetings** for which you need to find an appropriate date and place for everybody.
- Individualising a student's learning means taking into consideration different learning styles: Some students learn better by reading, others are more auditory or kinesthetic. E-learning platforms predominantly appeal to learners who are **visually oriented**. In the next section, it will be outlined how we plan to overcome this disadvantage.
- Setting up and keeping up a virtual school takes a lot of **time and effort**. Compared to face-to-face courses or workshops, e-learning will not save time – contrary to what many people might expect.

(5) What factors should be taken into consideration when planning e-learning?

There are two very important scientific findings to be considered when planning online training: The five-stage model of e-learning by Gilly Salmon and John Sweller's and Paul Chandler's *Cognitive Load Theory*.

- **The Five-Stage Model of e-learning**: According to Gilly Salmon's 5-stage-model,[26] participants in e-learning courses need to be guided through a pre-structured set of stages to ensure interaction and participation.

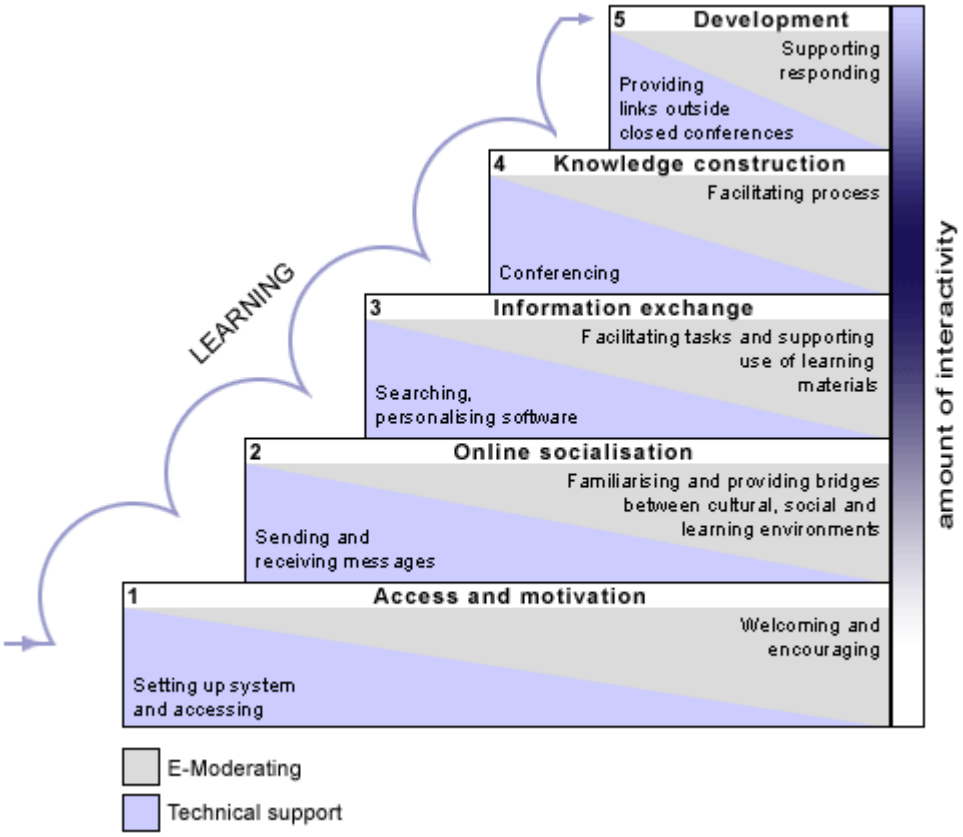

Figure 1: Gilly Salmon's Five-Stage Model[27]

a. **Provide access and motivation:** At the first stage, instructors must ensure that all participants possess the relevant computer skills and are able to access the learning platform. The participants should feel welcome, encouraged and motivated to visit the online platform regularly.

b. **Provide online socialisation:** The second stage involves establishing an online community in which the participants feel comfortable communicating with each other – not only about the contents of the modules but also about their own experiences, emotions and attitudes. Establishing an online café or an online pub may provide such an opportunity for informal talk. Research at Oxford Brookes University has shown that informal communication tools should not be eliminated for the sake of efficiency.[28]

We plan to do stages 1 and 2 at an initial face-to-face meeting at the beginning. At this meeting, the following contents will be dealt with:

i. Presentation of an overview of the contents and the main features of the virtual school

ii. Discussion of general and organisational issues: What is needed for a successful training? What are the counsellors' tasks? How much time does

[26] Salmon 2008.
[27] Salmon 2008.
[28] Maresch 2005; Monty 2005.

one need for reading and doing the tasks and quizzes? How does the evaluation work? Etc.

iii. Introduction of the moodle-platform.

iv. The parents should get to know each other more intimately. Experience has shown that participation in an online-forum is rare if the participants are not acquainted with each other.[29]

v. Beside serving as a platform for group-building activities and technical information, these face-to-face-meetings should also reserve time for motivation, self-reflection and for helping the parents plan their online-phases.[30]

We are planning to hold a meeting right at the beginning of the training course, then one in the middle and one at the end, after everyone has finished the training. The last meeting should serve as a platform for giving and receiving feedback as well as for awarding the parents a certificate. This approach (initial face-to-face meeting, e-learning phase, face-to-face-meeting, e-learning phase and final face-to-face meeting) is called **Blended Learning** and has proved to be more effective than just e-learning.[31]

Figure 2: Blended Learning-Phases.

c. **Information exchange:** In the third stage of Salmon's 5 stage model the parents will become comfortable reading the texts, finding information (e.g. glossary), doing tasks and commenting on both contents and tasks in the forum. During this stage, the counsellors' tasks are the following: express clear expectations, set precise assignments, answer the participants' questions, and comment on their entries.[32]

d. **Knowledge construction:** When parents have started to develop their own schemata, to reflect on the information, to combine it with their own experiences and are open for adapting their knowledge, they have arrived at stage 4. The counsellors can help the participants at this stage by commenting on entries quickly and in detail and by asking questions that provoke self-reflection and metacognitive thinking.

e. **Development:** At Stage 5 "participants become responsible for their own learning and that of their group".[33] They become committed and creative in regards to online participation. Furthermore, they have gained self-insight and are able to make judgments on the experience and the knowledge they have accumulated. Like in stage 4, counsellors should try and initiate self-reflection and metacognitive thinking.

- **Cognitive Load Theory:** John Sweller's and Paul Chandler's *Cognitive Load Theory* stipulates that a person's working memory has limitations, i.e. a person is able to process only a certain amount of information or cognitive load.[34] It also suggests that "effective instructional material promotes learning by directing cognitive resources towards activities

[29] Gertsch 2006.
[30] Pauschenwein 2004.
[31] Gertsch 2006.
[32] Salmon 2008.
[33] Ibid.
[34] Chandler & Sweller 1992; Brünken & Leutner 2001.

that are relevant to learning rather than to processes that are an adjunct to learning".[35] CLT distinguishes between three different kinds of cognitive load:

a. *Intrinsic* cognitive load describes the inherent difficulty that is associated with the learning material. It cannot be altered by an instructor.
b. *Extraneous* cognitive load describes the additional load that is generated by the manner in which the learning material is presented. This *can* be altered by the instructor.
c. *Germane* cognitive load describes the cognitive load devoted to the processing, construction and automation of schemata, which is an important aspect of learning. The amount of germane cognitive load can also be altered by the instructor. In general, it is suggested that instructors limit extraneous load and promote germane load.[36]

The implications of the Cognitive Load Theory for the virtual parents' school are as follows:

a. Learning material needs to be as precise and short as possible. Non-essential ("nice-to-know") information, which is related to a module but extraneous in nature, hinders learning. Richard Mayer and his colleagues at the University of California at Santa Barbara have found that learners who studied a shorter lesson showed much greater learning than those who studied enhanced versions. Mayer believes that non-essential information activates irrelevant prior knowledge which then interferes with the new information to be learned.[37]
b. In general, addressing different learning styles and using various e-learning tools (graphics, audio, text) help with learning. However, as with non-essential information, instructors need to be careful not to "overload" learners. Research has shown that better transfer learning occurs when, for instance, a graphic is explained by audio alone rather than by audio and text.[38] In order to address auditory learners too, we intend to hold regular online presentations and online conferences with the help of Web 2.0 tools and Skype.

(6) What are the contents presented and methods applied in the virtual parents' school?

The training course consists of ten modules:

1. Giftedness and the development of giftedness;
2. Intelligence and creativity;
3. Developmental psychology – A general introduction;
4. The child's development;
5. Identification of giftedness;
6. Cooperation in the provision of gifted children;
7. How can parents foster gifted children?
8. Double exceptionality;
9. The gifted child within the family; and
10. Provision programs and legislation in Austria and other countries.

- **"Giftedness and the development of giftedness"** will include definitions and concepts of giftedness and talent; factors of giftedness like motivation, interests, self-efficacy, self-management etc; the development of giftedness; research on expertise.
- **"Intelligence and Creativity"** will include a brief history of intelligence research and different theories of intelligence; the interaction between culture and intelligence; definitions and identification of creativity.

[35] Cooper 1990.
[36] Sweller, Van Merriënboer & Paas 1998.
[37] Clark 2002; Cooper 1990.
[38] Clark 2002.

- **"Developmental psychology – A general introduction"** will give a brief history of developmental psychology; it will show theories and controversies within this field; and it will deal with issues like parenting styles, a child's basic needs etc.
- **"The child's development"** will be concerned with the various stages of a child's development; the development of motor skills; cognitive development; moral development; asynchronous development etc.
- **"Identification of giftedness"** will deal with pedagogical and psychological diagnostics: characteristics of gifted children, checklists and their flaws; tests and their implications.
- **"Cooperation in the provision of gifted children"** will be concerned with the following topics: How can parents promote their children? What are the features of a kindergarten that supports gifted children? What are the features of a school that provides for gifted children? How should parents communicate with teachers? Early schooling and grade-skipping; provision within the community.
- **"How can parents foster gifted children?"** will deal with fostering talents and creativity at home, how to deal with boredom, how to foster life-long learning.
- **"Double exceptionality**" will provide information on: gifted girls; underachievement; attention-deficit, hyperactivity, dyslexia, autism.
- **"The gifted child within his/her family"** will be concerned with the importance of family, relationships within the family, the influence of siblings; solving conflicts, communication strategies.
- **Module 10** will provide information on **provision programs and legislation in Austria and other countries**.

All in all, the training will take about a semester, each module taking about two weeks.

The virtual parents' school will be enlivened by quizzes, tasks and practical case studies. Parents will have the opportunity to pose questions to the counsellors (pedagogues and psychologists) in an online room.

Each module has its own forum and its own threads. The modules will be activated successively, they will then be kept open throughout the course to improve recall and repetition of the contents.

For parents who prefer the privacy of an email, we will offer the opportunity to write emails to the counsellors.

We will also carry out an evaluation of the virtual parents' school. After having completed the school, do parents see their children differently? Do they understand them better? Has there been a change of family life?

To summarize: The Austrian Research and Support Centre for the Gifted and Talented is currently developing a virtual parents' school in order to provide training for the parents of gifted children. The school will provide training via e-learning and face-to-face meetings and offer ten modules, an online café, online counselling, online presentations, online conferences, quizzes and tasks.

When we have finished and evaluated the pilot-project we will offer the virtual school to institutions that are interested in offering a virtual parents' school to their own clients.

References

Brünken, R. & Leutner, D. (2001). Aufmerksamkeitsverteilung oder Aufmerksamkeitsfokussierung? Empirische Ergebnisse zur ‚Split-Attention-Hypothese' beim Lernen mit Multimedia. *Unterrichtswissenschaft*, 29, 357-366.

Chandler, P. & Sweller, J. (1991). Cognitive Load Theory and the Format of Instruction. *Cognition and Instruction*, 8:4, 293-332.

Clark, R. (2002). Six Principles of Effective e-Learning: What Works and Why. *Learning Solutions e-Magazine*. September 10, 2002.

Cooper, G. (1990). Cognitive load theory as an aid for instructional design. *Australian Journal of Educational Technology*, 6:2, 108-113.

Gertsch, F. (2006). *Das Moodle Praxisbuch. Online-Lernumgebungen einrichten, anbieten und verwalten*. München: Addison-Wesley.

Maresch, G (2008). *Blended-Learning-Didaktik*. Innsbruck: Studienverlag.
Monty, A. (2005). A pedagogical model of elearning at KVL: 'The five-stage model of online learning' by Gilly Salmon. *University of Copenhagen*.
In: http://www.itlc.life.ku.dk/it_paedagogik/elaerings_paedagogik/gilly.aspx (accessed 12 June, 2008)
Pauschenwein, J. (2004). Paradigmenwechsel in der Didaktik und das Umsetzungspotential durch e-Learning. *TEL & CAL, Zeitschrift für neue Lernkulturen*, 14-21.
Salmon, Gilly (2008). The Five Stage Model. *All Things in Moderation*.
In: http://www.atimod.com/e-tivities/5stage.shtml (accessed 13 June, 2008)
Sweller, J., Van Merriënboer, J., & Paas, F. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*, 251-296.

About the Author

Dr. Claudia Weixlbaumer got her Ph.D. in 2007 from University of Portsmouth. Her thesis addressed "The Emergence of the Thinking Skills Movement". Since 2006, she is working at the Austrian Research and Support Centre for the Gifted and Talented in Salzburg. Dr. Claudia is interested in history, social studies, and studies in English.

(B.10)

Gifted and in Control: Profiling the New Millennium Gifted Learner

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Abstract
This presentation discusses research that profiles the gifted learner in the new millennium, identifying who they are, what motivates them to achieve excellence and what it is that schools can do to facilitate academic success. The research that informs this paper is part of a three-year study investigating New Zealand's top secondary school students based on their performance in national Scholarship examinations administered through the Ministry of Education and the New Zealand Qualifications Authority. Existing overseas research and theory that characterises and quantifies the percentage of gifted and talented students in any given cohort would suggest that this group of young people are representative of academically gifted and talented adolescents.
Findings from this study suggest that gifted learners in the new millennium are adept at managing their own time; have wide and varied interests and hobbies; value family involvement in their learning; and have had a teacher or teachers who have inspired them to achieve excellence. Implications of the findings include identification of some of those challenges for those who support the students in achieving academic excellence.

Keywords: Gifted, scholarship, extracurricular, learning community

Introduction

The impetus for this research came through the merging of an opportunity provided by the Scholarships examination process and the lack of New Zealand research identifying profiles of the factors important to nurturing achievement in our top students. The project investigated the link between New Zealand's "very top students" (Ministry of Education, 2005, p.3), who were rewarded for their results in the Scholarship examination in 2006, and the factors that these students perceived to have influenced their learning during high school. Overseas research has described the factors that have influenced successful gifted adults or talented teenagers (Bloom & Sosniak, 1985; Csikszentmihalyi, Rathunde & Whalen, 1993). However, there is a paucity of research that describes the factors that have influenced the gifted *New Zealand* adolescent. While there exists no agreed measure to identify this population in New Zealand, the evident valuing by the New Zealand Ministry of Education of the top secondary school scholars through the provision of monetary rewards does provide identification of a group that most would consider represents gifted and talented students.

It is important to state that this research is not attempting to generalise the findings to all gifted and talented high school students. Rather, it aims to provide a picture of a cohort identified as top scholars and to present a range of these students' perspectives of factors that facilitated their success, with the acknowledgement that there were students whose views differed from those presented here. It is also important to note that although the full report of this study includes many other factors students identified as having influenced their success, the focus of this paper is on the ways in which many of these Scholarship recipients have managed their time; their interests and hobbies; the influence of family, teachers and friends, and the implications of each of these factors for those people who work in learning communities that support students aiming for high academic achievement.

Literature

Although there is a large and steadily growing body of literature that discuses various aspects of gifted education including identification, programming and related needs of gifted and talented students, there is a paucity of literature directly relating to student extracurricular, in-school and out-of-school interests and hobbies. However, one major work that investigated this topic was a study of talented teens (Csikszentmihalyi et al., 1993). This study identified and measured a range of interests, sports and hobbies that talented teenagers engaged in, reporting that this group was more likely to spend less time 'hanging out' with friends and preferred "…more active or challenging pursuits with friends, for example, hobbies and studying" (Csikszentmihalyi et al., 1993, p.244). Another project that used a model for talent recognition and development in schools recommended that parents, teachers and students collaborate to select extracurricular activities based on the student's prior achievements (Feldhusen, 2001).

In a small scale study designed to investigate gifted chemistry students' academic background, including perceived strengths and weaknesses, one finding that emerged was that these very able students were either involved in a range of school-based sports and activities, or pursued out of school interests (Rose, 1999). A further and much larger study of 230 students participating in a gifted programme at university revealed that sports were the most frequent extracurricular activities engaged in by gifted students, in addition to playing or working on computers (Olszewski-Kubilius & Lee, 2004). This study also identified some gender stereotypical roles in the students' extracurricular in and out-of-school activities, and in the support received from their parents.

An additional component of extracurricular activities is that of part-time work. New Zealand research into students studying for their National Certificate in Educational Achievement (NCEA) found that those students working 1 – 10 hours per week showed "the most positive pattern of achievement" (Meyer, McClure, Walkey, McKenzie & Weir, 2006, p.2). This study determined a threshold at which point students showed few positive patterns of achievement relating to the number of hours they worked in a week.

Gagné's Differentiated Model of Giftedness and Talent (DGMT) established a link between environmental factors and talented students (2003). This finding was not dissimilar to those of Csikszentmihalyi et al. (1993) whose study of talented teens identified a range of factors influencing success in these students including the influence of their families. That study, and another by the author of this paper, concluded that the students from the families in this study perceived their parents as supportive of their teens (Horsley, 2008a). Csikszentmihalyi et al. (1993) also found that the talented teens' families' educational and economic resources were better than was typical of the community, and that these families demonstrated flexibility and family cohesion. Another study investigating the impact of parental expectations on talented students focused on the impact of parental high expectations on 800 academically talented students (Ablard, Hoffhines & Mills, 1996). Findings from this study suggested that the majority of students felt able to meet their parents' expectations without feeling unduly pressured. The study also found that 99% of these students felt confident in their own ability, believing it was possible to meet their parents' expectations. A later study that used a similarly large sample considered students' feelings toward their families and found that 98% of the 800 students sampled felt their family was usually caring and supportive of them (Ablard, 2004).

Literature that includes furthering understanding of the effect of internal and external dimensions on motivation must include the work of Gagné (2003) whose description of intrapersonal catalysts includes physical, motivational, volition, self-management and personality catalysts that impact positively or negatively on the development of informal and formal learning and practising. Gagné proposes that motivation plays "a significant role in initiating the process of talent development, guiding it, and sustaining it through obstacles, boredom, and occasional failure" (p.64). Weiner (1972, 1985) identified characteristics that can be attributed to success or failure in relation to achievement. These causal cognitions are: ability, effort, task difficulty, persistence, and luck**.** This theory of attribution provides a cognitive model for understanding human motivation, that is, the individual's perceived control over his or her success or failure.

The way in which parents and others involved in educating gifted students can help gifted students manage stress is discussed in an article that refers to the importance of adults allowing gifted students to live their own lives and develop their independence (Kaplan, 1990). This paper advocates for parents and other adults to be available to listen to, and guide, the student, proffering advice when it is needed.

Literature that discusses qualities of effective teachers of gifted students includes reference to the teacher facilitating the learning and sharing control in the classroom; to having high intelligence and a need to strive for excellence; to being able to relate well to their students and demonstrate a passion for their subject and teaching; and to use a variety of teaching strategies (Feldhusen, 1997; Riley, 2000; Vialle & Quigley, 2002; Vialle & Tischler, 2005; Horsley, 2008b).

Following a review of literature pertaining to giftedness and motivation there emerged one key question that directed this study:

To what factors do students attribute their success in attaining Scholarship?

Additional questions addressed patterns of motivation orientations, academic pathways, and students' valuing of Scholarship.

Participants

The participants in this study had each achieved success in at least one Scholarship subject in the 2006 New Zealand Qualifications Authority (NZQA) Scholarship examination. Scholarship is an examination available to the country's very top students and is most often sat in Year 13, with some students opting to sit in Year 12 and in a few cases, re-sit in Year 13 to gain additional Scholarships. This is an external examination with the Scholarship Reference Group having stated "a key goal for Scholarship should be to not only extend our most able students but also to identify a small number of the very top students" with identification of top scholars being restricted to "within a range of 2 to 3% of the cohort in each subject" (Ministry of Education, 2005, p.3).

Although there are likely to be other students meeting different criteria for identification as gifted and talented, existing overseas research and theory that quantifies the percentage of gifted and talented students in any given cohort would suggest that this group of young people do represent gifted and talented adolescents (Gagne, 2003; Renzulli, 2002).

The students whose perspectives are shared in this paper attended a range of state; state integrated (formerly Catholic schools); or independent (private) secondary schools throughout New Zealand. Forty-eight students participated in the initial pilot study that comprised an on-line self report survey and student interviews. Two additional students were interviewed but did not complete the survey, and a further 14 students who completed the survey were also interviewed. Of those 48 students completing the on-line survey, 27 were male and 21 were female.

Method

This research aimed to elicit student perceptions of those factors that facilitated their success in gaining Scholarship. The researcher employed a phenomenological multi-method approach to assist in the gathering and interpretation of data. Case study methods coupled with grounded theory enabled the collection and analyses of both qualitative and quantitative data. As data were collected the researcher used a range of coding to identify emerging theory and to detect relationships between variables in the study. This project was designed as the pilot study for the much larger project planned for 2008.

Data Gathering and Analysis

Data for the pilot project were gathered from March 2006 until October of the same year from an on-line self report and student interviews.

On-line survey items were designed following a review of literature associated with motivation, student interests and, the development of gifts and talents (Csikszentmihalyi et al., 1993; Eccles & Wigfield, 1995; Gagné, 2003; Meyer et al., 2006; Weiner 1985). The on-line survey programme, Survey Monkey, enabled the collection and analyses of data, aggregating information to produce graphs and tables (www.surveymonkey.com).

Included in student interviews were questions related to initial findings in the on-line survey. This incorporated further probing of the characteristics of the person or persons identified as having had the greatest influence on the students' Scholarship results and questions relating to students' motivation orientation.

Although research using a qualitative paradigm is considered to be a fairly recent addition to gifted education, it is now an accepted mode of inquiry (Coleman, Guo & Dabbs, 2007). Evidence suggests research into giftedness may be either, or both, qualitative and quantitative with quantitative research used to describe trends and to explain relationships and qualitative research exploring experiences and providing descriptions of stories and situations (Callahan & Moon, 2007). In this NZQA Scholarship research, qualitative data were analysed using coding consistent with that described in grounded theory (Strauss & Corbin, 1994). Three types of coding were used: open, axial and selective. The programme Statistical Package for Social Scientists (SPSS) was used for further analysis of the student self-reporting. Given the small sample size, the programme selected for aggregation and analysis of data was Cross Tabulation, a non-parametric tool that aggregates data and provides frequencies.

Findings

Student comments that are representative of responses received during interviews have been included in italics.

cio economic influence

In New Zealand, census information is used to determine a school's decile ranking. The ranking is an indication of the extent to which the school draws its students from low socio-economic communities and the government funds proportionately (i.e. low decile = higher funding). In this research, three decile bands were created: low decile (1 – 3) mid decile (4 – 7) and high decile (8 – 10). The breakdown of schools by decile of those students who completed the online survey is provided in Figure 1. As this table shows, the majority of participants attended high decile schools.

Table 1: Student participants by school decile.

	Low Decile			**Mid Decile**				**High Decile**			
School decile	1	2	3	4	5	6	7	8	9	10	
Number of respondents	0	0	3	2	6	2	2	3	0	30	**48**
Total	**3**			**12**				**33**			**48**

Motivation orientations

Students were asked to indicate the extent to which each of the causal cognitions influenced their Scholarship success. Details are shown in Table 1.

a) *Ability*. Most students (77%) believed their ability had influenced their success. The remaining 23% of students believed that ability had some influence on their success.
b) *Effort.* Student perception relating to the influence of effort varied, with 55% of student respondents claiming effort had some influence or was a big factor in their successful results and 45% of survey respondents believing that effort had little or no influence on their success.
c) *Interest and Enthusiasm*. The majority of students (93%) felt that their interest and enthusiasm for the subject was either a big factor or had some influence on their successful results.
d) *Luck.* Most respondents (75%) felt that luck had little or no influence on their success.
e) *Persistence.* Student perception was evenly spread with 47% indicating that persistence had some influence or was a big factor in their successful results and the remaining 53% of respondents believing that persistence had little or no influence on their success.

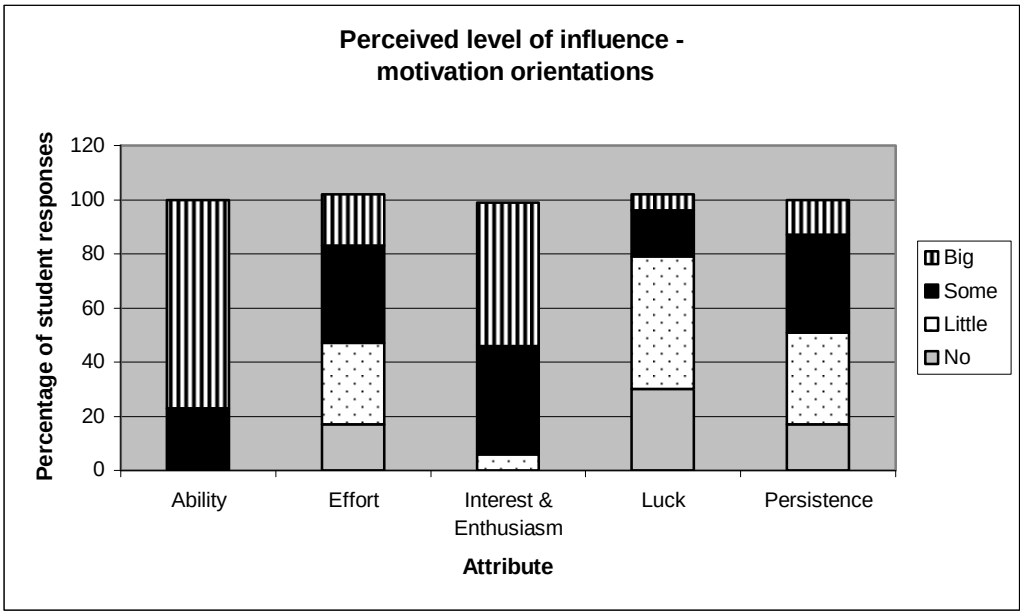

Figure 1: Motivation orientations.

Extracurricular activities

Findings relating to how students spent their time when not engaged in academic work revealed that a proportion of time was spent in extracurricular activities (Table 2). These activities included participating in sport, school clubs, performance clubs (e.g. kapa haka), church, community work, part-time employment, and 'other' activities that were not specified.

Table 2: The percentage of each year group participating in extracurricular activities.

	Athletic activities	School Clubs	Part-time work	Performance clubs	National/ International teams	Community	Church	Other
Year 11	97.5	64	60	54	21	36.7	29.6	32
Year 12	92	62.5	70	57	17.9	50	33	33
Year 13	85	69	76	54	35.7	50	22	59

Most students who gained Scholarship in 2006 had participated in athletic activity in Years 11, 12 or 13. The percentage of these students who were competing nationally or internationally increased as the students progressed through the years, with 35.7% of students in Year 13 gaining representative honours in a sport, either nationally or internationally.

The sports that students were representing included (but were not restricted to) aerobics, band competitions, dragon boating, gym, karate, mountain biking, orienteering, rock climbing, rowing, rugby, skiing, soccer, squash, swimming, water polo and yachting. Academic and cultural endeavours where students gained national or international representative honours included the biology olympiad, cheerleading, chemistry olympiad, debating, music, Shakespearean drama, and as representatives to the [youth] United Nations.

Student participation in community work also increased as they progressed through high school, with 50% of the students participating in this survey having been involved in community work in Year 12 or 13. The type of work they participated in included: sports' coaching, hospital visiting, youth work, Amnesty International or spending time in geriatric institutions. Student involvement in Church activities decreased over the three years with 22% of students involved in Year 13 compared with 29.6% in Year 11 and 33% in Year 12.

The number of Scholarship recipients working for more than 10 hours a week increased with each year group, from 28.6% of Year 11 students; 29.7% of Year 12 students and in Year 13 (the year most students attempt Scholarship) 36.8%. Student jobs included: working at fast food outlets and retail stores, fruit picking, supermarket work, tutoring, and waiting and waitressing.

Time spent studying

Students were asked: On average, about how many hours per week during study leave in the year you sat Scholarship did you spend preparing for Scholarship examinations? Results are displayed in Figure 2.

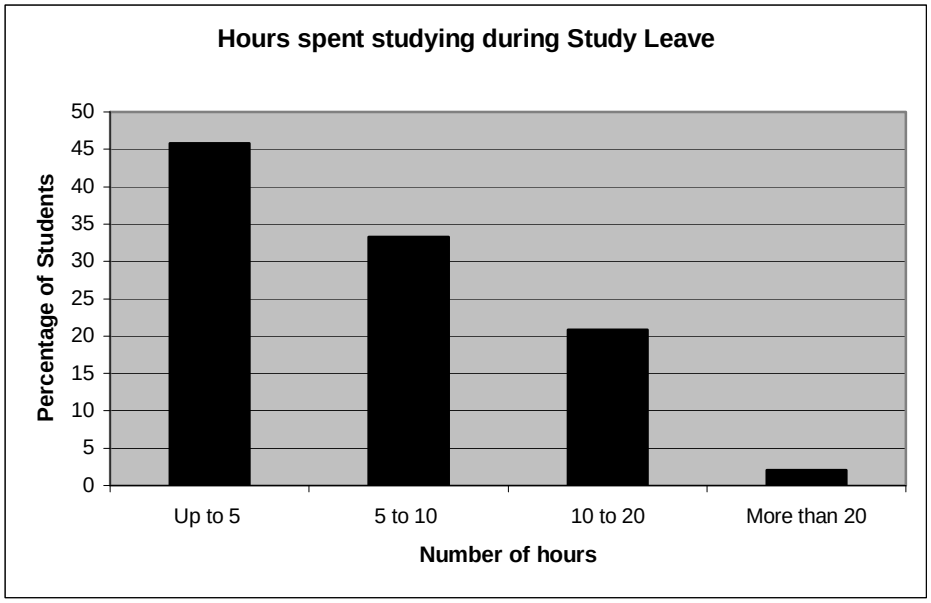

Figure 2: Average numbers of hours spent studying for Scholarship during study leave.

Most students (45.8%) spent up to five hours a week studying for Scholarship, with 33% studying between 5 and 10 hours and only 2.1% of students studying for more than 20 hours per week.

The influence of family

Amongst the on-line survey items was an invitation to: "Choose and rank the three people who had the greatest influence on your Scholarship results." It is important to note that overall, 78.7% of students nominated their teachers as the first ranked person and this will be discussed further on in this paper. The next highest number one ranked person was 'mother' (10.6%). Student rankings of their perceived influence of family members and 'friends' can be viewed in Figure 3.

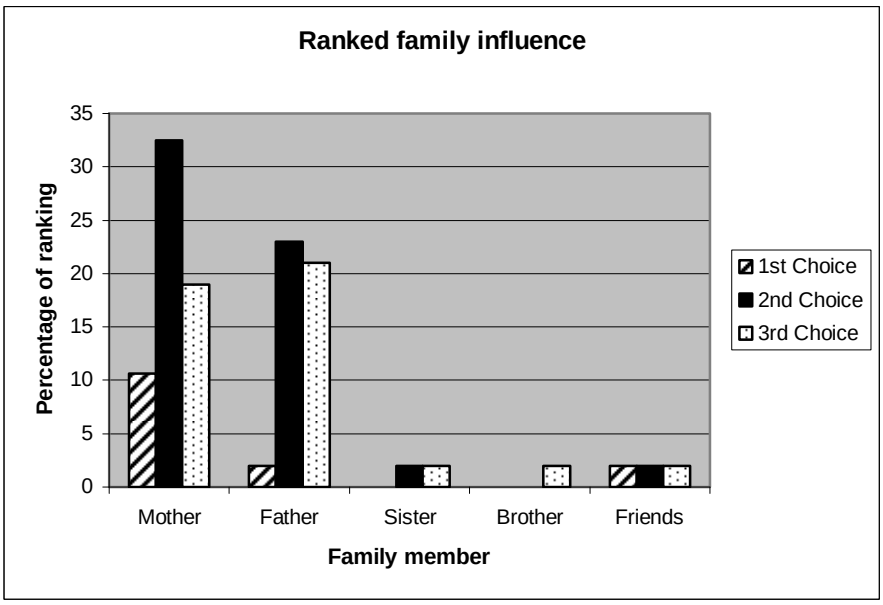

Figure 3: The ranked influence of family and 'friends'

As Figure 3 shows, 'mother' was considered to be more influential than 'father' in students' on-line survey results with 'mother' gaining 10.6% of first choice rankings, and father and friend both gaining 2%. 'Sister' and 'brother' gained no first rankings, but 'sister 'gained 2% in both second and third rankings and 'brother' gained 2% in the third ranking. Reasons for these (and other rankings that are not discussed in this paper) were probed during subsequent student interviews.

Parental influence

The students explained that they felt their mothers offered tangible support in an ongoing manner. As one student suggested, a mother's influence was greater than other ranked choices because *they're at home more*. Another student stated that in his case, his mother could be considered to be a greater influence than his father because:

> *…my mother is the more academic of my parents….she had higher expectations of my schoolwork.*

A male student described, and evidentially appreciated, the tangible support his mother provided when he was studying*:*

> *When we are in study mood she makes sure we're comfortable – asks if we want drinks, knows when we're in the mood [to study]. She's very supportive – makes sure the house is quiet.*

This student also appreciated his mother reminding him to do his homework. Other students agreed that mothers provided substantial support whilst they were studying:

> *I'd say "I'm going to my room to study now" and Mum would say "I'll make sure you're not interrupted."*

Fathers ranked lower than mothers in most survey responses, but when asked about the ranking in interviews, many students were unable to explain why this might be. Students felt their father had played no less of a role than mothers. A number of students suggested their mother and father had been equally influential:

...not one of them was more influential than the other.

Students also described family support or tutoring in subject areas in which parents were knowledgeable. One male student suggested that his father had been influential because of his knowledge of the examination system but still felt that it was both parents who had influenced and encouraged him:

> *Dad knew the NCEA (examination) system and he wanted me to do well – ever since I was little they encouraged me in what I wanted to do – always checking and reminding me to do things*.

Although one student commented that their family had had no involvement in their Scholarship, it appeared that many of those students interviewed felt it was the combined attitude of both parents that had supported their entry into Scholarship and ultimately, their success:

They are both supportive in different ways. They are both interested and helpful.

One female student said:

> *My parents said I might as well attempt it [Scholarship] – I had nothing to lose and I'd gain a bit of money if I did well....*

Students also discussed the absence of familial pressure as a positive influence on them:

here was no pressure on me. I'm driven by myself.

Sibling influence

When questioned during interviews, students found it difficult to give specific reasons their siblings may, or may not, have assisted their gaining of Scholarship. One student however, stated:

My sister is into higher education and she pushed me to keep going.

The influence of friends

There were a variety of roles students ascribed to their peers: competition, like-minded peers, and encouragement. Some students felt their greatest influence had been in providing them with competition:

> [they influenced me in providing]… *competition. Only one or two of us at my school got three subjects – I was trying to out do my friends and this helped me. One friend in particular – we did the same subjects together and we helped each oth*er.

Yet another student suggested that although he did not feel his peers had influenced him unduly, having a peer at his level was positive*:*

> *... it helped [me] having another guy [in the class] who was also sitting Scholarship. We fed off each other.*

Other students felt that their friends had been instrumental in encouraging them to sit for Scholarship:

> *Some of my friends said – "yeah – why not" [have a go]. Others couldn't be bothered – It was about a month after we finished sitting our other exams so it was a bit of a hassle to go back to school to sit it and to study for it during that month.*

In addition to the support received, there was student comment on the negative influence of friends and peers and the way this could interfere with the students' wishing to focus on the examination:

> *... my friends wanted to go out and have fun – they didn't study. They were all doing PE [Physical Education] and the day before we had assignments due they'd pull an all nighter and do the whole assignment. School wasn't their priority.*

Other comments suggested peers had no influence at all on Scholarship success and that students were motivated without the influence of others':

For me – none [no influence]. I just wanted to do it.

The influence of teachers

Of the respondents, 78.7% nominated their teachers as the first ranked person. When students were interviewed, there were many comments affirming both professional and personal qualities that students had identified in their teachers. Selections of these comments are evidenced in Table 3.

Table 3: Students' perceptions of teachers' attributes (Horsley, 2008b).

Teacher Attribute	Student Comment:
Were enthusiastic and passionate about their subject	*My [subject] teacher helped me most – he was really enthusiastic*
Treated students as adults	*[Good teachers] make us think – they treat us like adults*
Showed a valuing of opinions	*He treated us like adults, more like we were the same as him. He valued our opinions*
Took a personal interest	*She became my friend. When I got Scholarship I rang her and she cried with me*

Teacher Attribute	Student Comment:
Created a classroom climate conducive to learning	*This teacher's classes were different. His classes were more of a tutorial. He'd ask questions and the class would discuss them. It was more verbal than written…He mentored us. He knew the objective of the lesson but was willing to go off on a tangent but always came back to the topic*
Was knowledgeable about their subject	*…he [the teacher] went to seminars himself to upskill himself*
Linked learning into 'the real world'	*He told stories about his personal life that had links into what we were studying, for example, Shakespeare*
Showed commitment	*He helped outside of school hours. Few teachers in the past have done anything outside of the curriculum*
Had strong subject knowledge	*…very experienced and skilled in [his subject]. He was the HOD and other teachers came to him for advice*
Provided feedback that promoted learning	*"Your work is looking good" – and they told us always to improve*

The influence of family and teachers

Students were invited to consider the overall support they received from their family and their teachers and to indicate whether the statements relating to this support were 'always true, sometimes true, mostly not true or not at all true'. Student responses are evidenced in Figure 4.

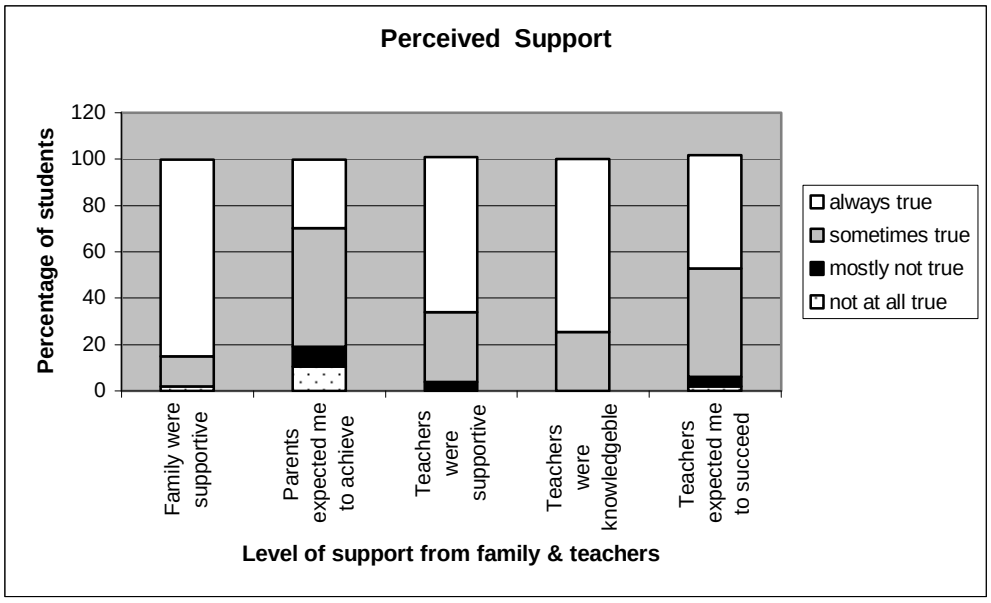

Figure 4: Perceived support from family and teachers.

As this graph shows, most students (85%) felt it was always true that their family supported them in their Scholarship study and 67% of students felt their teachers were always supportive of their

Scholarship study. Student perception of parental expectation of their being successful in Scholarship was slightly lower with 29.8% feeling it was always true that their parents expected them to be successful and 51% believing it was sometimes true. Student perception was that 48.9% of their teachers had always expected them to gain Scholarship and a further 46.8% felt that this was sometimes true. Students were asked if they felt their teachers were knowledgeable in the subjects in which they gained Scholarship and 74.5% of respondents felt this was always true with the remaining 25.5% believing it was sometimes true.

Future plans

Students were asked to make up to three choices of what they might do now that they had attained Scholarship. Results are presented in Figure 5. Of those students who responded to this section 66% selected 'go to University' as their first choice. The highest ranked next first choice was to continue with Year 13 studies (13%). Several activities received no first ranking, and these included working part time while deciding what to do; doing professional sports full-time; enrolling in a vocational programme to prepare for work; travelling maybe overseas; going overseas to work indefinitely; just hanging out and, getting married and/or starting a family.

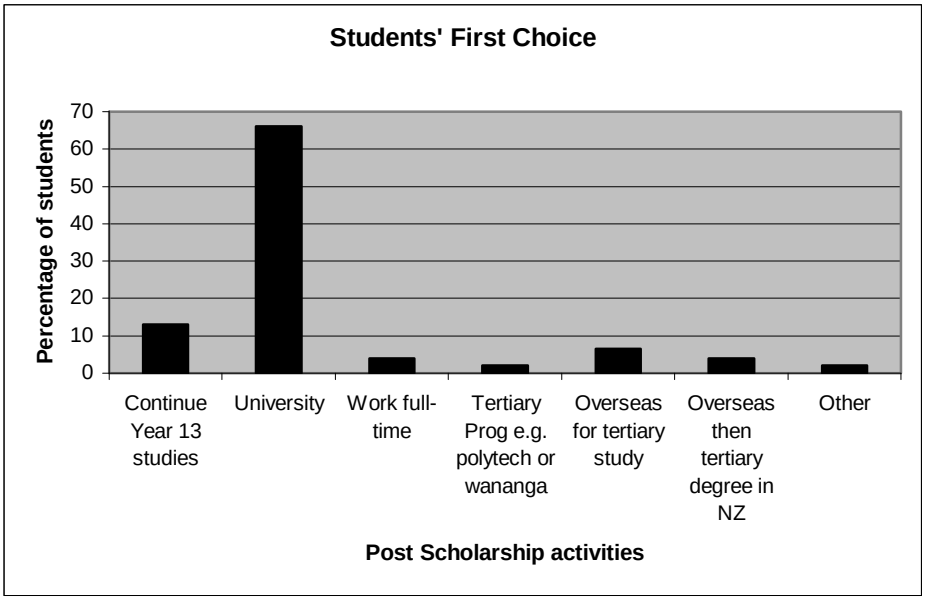

Figure 5: Student first choice activities following their gaining Scholarship(s).

Implications and opportunities for further research

It appears that many of those characteristics identified in the students in this study, align with the findings in the literature pertaining to the education of gifted and talented students and that these findings have possible implications for future Scholarship students, their teachers, family and other members of their learning communities. These findings and implications are discussed and presented in an appended table (Table 4).

Table 4: Findings and possible implications.

A Possible Profile of the New Millennium Gifted Learner	
The gifted and talented adolescent is likely to:	**Considerations for members of the student's learning community:**
1. have attended a high decile secondary school.	How can teachers in mid and low decile schools provide support for high ability students to engender academic success?
2. perceive that their ability in the subject(s) had influenced their success	What influence do we have over these beliefs?
3. believe that their interest and enthusiasm for the subject(s) had influenced their success	What methods can we employ to support students in maintaining their interest and enthusiasm?
4. be involved in extracurricular activity for more than one hour each week	In what additional ways can we provide support for students engaging in extra curricular activity and study?
5. have spent between one and five hours a week during study leave, on Scholarship study	How can we best support these high ability students during study leave?
6. identify and value parental support	
7. believe his or her friends had some influence over their success	In what ways might schools provide opportunities for high ability students to work together to achieve high academic success?
8. recognise and value the influence of the teacher in whose subject they were successful	How does the teacher's practice engage and support high ability students?
9. be employed part-time for more than five hours each week	If a relationship is established between the number of hours worked part time and high academic success, what role(s) do we need to play in encouraging and supporting this?
10. intend going to university the year following their Scholarship examination	If this is the student's goal, what is our role in supporting them to achieve it?

It would appear that the sampling process used in this study resulted in a group predominantly from high decile schools that limited the researcher's ability to address the research questions for other academically talented students. Hence, a different recruitment process for the second study has been designed to remedy that. Although this research did not address cultural diversity, data on the NZQA website suggest that students from low decile schools may also be culturally diverse. These statistics from the 2007 Scholarship examinations show that New Zealand students in low decile schools, and students who are Mäori or Pasifika, are gaining Scholarship in fewer numbers than those students who are from European or Asian backgrounds. A New Zealand report investigating approaches to teaching gifted and talented students identifies the barriers to proportional representation of culturally diverse students in gifted education (Riley, Bevan-Brown, Bicknell, Carroll-Lind & Kearney, 2004). While the report suggests that most evidence reporting Mäori students as under-represented in gifted education is anecdotal, it also states that "empirical evidence of under-representation is sparse" (p.133). However, one report that Riley et al. suggest contains "hard data" is a study by Keen that states that part of the reason for this under-representation could well be related to socioeconomic status rather than ethnicity (Keen, cited in Riley et al., 2004, p.133-134). International literature has shown that underrepresented culturally diverse and economically disadvantaged students can excel when they are given the right programme and resources (Pierce, Adams, Spiers Neumeister, Cassidy et al., 2007).

Clearly, students' belief in their ability, and interest and enthusiasm for a subject or subjects, was perceived as a facilitating factor in their Scholarship success. Further understanding of those factors

that engendered student enjoyment *of* and *for* the subject, in addition to identifying those factors that influenced student ability could help to provide future students of high ability with similarly successful results. Also of interest would be determining the relationship between Weiner's motivation orientations (ability, effort, interest and enthusiasm, luck, and persistence) in each student's success (Weiner, 1972; 1985).

Another theme emerging from literature is the involvement gifted and talented students may have in extracurricular activities (Csikszentmihalyi et al., 1993; Olszewski-Kubilius & Lee, 2004; Rose, 1999). This was also true for many of the New Zealand Scholarship recipients who were participating in a wide range of sports and hobbies. What is not evident from this research, but was a finding in the Csikszentmihalyi study, is whether these Scholarship students preferred more focused activity than their friends who were not Scholarship recipients (Csikszentmihalyi et al., 1993). Also not evident is whether those students who were involved in work for more than ten hours a week, gained as many Scholarship subject passes as those students who worked between one and ten hours a week, as evidenced in the New Zealand motivation study (Meyer et al., 2006). Possible implications of this finding could influence students' extracurricular choices – either acting as an incentive to be more involved, or a deterrent, to be less involved in extracurricular activities or part-time work.

The majority of students in this research spent between one and ten hours during study leave, preparing for Scholarship. It would be interesting to determine whether those students who studied for longer than ten hours, gained more passes, and to consider what this study time looked like for the student: what methods they choose to study and were these same for all subjects? Within the idea of hours engaged in study must also be consideration of the influence of home factors that supported this success.

There was evidence to suggest that Scholarship recipients value parental support and this was consistent with the earlier findings of Ablard (2004). Further investigation could consider whether the students' parents needed to be living together to provide this support. In addition, it will be interesting to determine the form that parental support took: did the parent need to be at home during student period or was the knowledge that they supported the student considered to be adequate? The implication of this suggests that with greater clarification of those things a parent did to facilitate or support the student's success, there will be things that can be done in the home to establish and maintain an environment that encourages and supports high academic success of our very top students.

Quite clearly, effective teachers are not only recognised but also highly valued by successful students. In the subsequent study, it is planned to interview teachers nominated by Scholarship recipients to determine how they perceive their practice in light of their students' success. It is important that teachers reflect on those characteristics identified by students as evident in the teachers whom they felt had engendered their success, as these findings have implications for teachers of potential Scholarship candidates and, arguably, for all teachers aiming to engender high academic achievement in their students.

Longitudinal research that investigates student pathways following the gaining of Scholarship may provide detail of university attainment for those who indicated that they would follow this path. Interesting too would be longitudinal research that considered alternate pathways students choose following their Scholarship success, to help determine any long-term perceived benefit or otherwise of gaining NZQA Scholarship. This information may help career advisers and others who support students in making school leaving choices.

In summary, this small scale project is only a starting point from which we can gather and analyse data that suggests there are some common themes and attitudes found amongst New Zealand's most able students. What we can learn from their practices may assist teachers, family and other members of the student's support network and learning community to help prospective Scholarship students attain academic success and recognition, as students who have achieved at a level only reached by 2 – 3 % of the country's top students. Through better understanding of those factors students perceive to

have facilitated their success, and as members of their learning community, we can more ably meet their needs and support the gifted and talented adolescents of the new millennium, in achieving their potential.

Author's Note

The subsequent, much larger study involves 326 students in an on-line survey and at the time of writing, preparation is being made to interview a number of these students and their teachers.

Acknowledgement

This study would not have been possible without the support of the schools and students who participated in the project. I would also like to thank Luanna Meyer and Tracy Riley for their input into this research and the preparation of the report.

References

Ablard, K. E. (2004). The Developmental Study of Talented Youth (DSTY): Six-year trends (Tech. Rep. No. 31). Baltimore, MD: Johns Hopkins University, Center for Talented Youth.

Ablard, K. E., Hoffhines, V. L., & Mills, C. J. (1996). Parents' values and children's perceived pressure (Technical Report No. 13a). Baltimore, MD: Johns Hopkins University, Center for Talented Youth.

Bloom, B. & L. Sosniak, L. (1985). *Developing talent in young people*. New York; Ballentine Books.

Callahan, C., M. & Moon, T., R. (2007). Sorting the wheat from the chaff: What makes for good evidence of effectiveness in the literature in gifted education? *The Gifted Child Quarterly:* Fall 2007, 51(4), 305-319.

Coleman, L. J., Guo, A., Simms Dabbs, C. (2007). The State of Qualitative Research in Gifted Education as Published in American Journals. *The Gifted Child Quarterly:* Winter 2007, 51(1)

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. Cambridge, England: Cambridge University Press.

Eccles, J.S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin, 21,* 215-225.

Feldhusen, J. F. (1997). Educating teachers for work with talented youth. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 547–552). Boston: Allyn & Bacon.

Feldhusen, J. F., (2001). *Development in gifted education: New conceptions of intelligence and talent.* Retrieved on-line 20 April 2008 from: http://www.hoagiesgifted.org/eric/e610.html

Gagné, F. (2003). Transforming gifts into talents: The DMGT as a developmental theory. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 60–74). Boston: Allyn & Bacon.

Horsley, J. (2008a). How to parent for scholarship success. *Tall Poppies, 33*(1), 18-21.

Horsley, J. (2008b). Teaching for scholarship success. set. *Research Information for Teachers, 1, 10-14.*

Kaplan, L., S. (1990). *Helping gifted students with stress management.* Retrieved on-line 18 April 2008 from: http://www.hoagiesgifted.org/eric/e488.html

Meyer, L., McClure, J., Walkey, F., McKenzie L., & Weir, K. (2006). *The impact of the NCEA on student motivation. Final report.* Wellington. Ministry of Education. Retrieved on –line 14 November 2006 from the World Wide Web: http://www.minedu.govt.nz/web/downloadable/dl11337_v1/student-motivation-report-june-2006.doc

Ministry of Education. (2005). *Report of the Scholarship Reference Group.* Wellington: Ministry of Education.

New Zealand Qualifications Authority Mana Tohu Mataurangi O Aotearoa. Retrieved on-line 02 June 2008 from the World Wide Web:(http://www.nzqa.govt.nz/qualifications/ssq/statistics/nqfstats.do?comparison=2&ch=3020&la=&eg=e&eg=m&eg=p&year=2007&nqfLevel=0&st=3&cg=0&decile=DB1To3).

Olszewski-Kubilius, P., & Lee, S.L. (2004). The role of participation in in-school and outside-of-school activities in the talent development of gifted students. *Journal of Secondary Gifted Education, 15*(3), 107-125.

Pierce, R.L., Adams, C.M., Spiers Neumeister, K.L., Cassidy, J.C. et al. (2007). Development of an identification procedure for a large urban school corporation: Identifying culturally diverse and academically gifted elementary students. *Roeper Review, 29*(2), 113-118.

Renzulli, J. S. (2002). Emerging conceptions of giftedness: Building a bridge to the new century. *Exceptionality, 10*(2) 67-75.

Riley, T. (2000). *Shifting your mindset: Teachers of gifted and talented students*. Retrieved November 12, 2007 from http://www.tki.org.nz/r/gifted/pedagogy/mindset_e.php

Riley, T., Bevan-Brown, J., Bicknell, B., Carroll-Lind, J., & Kearney, A. (2004). *The extent, nature, and effectiveness of identification and provisions for New Zealand gifted and talented students. Final report.* Wellington: Ministry of Education. Retrieved 6 April 2008 from www.minedu.govt.nz/goto/gifted

Rose, L. (1999) Gender issues in gifted education. In the *National Research Center of the Gifted and Talented Newsletter, Spring 1999*. Retrieved 20 April 2008 from http://www.gifted.uconn.edu/nrcgt/newsletter/spring99/sprng994.html

Strauss, A., & Corbin, J. (1994). Grounded theory methodology: An overview. In N. K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 273 – 285). Thousand Oaks, CA: Sage.

Vialle, W., & Quigley, S. (2002). Does the teacher of the gifted need to be gifted? *Gifted and Talented International*, *17*(2), 85–90.

Vialle, W., & Tischler, K. (2005). Teachers of the gifted: A comparison of students' perspectives in Australia, Austria and the United States. *Gifted Education International*, *19*(2), 173–181.

Weiner, B. (1972). *Theories of motivation: From mechanism to cognition.* Chicago: Markham Publishing Company.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review 92*, 548-545.

About the Author

Jennifer Horsley has extensive experience as a classroom practitioner at all levels of the primary school. In 2005 she joined the staff of Victoria University, Wellington, New Zealand as a Senior Lecturer. Her current interests and fields of research include investigation into those factors that high achieving students perceive to have facilitated their success, and longitudinal research that investigates pathways of high achieving students following their graduation from high school.

(B.11)

Michael F. Shaughnessy, Cynthia Kleyn-Ke, Gifted Education: Current Trends and Needed Innovations: This presentation will review the main trends in gifted education over the last 20 years and examine needed innovations and examine the realm of gifted education for the future. Innovations such as computer programs, the use of the Internet for education, and acceleration as an innovative approach will be examined, explored and discussed.

(B.12)

Mousa Alnabhan, Developing a regression model used to screen the gifted children in Bahrain: The main purpose of the current research is to develop a parsimonious regression equation consists of a criterion (the level of creativity measured by one of the common creativity scales) and some predictors like (1) verbal IQ, (2) nonverbal IQ, (3) emotional intelligence, (4) achievement level , (5) parent's questionnaire, and (6) teacher's questionnaire. A representative sample of 500 fifth graders has been selected from the Bahraini public elementary schools covering all districts and genders. In addition, parent's questionnaire and teacher\'s assessment scale will be applied accordingly. The initial and inferential statistics and some qualitative interpretations will be presented. Finally, the model will be statistically and empirically checked against real observations and basic statistical distribution assumptions.

About the Author

Mousa Alnabhan has a PhD. in educational research methodology from the University of Pittsburgh,USA. Currently working at the Arabian Gulf University in Bahrain, serving the Program of Gifted Education. All my research Interests focusing on (1) developing and standardizing mental, psychological and social scales and tests, (2) Assessing emotional Intelligence, leadership, management, and creativity, (3) Analyzing quantitative and qualitative data, and (4) Assessing academic and non academic traits of gifted leaders and managers.

(B.13)

Zafra M. Lerman, Science Education for Students Gifted in the Arts: The 21st Century is truly the century of science and technology. If we will not make science and technology accessible to all, we will form a two-class society, divided not by royalty or economic status, but by knowledge of science and technology. It is my tenet in life that science education is a human right that belongs to all. Therefore, it is essential that we employ every method possible to make science accessible to all in the 21st Century. A Chinese proverb states: "I hear and I forget; I see and I remember; I do and I understand." At the Science Institute, Columbia College Chicago, we believe strongly in this proverb, and we incorporate visualization and art in the teaching and learning of science, especially for students who are gifted in the arts. Students remember and understand abstract scientific concepts best by creating their own artistic projects. Through this process, students take an active role in the learning process, instead of only being passive observers. The students can produce visualization projects using the media of their choice, from computer animation (High Tech) to art, dance and drama (No Tech). These projects are used as an alternative assessment method where the evaluation is done in a constructive way by the whole class and not just by the instructor. This method has been proven successful with undergraduate students, with science teachers and with middle and high school students. Many institutions in the US and around the world have adopted this method. Examples of students' art projects communicating science will be shown during the lecture.

About the Author

Zafra Lerman is Distinguished Professor of Science and Public Policy, and Head of the Institute for Science Education and Science Communication at Columbia College Chicago.

She received her Ph.D. from the Weizmann Institute of Science, and conducted research in isotope effects at Cornell University, Northwestern University, and at the Swiss Polytechnic in Zurich, Switzerland.

Prof. Lerman developed an innovative approach of teaching science to non-science majors, which has received national and international recognition. She has been invited to lecture on her methods all over the U.S. and in many other countries, including Brazil, Turkey, Hungary, Australia, England, Russia, Germany, Mexico, China, Japan, Taiwan, Cuba, Egypt, Kenya, South Africa and Israel. She has received over $5,000,000 in the past few years to work with Chicago inner-city teachers, parents and students.

For the past 20 years, she has worked tirelessly on behalf of dissidents all over the world. She chairs the Committee on Scientific Freedom and Human Rights for the American Chemical Society (ACS). At great risk to her personal safety, she has worked within the Soviet Union, China and other countries and has succeeded in preventing executions, releasing prisoners of conscience from jail and bringing dissidents into freedom.

In 2001, she started working toward peace in the Middle East; it is her belief that scientists can succeed where politicians have failed. She is the chair of the organizing committee for a series of conferences designed to use science as a bridge to peace in the Middle East. These conferences, which were her brainchild, bring together scientists from 14 Middle East countries (Including Israel, Iran and the Palestinian Authority) as well as several Nobel laureates to work together on solving regional problems, establishing cross-border collaborations, and forging relationships that bridge chasms of distrust and intolerance.

Prof. Lerman received the 1998 American Chemical Society Award for Encouraging Disadvantaged Students into Careers in the Chemical Sciences. In 1999 she received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring from President Clinton. In 2000 she was presented with the World Cultural Council's Jose Vasconcelos World Award for Education in Johannesburg, South Africa (the first international award presented in the new democratic South Africa), and in February 2001, she was elected a Fellow of the American Association for the Advancement of Science. She is the 2002 awardee for the James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry from the American Chemical Society -- Northeastern Section, and is the 2003 recipient of the American Chemical Society's Charles Lathrop Parsons Award in recognition of outstanding public service to society through chemistry. The Royal Society of Chemistry in England awarded her with the 2005 Ronald Nyholm Lectureship – Education Division Award, and the New York Academy of Sciences presented her with the 2005 Heinz Pagels Human Rights for Scientists Award. Most recently, she received the 2007 George Brown Award for International Scientific Cooperation from the U.S. Civilian Research & Development Foundation (CRDF), an award established by the U.S. Congress.

She has also been featured by newspapers, magazines, radio and television stations around the world.

Prof. Lerman remains very active professionally with national and international associations in the fields of science, science education, scientific freedom and human rights, and using science as a bridge to peace in the Middle East. It remains Dr. Lerman's tenet that free and equal access to science education is a basic human right that belongs to all.

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(B.14)

Relational Aesthetics And Gifted Education: Finances And Art Production.

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Abstract:

Limited public funds available to stimulate art education and art- production make apparent the need of including financial education programs in the education of the gifted, and to encourage teachers to become financial educators from a relational-aesthetic approach to the 'art' of teaching economically and culturally disadvantaged gifted students. From a philosophical perspective, relational aesthetics or relational art, also known as *collaborative public art,* is one of the *logically possible* ways of addressing the classical values of ethics and aesthetics --'good' and 'beauty'-- in gifted education to produce *individual aesth-ethic choices*. Concerns about the intent of blending values at the crossroads of the private domain of art production, and the public economic sphere ruled by more utilitarian forces affected by the invisible hand of supply and demand are acknowledged. A testimonial approach is used to illustrate the relational approach and of four young artists living in the US-Mexico border. Samples of their endangered artistic production are also presented. If a financially sustainable artistic education is undertaken by gifted teachers from a relational aesthetic approach is possible is discussed, and defended. From a modal logic perspective, the risk of increasing greediness among the gifted exists and is accepted as much as the possibility that some artistically gifted remain completely indifferent to participate in the financial game, which is consistent with the general principle that we humans learn only what we really want to learn.

Introduction

Artistic life and art production are embedded in socio-economic and political contexts that affect the life and development of artists and the communities those artists live in. Historically, nor religious believes, attitudes or behaviors, nor ethic-philosophical speculations, nor economic or political warfare have being able to provide for beautiful living conditions to a significant fraction of the world population who –excluding voluntary ascetics—have lived generation after generation in *desperation*, or *stoic*, or *spiritual* semantic acceptance of their not exactly beautiful life. In that context, we can ask if is it possible to bend the natural and cultural inclinations that seem to rule human behavior. Is it possible in our contemporary world to humanly live ethic and aesthetic lives yet? Some individuals -- some artists, some philosophers, some religious leaders, some scientists, even some politicians-- have instantiated the possibility of pursuing *good and beautiful lives.* Unfortunately, the *happy and fair* integration of good and beauty at a communitarian level has proven to be not a simple, nor a quite successful objective to achieve.

"How to achieve a *good, and beautiful* life *for all*?" In a modal logic universe, the simple answer would be, "*It is not impossible."* As in different cultural metaphors, in the western tradition under guiding light of Plato's mind, *good* and *beauty* almost blended into each other; however, in his *Republic* Plato assumes a totalitarian modality to make possible the political instrumentation of that ideal.

Within such cultural antecedents, does it make sense to pursue that *ethic-aesthetic* objective? If it does, who *would* assume the responsibility of turning a logical possibility into a sustainable cultural process? *Shouldn't* that be a common responsibility? *Shouldn't* education be the *way* to achieve that goal? Under these terms, the analytic distinction between the *optional would* and the *enforceable shall* is needed, for "*I could*" or "*You ought to*" are loaded with different semantic, cultural, and historic nuances. In agreement with Zigmunt Bauman (1995), postmodern ethic analysis only allows us to conclude that morality if certainly not discarded, is not universalizable.

In this paper, a reflection on contemporary ethics and relational aesthetics is applied to the recommendation of including financial education in gifted programs, and an invitation to gifted teachers to become relational artists in this field. To flesh and land the philosophical reflection, a testimonial approach was used. Two local adult artists and two art students were interviewed to approach their own understanding of the role of art in their lives, and the role that finances play in their artistic production. The conclusions are framed in modal logic considerations around the notions of possibility, and contingency.

The Boundaries of Fairness and Aesthetics

It would seem that non-significant advancement has been made by human race regarding the naturally self-interested, survival-oriented decision making cultural process through which we enact our lives. Nonetheless, through centuries of reflection and criticism, the ethical-philosophical reflection has significantly expanded the boundaries of its theoretic horizon around the notion of *good* and *fairness*, by going from the personal pursue of a self fulfilling virtuous and happy life to postulating broader --almost impersonal and futuristic-- concerns about the preservation of ecological niches to serve distant and future generations of human and non human life on planet Earth.

In the field of aesthetics, questions and answers about *the nature of art* have also gone through change from time to time under diverse or alternating assumptions, in such a way that the artist, the art piece, and the public/spectator/consumer are more or less distant from each other. Thus the function of art production has been tailored to answer to different dominant interests, such as to beautify the life of patrons of art who are able to pay for it as long as they have profited enough from their interactions with nature and other humans; or, to illustrate the idealized iconographies of deviant or mainstream ideologies. However, relatively recent developments in the field of aesthetics are indicative of a growing awareness among certain artists to re-define or de-define the function of art, and their own role as social actors, which in turn also brings around changes in the meaning of what a piece or art should be. By changing the understanding of the function of art and the artist's role in society, the meaning of art products in the twentieth and twentieth first century has also changed pushing the limits of what the definition of a piece of art may be.

Relational Aesthetics

For artists the possibility of linking aesthetic and ethic values into the political contexts we live in is a possibility within the postulates of relational aesthetics. Borrowing from some post modern art-modalities such as happenings and performances, r*elational aesthetics*, or *relational art* approaches art as different forms of social interaction that deal fundamentally with issues regarding public and private space, disdaining in some cases the *permanence of the art piece* to consciously embrace the *ephemerality* of the artistic gesture or performance, regardless of how ephemeral they are. In relational aesthetics or relational art the intent of the artistic gesture is decisively ethically and politically loaded despite the ephemerality of the interaction itself, going beyond the simple "performance," to the point of becoming, according to Nicolas Bourriaud (2002), a mini, a micro-utopia.

For the relational artist, the *piece of art is the relationship itself as established by the artist with other social actors*, it is both, the media and the theme, the form and the content. As such, it is the interaction where the other actors contribute to the relationship just under their condition of being human beings living their own lives under their specific circumstances and personal motives, purposefully and contingently encountering each other to build networks in shared contexts. In this way, relational artists enact one of the *possible* ways of blending the "values" of ethics and aesthetics, reifying simultaneously the idea of living an *aesth-ethic life,* and possibly helping *others* to live a "better and beautiful" life. The awareness and concern about the communitarian niche leads to

understand aesthetics as *a praxis of relational collaborative and transformative creativity* in context. Some relational artists are trying to understand *art* in their socio-cultural and historical perspective, and to undertake a *corrective-intervention approach* knitting close relationships with their audiences, assuming a social responsibility and a participatory role, by engaging their lives to improve the living conditions of others. For Nicholas Bourriaud (1998) relational aesthetics is the understanding of art as the human experience in which the artist is not exclusively engaged in the production of a piece of art but on transforming and empowering herself/himself and others through and along the creative process, transforming the world by transforming the creator and the spectator. (Ferreria, Christopher. Personal communication, September 2006)

With an ethic concern in mind, *relational* artists touch the boundaries of ethical human behavior and force the re-consideration of concepts such as *duty*, *rights*, *social justice*, *compassion*, or *human dignity* to delicately step into the political domain overlapping the margins of *aesthetics, ethics* and *politics,* forcing with their *artistic gestures* or artistic behavior some sort of deviating Socratic, or simply *mischievous dialogue* and political intervention in social contexts from their artistic and optional politically dissenting and critical vantage point. The beauty of *this* choice and *that* performance consist in the fact that it is rooted in the here and now, and it is not a product emanated from an external totalitarian policy or form of government.

Relational artists' work still depends upon financial liquidity or scarcity, which forces the following question: How far away can go the transformative action of these artists? Far from classic or modern utopias, the honest answer is "We don't know yet." Will we ever know?

How is it possible to transform the world from scratch and rebuild a society which would be totally different? I think that is totally impossible and what artists are trying to do now is to create micro-utopias, neighborhood utopias, like talking to your neighbor, just what's happening when you shake hands with somebody. This is all super political when you think about it. That's micro-politics. (Nicolas, Bourriaud and Karen Moss. (2002) Part I**.** Interviewed by Stretcher. October 18, 2002 in the Walter McBean Gallery at SFAI.) http://www.stretcher.org/archives/i1_a/2003_02_25_i1_archive.php. Retrieved May 11, 2008.)

As long as theoretical answers to ethical concerns remain dependent upon *individual and communitarian preferences,* the debate **between** *individual aesth-ethic choices* and legal or illegal *poli-ethic procedures* implies that ethical and political theories and choices can't but be trapped in their own logical space --the same broad field that comprises all possible-possibilities-- within its particular and limited historical circumstances: *Relational aesthetics* is not the exception nor escapes the economic constrains in which individual choices and communitarian procedures are made or implemented.

Finances and Relational-Art Production: A testimonial Approach

There are several documented initiatives of collaborative projects around the planet, some of them through the institutional encouragement of universities, such like the program Partnership Learning through Art, culture, and Environment (P. L. A. C. E.) at the University of New Mexico (http://place.unm.edu/relational_art.html#together. Retrieved May 2008); however, despite the good-will inspiring relational artists to create collaborative projects their efforts are embedded in economic contexts and relationships; if relational artists address their efforts to peripheral and impoverished populations, for how long can they afford the operation costs of helping other to improve and embellish their lives? Or the artists are extremely wealthy, or they obtain external funding, or their efforts may be short living. To answer some of these concerns, four locals artists in San Diego were interviewed through personal and online conversations: Armando De La Torre, Terry Hughes-Oerlich, Ivan Cmarena, and Miel (fictitious name). The questions were intended to understand their ethical-aesthetical approach to art, and to explore the role that finances played in their art production.

Although they were not equally proliferous in their answers, they provided relevant hints that fit the main focus of the interviews. The transcription of their answers is provided infra in the addenda.

Relational Testimonies.

When I met Armando De La Torre, he introduced himself as an artist, which meant to me he had an 'aesthetic' orientation in life. When I asked what kind or work was he producing at this time, I learnt he was helping an old widower to re-set the bathroom of her house in a more functional condition, without charging her for the *artistic labor* he was performing! To keep a record of his *artistic performance,* now and then he videotaped himself and his artistic work of helping an old woman-in-need. De La Torre had arrived to a concept and practice of 'art' that lead him "to make himself 'available' to 'apply' his 'technical knowledge' and 'artistic skills' to 'help' 'other' human individuals as they request it from him, and to 'perform' within the coordinates of those individual's circumstances. His 'choice' shapes his '*aesthetic performance*,' granting simultaneously an '*ethical'* dimension to his *way of life*, blending in practice, ethic and aesthetic '*values*.' Bourriaud resonated immediately: "the role of artworks is no longer to form imaginary and utopian realties, but to actually be ways of living and models of action within the existing real, whatever the scale chosen by the artist." Bourriaud (1998; 13)

De La Torre, a former member of the U. S. A. military, chose to become an artist while he was stationed in Korea once he was honorably discharged from the Army around 1995. He has studied, and worked in multiple art-related international settings being thus exposed to diverse cultural styles of surviving. His academic influences come from New York School of Visual Arts, and Sta. Monica College School of Design, Architecture, and Art in California. *(De La Torre, Armando. 26 October. 2006. E-mail to the author. 27 October 2006,* and November 14, 2006).

De La Torre started his artistic path producing paintings, installations, performances, shoot-to-edit documentary video production, exploring sound, and integrating in constant dialog all of those media in his work; from 1998 to the present, keeping himself "… active in unifying community through art, and creating an environment comfortable and conducive to multicultural dialog; compassionate to [other] subjects empowering them to share their voice…" *(De La Torre, Armando. E-mail to the author. 27 October 2006)*.

An external observer may be unaware of the many layers embedded in the technical work De La Torre performs, as he also engages in a conversation helping others to uncover their underlying stories:

"… talking to people, I'm aware that my work is also a healing intervention that I create through my interaction with others. When the handy work is completed *a meaningful net of human interactions and redesigned spaces has been created in a transcendental site specific installation*." [My emphasis.] *(De La Torre, Armando. 26 October. 2006. E-mail to the author. 27 October 2006)*

Under a different set of socio-historical circumstances, there is a female artist, Terry Hughes-Oelrich, American, married, mother of two beautiful children ages five and three, and a current Art faculty instructor at a local city college. She grew up in Huntington Beach, "naive of the world," off she went to college at University of California Santa Barbara, and also in her case art played a liberating role: "Art history taught me to start questioning things which informed my art making." *(Hughes,-Oelrich, Terry, 26 June. 2008. E-mail to the author. 26 June, 2008.)* To the question, "What is the role that finances have played in your artistic life? Terry answered**:**

Some, I certainly can[Sic.] do more if I had more money, but I am not making art to sell and rarely have[,] except on occasion for craft sales. I teach because I enjoy it, and it also gives me the finances to make art. *(Hughes-Oelrich, Terry, 26 June, 2008. E-mail to the author. 26 June, 2008.)*

From the power of her teaching position Terry involves her enrolled art-students in collaborative projects oriented to beautify neglected areas in the community projecting her power from the

classroom toward the community, and seeding the minds of her students to take over additional social responsibilities.

It is apparent that although De La Torre and Terry are two adult artists with a significant personal experience in their back, having or not having a regular income makes a significant difference in the financial burden that each has to face to continue addressing their social concerns through their artistic production, and the consequent impact they both have in their communities.

Art production, nonetheless, is a vital time and energy consuming activity, and by the same token it is an economic activity with financial implications. If the artist has to attend survival needs in an *aesth-ethic form*, the conflict arises in the form of financial cause-effect relationships fully embedded in a net of multiply stratified social assumptions, financial implications, utilitarian means and ends, and supply and demand relationships. The conflict is also present in De La Torre's performative-relational-art-production.

I have now taken my act into many homes, rendering paid creative services with inexpensive materials solving different complex situations. (…) And at times I don't feel like an artist but like a handy man. But in my mind I still think of myself as a performing artist. *(De La Torre, Armando. 26 October. 2007. E-mail to the author. 27 October 2007)*

Doubts may arise about how promising this forms of art production are. Whatever the preferred answer may be, the possibility of human collaboration in those particular cases is real and worth to explore. What is poetically ethic in this art work is the objective; as Conwill (1995) points out, "they not only inspire the viewer but give evidence of the artist's own struggle to achieve higher recognition of what it means to be truly human."

Descending in the economic spectrum, two more examples illustrate the close relationship between finances and art production. Ivan Camarena and Miel are two young construction workers and art students at a local community college. Ivan whose work is also included in this presentation has financial support of his middle class Mexican family; interestingly, he interprets positively the lack of resources as it encourages creativity.

Up to this point I have been lucky enough to afford most of the art materials that I need in order to complete the work I want. There have been times in which I can not acquire certain materials and [it] has made my job more difficult but not impossible. Finances for artistic production should not be a significant factor to produce work. I find that sometimes having absolutely nothing makes for better artwork because the creativity is working that much harder in order to compensate for the lack of materials…I think the ideal position is to have just enough in order to create and let creativity make up what you don't have. *(Camarena, Ivan. Personal communication, May 2008.)*

In contrast, Miel (fictitious name) was brought to the United States when he was only a baby as an illegal allien, and grew up undocumented, finish high school, and started working for no more than minimum wages, no dreams of social benefits. Citizen of no country but street-smart, Miel faces his survival needs with whatever means and jobs he finds available. Art production? Very limited. Physical survival comes first. Here some questions and answers: Money is always needed, but I will use anything I have in my reach to create art. Life itself should provide for me. As long as I keep riding the art spirit. Beautiful blessings pop out [from] nowhere. Live right and eat well, sleep well, and drink tea. *(Miel. Personal communication, May 2008.)*

Are Financial Education Programs for the Gifted Truly Needed?

If the *production of art work* in *relational aesthetics* is the production of a *shared human experiences* or *subjective relationships* with specific ethic and aesthetic nuances, that production is not instantiated in the vacuum and without *societal* and *economic* implications. As long as historical patterns repeat themselves, social structure, and social functions reproduce and embrace each other, and the embracing arms have economic prongs. Thus, the social --political, economical, ethical, and

aesthetical-- becomes a nest of annoying financial relationships. It is not surprising that relational art production will remain depending upon the existence of generous traders of services and patrons of art.

In California, two facts support the need of including financial education programs in the education of the gifted: a) limited public funds are made available to stimulate art education and art-production; and b) the absence of financial education subjects in the official state policies and academic standards. These two facts may encourage teachers to become relational-aesthetic-financial-educators of economically and culturally disadvantaged gifted students.

Questions arise about the possibility of finding artistically gifted students interested on learning about financial management: There is a possibility that gifted and financial education may not mixed (Sternberg, Robert. Personal communication, Paris. July 2, 2008); and there are hints in the testimonies of the four San Diegan artists presented here that provide indirect support to that hypothesis. Nonetheless, some countries are taking important steps to include financial education among their academic standards, even if they are not specifically addressed to gifted students. From a logical perspective, if opposite possibilities actually coexist in a broad logical space, then there is not a necessary reason for not to act in a direction that may turn in benefits both for the community at large and for the artistically gifted individuals in particular.

The relational-aesthetic approach can be extended to the practice of gifted education not so much by "enriching" the curriculum with financial education lessons, but by *expanding the collective vision* of the gifted with economic and financial topics that actually shape or impact the life of our human communities, even if it is only to conclude that *universal change* is the expression of lack of necessity, that it transcends our finite existence and our preferred currencies, or that the future is under no obligation to mirror the past. Gifted teachers can do it and become themselves performing relational artists. Gifted teachers can take a relational approach to gifted education, and help those students with special artistic gifts showing them means to take control of the financial fetters that may threaten the possibility of reifying the ideal of artists living an *aesth-ethic life*, and generating a more socially responsible *aesth-ethic* concern *with a poli-ethic* impact in their communities. The possibility and biggest challenge of teaching finances without teaching or encouraging the morality of rational self-interest (Rand, A. 1957), remains unsolved.

Conclusion

At times, we all can make the mistake of thinking that *having* is relevant, but it doesn't take long to realize that *being* is what is important. With this acceptance comes the realization that even if *being* is a given in which we didn't have participation at all, the personal decision consists on taken responsibility, or not, for what we are going to do with our received being in the world; thus, the *true* question becomes: *To do, or not to do?* The drama and vital contradiction of being human originates from acknowledging that *even if contingency* is the indelible root from which all doing originates, we exist in a world in which *being* is *active being* even if we choose not to do anything. Thus, acting, or performing, paradoxically become almost *necessary*, and ethic or un-ethical, aesthetic or un-aesthetical *meaning production* becomes the paramount engagement of human living. Translated to the field of gifted education, the question gifted teachers may want to address is if they can promote financially sustainable relational-aesthetic projects that positively impact their communities. Although a concern remains around the possibility of indifference among some gifted toward the financial world or the possibility of increasing greediness among others, we can only take the risk: Some of them will love the subject, some will not. Gifted or not gifted, we only learn what we truly want to learn.

References:

Bauman, Z., (1993). *Postmodern Ethics*. Oxford: Blackwell.

Bourriaud, N. and Karen Moss. (2002) Part I**.** Interviewed by Stretcher. October 18, 2002 in the Walter McBean Gallery at SFAI. http://www.stretcher.org/archives/i1_a/2003_02_25_i1_archive.php Retrieved May 11,2008.

Bourriaud, N., (1998). *Relational Aesthetics*. Paris: Presses du Reel.

Bourriaud, N., (2002) . *Touch: Relational Art from the 1990's to Now.* Walter and McBean Galleries of the San Francisco Art Institute. October 18 - December 14, 2002

Camarena, I. (2008) . *Personal communication.* San Diego, 2006-2008.

Cobb, C. (2002). Relational Aesthetics: Why It Makes So Much Sense. http://www.stretcher.org/archives/r3_a/2002_11_13_r3_archive.php. Retrieved May 11 2008.

Conwill M. E. (1995) . To Search for the Good and Make It Matter. In Suzanne Lacy (Ed.), Mapping the Terrain: New Genre Public Art, (1995) . Seattle: Bay Press.
De La Torre, A. (2006-2008) . *Personal communication.* San Diego, July 2006- June 2008.

Ferreria, Christopher. (2006) . *Personal communication.* San Diego, September 2006.

Hugues-Oerly, T. *Personal communication.* San Diego, May 2008.

Kulchisky, M. (1999) . Interview of Miroslav Kulchitsky with Nicolas Baurriaud. Kiev 1988; Art Magazine, Boiler # 1, 1999. http://www.boiler.odessa.net/english/raz1/n1r1s02.htm. Retrieved May 13, 2008.

Miel. (2007-2008) . *Personal communication.* San Diego, July 2007- June 2008.

Plato. (2000) . *The Republic.* Cambridge: Cambridge University Press.

Rand, A., (1957) . *Atlas Shrugged.* New York: Random House.

Sternberg, Robert. (2008) *Personal communication*, Paris July, 2008.

University of New Mexico. College of Fine Arts (c2004) . Partnership Leaning through Art, Culture, and the Environment Program. http://place.unm.edu/relational_art.html#together. Retrieved May 2008

Appendix 1.

Armandos De La Torre: Biographical information and testimonies.

sufiguava@gmail.com

What follows is a selection of answers I received from this artist by email on October 26, and November 18, 2006.

I. What is art?

De La Torre: "*Art is work.* (…) You are either being affected by, or you are affecting someone else, with the meaning of your act or your craftsmanship (…) I think good art has a purpose, and meaning, but the meaning doesn't always have to be clear. *It should have a social function, an emotional function, or a spiritual function.* Just like cities have a demand for qualified technicians to keep the city running smoothly, the world has a demand for qualified artist, to keep life running smoothly, building house's, making people laugh, make someone think, inspiring, directing, on and on and on. (…) *art is more than just work, and it takes a lot of work to make it, and most people that make it don't get paid for making it. But I do believe that art is work at a very fundamental level(...) [My emphasis.]*

S. Tell me about 'Beauty.'

De La Torre: "The object's beauty is subjective, the vessel is the carrier of the message, and the beauty of the object could be the message, which is inherent in the object but the origin of that beauty could be somewhere else… Like everything in life you see things as they appear to be, but upon closer

examination you find nothing, everything holds appearance… *However, I do believe in beauty*, we could beautify our schools, our mind, our relationships, and we never have enough beauty in our lives (…) I will not get into defining what beauty is and assigning aesthetic value to it. I do know that aesthetic preferences cause problems … there is no end to preferences. The aesthetic object is only the carrier of the message. Some object/subject relations work better than others… Like Andy Warhol would say "*Beauty is, beauty was*."" *[My emphasis]*

I. What is the function of art?

De La Torre: To me the function of art is to communicate my thoughts, feelings, emotions, or whatever one feels inspired or responsible to communicate. *But first, it was a way of expressing what I didn't understand, myself. I have come to understand the kind of person that I want to be, and the function that I have at a social level.* Who knows the real function of art? If we make it now, [later] it could take on a different meaning that reflects another time. Like the idea of history that is being re-interpreted all the time to better fit the moment and the historian who is rewriting the history. *The artist job is to be inspired, to dream a new way of living, to explore new horizons, to heal the human soul, to apply Balm and make sweet sounds.* But not everyone is a dreamer and the artist is often alone and misunderstood. (…) If we could meet the artist half way, I think we could move in the direction of a more conscious existence. *The function of art is[to achieve] consciousness. [My emphasis.]*

I. What the product of art should be?

De La Torre: (…) Art could be eternal, that has no time signature. Timeless is art. (…) The product should have lasting power and power of transformation. The product has to take you somewhere else, maybe to a world that has the perfect time and space. Yes the product should support you and take you away. What the product of art should be? It is a very complicated question in a time of technology that gave birth to sampling, loops, and sound bites. *Re-contextualizing the present by taking fragments of the past and organizing that information in an interesting way and selling it to an audience that accepts it as their art product [My emphasis.]*

I: Tell me about the ephemeral character of contemporary art pieces or performances.

De La Torre: *One has to take possession of the moment if and only to title the moment.* One can produce ephemeral work and document it and they could be documents of social value. It could be documented by video or photography. Or by doing the work in front of an audience, and the audience records the ephemeral experience by writing about it or talking about it. Also the experience gets recorded in the artist and audience's mind. And *the memory of the experience* could be recalled at any time …"

I: Tell me about your dreaming.

De La Torre: I have clear visions of the way things should be or could be, not always but they do come. I had one dream today of living in a town where you know all the people that live in it... like the young poet that works at the local bookstore and you get old together and every time you see him he has written a new poem. (…) I think of my work more as constructive energies, a form of vision is needed to be a painter, it's like dreaming but more deliberate. *(De La Torre, Armando. 26 October. 2006. E-mail to the author. 18 November. 2006)*

De La Torre: You ask about my trip to NY. It was for some commercial photo shoot, and to build my friends' loft. I also have artist friends who are working from NY. So we get together and talk about each other's work in a mutual healing intervention. I was in an exhibition in NY in February of this year [2006.] And I want to go back to NY to work. *As an Artist. So I keep that flame burning [My emphasis.]" (De La Torre, Armando. 26 October. 2006. E-mail to the author. 27 October 2006)*

I: One can't but feel some concerns regarding the future of De La Torre's artistic production, and the way it is going to evolve his self-image and identity. He is to. He is aware he has to work hard on building a strong self image in such a way that his handy work remains creative, artistic, *aesth-ethic*:

Appendix 2

Terry's Hughes-Oerlich: Biographical information and testimonies.

thugheso@sdccd.edu

What follows are the answers to questions sent and received by email in June 2008.

I: What facts have shaped your artistic life up to this point?

Terry: "Grew up in Huntington Beach, naive of the world, off to college at UC Santa Barbara, art history taught be to start questioning things which informed my art making."

I: What artistic phases have you gone through?

Terry: I've gone through phases of various media, for instance, I did a lot of welding for a few years then a lot of photo, etc. Conceptually my work has gradually changes but no so much as phases.

I: What is art?

Terry: Something that causes tension with the viewer and encourages them to think about the world in a new or different way.

I: What is/are the function(s) of art?

Terry: To open people's mind, to invoke thought, to delight in beauty.

I: What is the highest aesthetic value? Beauty …? If so, how you define beauty?

Terry: Beauty, yes but not in typical meanings of beauty. Ugly can be seen as beautiful.

I: Utility…?

Terry: Certainly important to have utility with some art, but should have beauty and a good design.

I: Consequently, what the product should be?

Terry: I'm not sure what you are asking here.

I: How are ethical values intertwined on the life of an artist?

Terry: With some artist, very much so. I think it should be.

I: To what extent the "creative" process is embedded in the artistic product?

Terry: same [sic.]

I: Can the product betray the process?

Terry: maybe [sic.]

I: Should the product address or include social "values"?

Terry: I think so.

I: How do you address the temporality of the product?

Terry: It seems wasteful but also thrilling to make art even though it might not last long. beneficial [sic.] to the artist also.

I: How do you address permanence vs. ephemerality in the art piece?

Terry: Both are important.

I: What is the role that finances have played in your artistic life?

Terry: Some, I certainly can do more if I had more money, but I am not making art to sell and rarely have except on occasion for craft sales. I teach because I enjoy it, and it also gives me the finances to make art.

Appendix 3

Ivan Camarena: Biographical information and testimonies.

e-Mail: littleman_jauja@hotmail.com

I: What is/are the function(s) of art?

Ivan: Art has too many functions for me to list. It has so many properties and can be used in so many ways.

I: What is the highest aesthetic value?

Ivan: It is all dependent on the individual artist what the highest aesthetic value is. I guess for me it could be beauty but I don't want to say that I have my clear definition of what the highest aesthetic value is or what art is for that matter. If beauty is the ultimate aesthetic value then it is in the eye of the beholder.

I: What the product should be?

Ivan: The product should be a manifestation of an artist's mind into reality: The artist's ideas out in the open for everyone to experience.

I: How are ethical values intertwined on the life of an artist?

Ivan: I believe that this is also different for every individual.

I: To what extent the "creative" process is embedded in the artistic product?

Ivan: Some times the creative process can be the product or just as important

I: Can the product betray the process?

Ivan: The product betrays the process when an artist's vision is not manifested the way he/she intended. In my work this is sometimes due to lack of craftsmanship but craftsmanship can always be learned. Although some times this may work out for the better.

I: Should the product address or include social or historical values"?

Ivan: If it is the artist's wish.

I: What do you expect of your own artistic production?

Ivan: I expect to surpass myself each time and learn something new each time as well. I also expect to keep alive the hunger in me for something greater. The idea that something great will soon come out of these hands keeps me going and at the same time frustrates me.

I: How do you address permanence vs. ephemerality in the art piece?

Ivan: I have never given much thought to whether I want my work to withstand the test of time or not. I would rather prefer that the message would be a timeless one.

I: What is the role of finances in your artistic production?

Ivan: Up to this point I have been lucky enough afford most of the art materials that I need in order to complete the work I want. There have been times in which I can not acquire certain materials and [it] has made my job more difficult but not impossible. Finances for artistic production should not be a significant factor to produce work. I find that some times having absolutely nothing makes for better artwork because the creativity is working that much harder in order to compensate for the lack of materials.

I: How do you solve that situation?

Ivan: I think the ideal position is to have just enough in order to create and let creativity make up what you don't have.

I: Last but not least, how do you live your artistic life?

Ivan: I am certainly a more observant person and appreciate a lot of the simpler things in life. I wouldn't say that everything I do in my life is art but I am constantly relating it to art and how I can manipulate and use things. I have no idea what it is I am searching for but I am always searching.

I: Will financial pressures defeat your artistic interests? What are you willing to do for this not to happen?

Ivan: I certainly don't think so. If I were to end up in some totally unexpected destination in my life that was not planned I still don't think that I could forget about everything I already know about art. It is already so integrated in my life that severing it would be like severing a vital organ.

Appendix 4

Miel: Biographical information and testimonies.
e-Mail: @yahoo.com

I: What is art?
Miel: Art for me is anything that contains life and creativity.... something new and fresh. Everything I have experience through sight, hearing, smell, and touch into a productive work.
I: What is/are the function(s) of art?
Miel: Art is to be experience openly. It could confuse, instigate, stimulate.etc. To be taught by someone else experience. Paintings and drawings were visual aids for everyone back in the 14-18centurys. Things have change dramatically.
I: What is the highest aesthetic value? Beauty? If so, how you define Beauty? Utility? Experience?
Miel: Beauty for me is the process of beauty. How a carbon rock turns into a diamond. Or how the oceans water smoothens the sharp rocks into smooth pearls.
I: What the product should be?
Miel: The outcomes of an art product should depend on how strong or polish is the idea.
I: How are ethical values intertwined on the life of an artist?
Miel: I think and artist has no ethics or values. Maybe human instincts and that is all about it. I would like to drop all my cultural habits and get to the point were you can't distinguished me, label me.
I: To what extent the creative process is embedded in the artistic Product?
Miel: Almost in everything. The design, composition, colors, ideas, feelings.
I: Can the product betray the process?
Miel: Of course nothing comes out like you planned it, there are always good mistakes. For me the whole process is pure infantile playtime.
I: Should the product address or include social or historical values?
Miel: Everything our eyes have seen usually gets out some way. Sometimes I get images or ideas unconsciously placed its right space.
I: What do you expect of your own artistic production?
Miel: Nothing but self-discoveries. Codes to life. I would like the work I do, to be my second brain.
I: How do you address the temporality of the product?
Miel: Like any other object.
I: How do you address permanence vs. ephemerality in the art piece?
Miel: Once I finish a work, I don't want to see it anymore. I want it out.
I: What is the role of finances in your artistic production?
Miel: Money is always needed, but I will use anything I have in my reach to create art. Life itself should provide for me. As long as keep riding the art spirit. Beautiful blessing pop out nowhere.
I: How do you solve that situation?
Miel: Live right and eat well, sleep well, and drink tea.
I: Last but not least, how do you live your artistic life?
Miel: Live the evil and the good, feed my dog, with god's permission.
I: Will financial pressures defeat your artistic interests? What are you doing to avoid it?
Miel: Willing to do for this not to happen. All the body really needs is drive to do, the rest comes at its pace if I genuinely desire for it. Plant it, water it, and pick the fruits. But I am really wiling go out there and draw portraits for money. I would also recycle cans, anything to pay for supplies.

(B.15)

Creating a 'Wow' Factor School for All Gifted Learners: An Achievable Vision

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Abstract

It's not all about money! Often a paradigm shift, teaching to assets instead of deficits, and determination to stick with a vision for the 'long haul' can turn around underachievement far more effectively than a cheque book. Based around the presenter's own experience over more than 20 years in gifted education in New Zealand schools, this paper draws conclusions about the some of the key factors that can turn even the most 'ordinary' of schools into the extra-ordinary. Every school can be the right environment for gifted learners. Statements such as "there are no gifted in our school because..." can become a thing of the past. This paper describes key factors that can make a profound difference in the development of learning environments that meet the needs of gifted. It examines the positive change processes that the author has witnessed in the New Zealand educational environment and links practical experience with research. Similarly, it examines the barriers to success, and the 'fish-hooks' of quick-fix checklists. With a commitment to a long-term vision and careful change management, every school can nurture and develop its gifted students.

Introduction: What is the 'Wow' Factor?

A "wow factor" school has an environment where it is cool to strive for success in any area of school life and beyond. The school day fairly hums with motivated, talented students engaged in learning that stretches them either academically, emotionally, creatively, or physically, depending upon their specific strengths and developing areas of talent. The school has the 'wow' factor for gifted learners when the whole school community has contributed to develop a shared vision for its gifted students, developing gifted education has long been part of the school's strategic plan, and there is belief within the school and its community that development of gifted pedagogy benefits all students.

Gifted students are challenged in their learning by both differentiated learning in-class and wide range of other school-wide provisions; they are scaffolded into areas of new learning beyond the level where-ever that is appropriate; they are challenged to dive deeper into more abstract, complex topics; and they are encouraged to build upon their strengths whilst working to develop areas that are not as strong. They have ownership of their learning: they know what they know, what they need to learn, how they will learn it, and how they'll know when they are successful. They exercise autonomy over their learning, under the watchful guidance of a teacher who acts as a learning facilitator.

Every teacher knows they are a teacher of gifted students, and differentiates the learning in all their classes, regardless of the existence or not of academically 'streamed' classes or other provisions such as acceleration. They understand that gifted learners are in class five or six hours daily, and need to be stimulated and challenged in every class, not only during a 'pull-out' programme once a week. They have a shared understanding of what constitutes giftedness in their community. Their school definition is broad and inclusive, and reflects a model such as Gagne's Differentiated Model of Giftedness and Talent (Gagne, 2002). All teachers participate in the identification of giftedness and emerging domains of talent with the confidence of the informed, and have the educated wisdom to know that the diversity of the human species means they will not always get it right. Hence, they are on the look-out for those most at risk of non-identification: by gender, disability, race or minority ethnicity. There is a shared 'can do' attitude amongst the teaching staff, regardless of student socio-economic status or home background. There is a belief that gifted learners are found in every group in society, regardless of gender, ethnicity, mother-tongue or culture. The school uses a multi-method approach to identification, but sees this as a significant beginning in the process: now that we've found them, what are their individual learning needs?

There is planned, ongoing professional discussion as to how the learning needs of the gifted can best be met, and what professional development may be required to support teachers' professional growth in this area. There is universal understanding that the learning needs of gifted are diverse, and differs according to the way in which the individual is gifted, the degree of giftedness, the area or domain through which that giftedness is being expressed, the socio-affective make-up of the individual, and cultural concepts of giftedness. There is every effort to provide a wide range of opportunities that are reflective these differences, and the school makes every effort to base learning upon student needs rather than the needs of the organisation.

The 'Wow' factor is missing when:

- Teachers have a narrow, outdated, exclusive view of giftedness.
- Only one or two teachers are focussed on gifted education
- Teachers assume, if their classes are streamed, that the other classes do not contain any gifted
- Identification procedures seek to exclude, are one-off, and an end in itself. "Susie didn't make the cut last year in the entrance exam – she's not gifted".
- There is a "check-box", compliance attitude to the development of provisions for gifted, e.g. the school has:
    a. written a policy that is sitting on a shelf in someone's office;
    b. identified a very exclusive group of (often) high achieving academics (and no-one else);
    c. run occasional ad hoc, 'one-off' withdrawal programmes for this elite small group of students (or done nothing at all);
    d. "done" gifted education professional development with the teaching staff because they held two or three sessions about it three years ago.
- There is a belief that parents who tell their child's teacher that their child is gifted is
    a. Biased, and 'wrong';
    b. A 'Pushy parent'; and

  and as a result parents are excluded in the identification process and provisions for gifted (unless they *are* pushy).
- There is a prevailing teacher attitude that kids at our school :
    a. Are from an impoverished district / home background /
    b. Are too naughty / too lazy / unmotivated
    c. Are bright, not gifted / are hard-working, not "way-out-there"
    d. Aren't literate /numerate enough to be gifted
    e. Don't fit with a stereotypical image of a highly successful gifted learner

  Therefore, 'we don't have any gifted in our school /my class'.

Assertions such as "there are no gifted students in this school – it's in a poor district" need to be examined against the reality that giftedness is not the domain of the middle and upper classes, and the following statement should be considered and discussed:

If we cannot find gifted students in this school, then we are using the wrong methods of identification.

- The provisions are mainly "One shoe fits all":
    a. The 'one shoe fits all' means teachers do not use summative and formative assessment to ascertain the learning needs of students and match teaching and learning with learner readiness levels.

b. There is no identification of learners who learn faster, know more, or have already mastered the concept or skill – to do so would require action. "To do nothing is not the same as to do no harm" (Colangelo, Assouline, & Gross, 2004).
c. There is no acceleration, whole year level or single subject, for those whose learning needs are beyond the year level, because the teacher/school doesn't believe in it.
d. There is little or no classroom differentiation for able learners that are above the learner readiness level of the learning objectives of the lesson or unit of work.

- There is a prevailing attitude that gifted learners:
  a. Will 'float to the top like cream';
  b. Will teach themselves;
  c. Should spend much of their time teaching others what they already know 'to consolidate their learning';
  d. Should keep quiet and let others have a chance to learn/ answer questions; and
  e. Are not gifted if they are unmotivated.

Most schools, fortunately, are not that extreme, but many, if they are honest, would admit that at least some of the descriptors above fit with the prevailing attitudes, practices and beliefs some of their teachers. The good news is, with a planned approach to teacher professional development, this can be changed.

Developing the "Wow" Factor

Where education officials in a country wish to see change occur in this area of education, I would point out that as a model, New Zealand made the identification of, and provision for gifted and talented learners mandatory in February, 2005. This has stimulated change in schools where otherwise it would probably not have occurred. It is a reality that for some, it is necessary to 'feel the heat before they see the light' (see Figure 1). Furthermore, since 2000, the government has put ongoing funding into supplying professional development experts as advisors to schools to guide the development of gifted education. The thrust of funding into this area highlights the importance of professional development in effecting change.

Funding

Let me be quite clear about one thing. Yes, all this does require funding, though not necessarily in the way one might expect, and for schools, not necessarily with 'new' funds, but perhaps through a re-prioritising of funds. Primarily there is significant cost (with correlating benefits) in shifting teacher paradigms and classroom practice. However, the assumption is often that it is expensive rooms and equipment that are required. Metadata research shows that teachers have by far the greatest impact on student learning (Hattie, 1999). Schools in New Zealand have a teacher professional development budget. Where they choose to spend this money is a matter decided by Management and Board. If development of gifted education pedagogy is a priority expressed in the school's long term strategic plan, then funds will be steered in that direction over an extended period.

Many schools do not have a budget for gifted education, yet its development requires resourcing – in teacher hours, teacher professional development, educational texts, and classroom and programme resources. Without commitment from Board and the senior management funds will not be allocated to effect the changes required.

Development begins with a Key Team

Once there is recognition from the Board and senior management that a long term commitment to development in this area will benefit the whole school and not just an elite few, and gifted education

holds a significant place in the school's strategic plan, then real change can begin to take place. A needs analysis ascertains where the school is at, and the areas needing development. The establishment of a key team is crucial. Its members should include at least one member of the school management team who has gifted education as part of his/her portfolio. Without a management team member, the team does not have the power to effect change, and there is often a mismatch of paradigms between management and key team. A really good team includes the Principal, as well as a deputy principal, a Board member, and two or three significant teachers such as the G & T coordinator.

The role of the key team is to become the experts within the school with in-depth knowledge of the gifted pedagogy, so that they can plan, guide and effect change. Initially, in New Zealand, it is most frequently the key team who receive in-depth professional development from the advisor. They in turn provide ongoing professional development to their school community, based upon their individual school action plan.

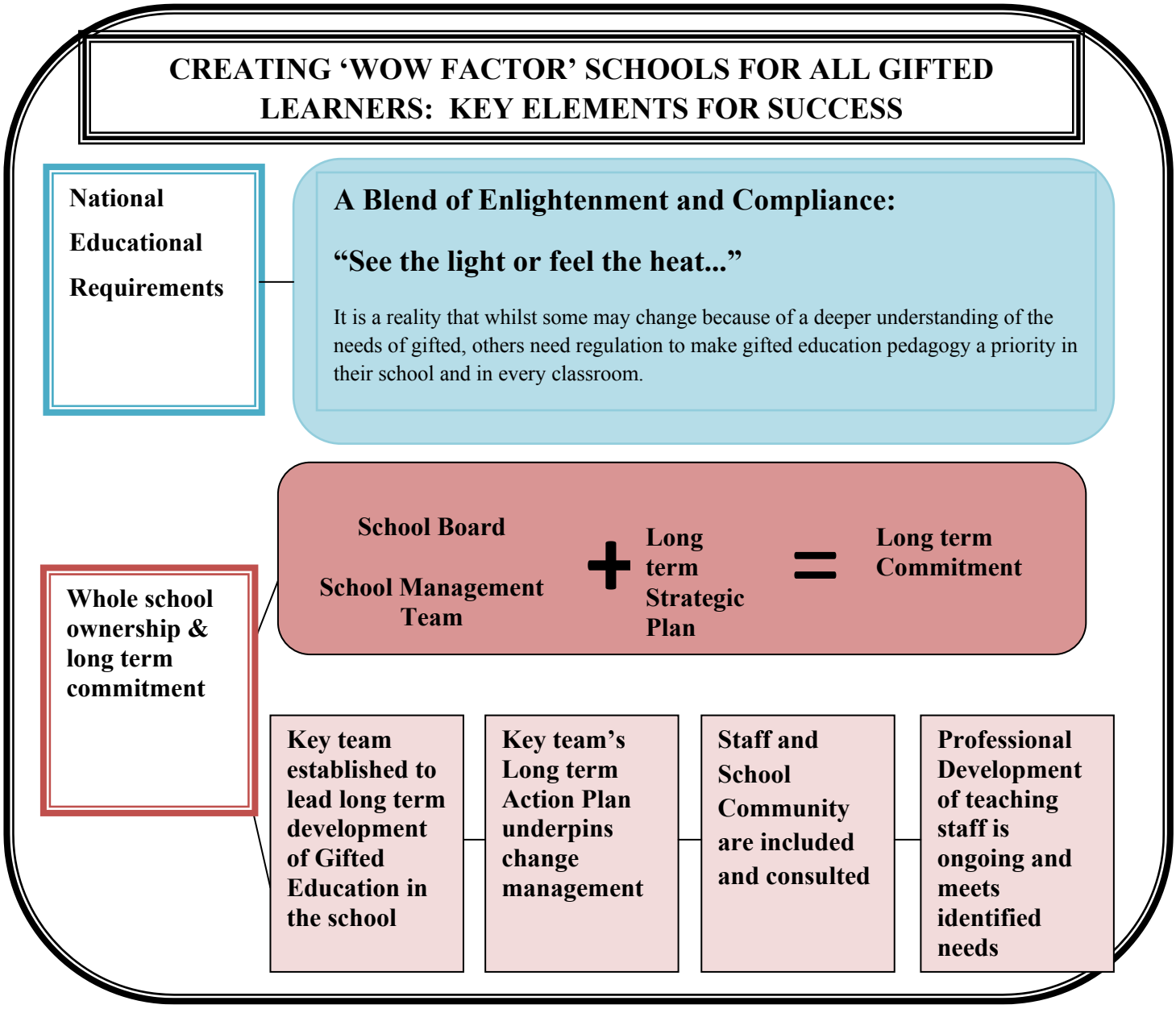

Figure 1: Key Elements for Success.

The aim of up-skilling a key team is ultimately to build capacity amongst its all the school's teachers. Where only one person is involved as the resident expert, their role is overwhelming, and they are likely to burn out (Ministry of Education New Zealand, 2004). A school with a long term goal needs to build capacity through a professional learning environment that has inquiry into teaching and learning methods as its focus, centres its inquiry around student assessment data rather than suppositions, and has improved student learning outcomes as its end goal. Current research shows that one teacher going on a course does not effect change in practice (Fullan, 2006). Change needs to occur through the building of professional learning teams within schools, where teachers are prepared to experiment to discover what affects student learning. "Effective schools are ones in which principals and teachers focus on student learning outcomes and link this information to improvements in teaching and learning in strategies" (Fullan, 2007).

'The Long Haul' Plan (Long Term Action Plan)

School management and key teams understand that creating the 'wow' factor means they need to be in this for 'the long haul'. Short term, stop gap measures are ineffectual. They embrace the big picture, and examine all aspects of developing gifted education pedagogy over 5 to 10 years. They develop a long term action plan to manage this process. This action plan is reviewed on a term by term basis and informs current and pending implementation strategies. The school moves through a process that includes a wide range of identified needs. Such needs may include:

- Developing a school-wide understanding of giftedness and subsequent working definition of giftedness that reflects current theory, and is relevant culturally and specifically to the school community;
- Developing a shared vision for the gifted and talented students of the school;
- Development of policies and procedures, e.g.: a policy for the gifted which is separate from those with special needs; identification policy and procedures; acceleration policy and procedures;
- Developing and maintaining a core team of experts in gifted pedagogy;
- Conducting ongoing professional development and consultation with the teaching staff and wider school community about all of the above, and especially where minority cultures are concerned; and
- Identifying and addressing the professional development needs of the whole staff over an extended period of several years, including areas such as:
    - The identification of gifted students, especially those most at risk of non-identification
    - in-depth, long term development of change in practice to incorporate abstract, higher level thinking and deep learning for gifted learners; and to differentiate and personalise learning in all classrooms so that gifted students meet the appropriate level of learning in whatever classroom they are in; and
    - Related areas of professional development such as 'assessment to learn', using formative and summative assessment to inform teaching, underpins learning outcomes with success criteria, and when implicated effectively engages the student in their own goal setting and self and peer-assessment.

- Critically reviewing existing provisions for gifted within the school, in consultation with parents, students and gifted education experts. Linked with the Vision, this can provide powerful impetus for planned, well-managed change.

Creating a vision

A long term vision is an essential component in establishing a 'wow factor' school. The vision describes where the school aspires to be in five to ten years time, in regard to the environment it will provide for its whole spectrum of gifted learners. The vision needs to be shared with both teaching staff and the broader school community, including School Boards, parents and caregivers, and representatives from the student body. Creating the vision should inspire high-end discussion, debate, and collaboration, as the vision is shaped and reshaped to fit the needs of the school and community. "It is a paradox of change that leaders must believe in their ideas but be open to the reality that others must reshape those ideas for change to truly happen" (Tomlinson, 1999).

The process should be seen as a means to an end, and in its early stages will be far from complete. It will initially highlight the vast and diverse range of beliefs and myths around giftedness, from the assumption that giftedness is the domain of a tiny percent of cognitively able students (the "I taught a gifted child once approach") to the assertion that every child is gifted. Far from creating dismay, the voicing of diverse views should be seen as an opportunity to develop a deeper understanding as current research and resulting theories are introduced and pondered over.

It is a worthwhile practice for schools to re-visit their vision every two or three years and re-shape it as their community becomes more apprised of the modern understanding of what constitutes giftedness, academically, physically, culturally, and social-emotionally.

Who are the Gifted in our Community?

The Definition is inclusive, & underpins philosophy, identification procedures and provisions (see Figure 2). When a wide range of talent is valued, across both co-curricula and extra-curricula areas, there are many more that just an elite few who are recognised for their potential and achievements. Even in the early 1990s, research in Britain which examined giftedness in terms of Gardner's seven intelligences found that multi-talented comprise 3-5% of the population, but at least 37% of the population were found to be in the top 10% in *one* of the multiple intelligences (George, 1993). Theorists differ in the number of domains that humans may excel in, and even Gardner now has 8 intelligences (Gardner, 2000). The fact remains that it is the responsibility of the school to identify and nurture both potential and high achievement in a wide range of areas. A definition which is narrow, exclusive and based solely on high cognitive ability does not have the magic and dynamics of a "wow factor" school.

When definition is multi-faceted it includes potential as well as high achievement, relative to similar age, background and experience. High cognitive, creative physical and social-emotional abilities are acknowledged so that the artist and musician are as valued as the mathematician and the

sports champion. There is recognition that giftedness is a matter of degree, and that for mildly and moderately gifted, a differentiated classroom program will meet their needs, but for highly, exceptionally and profoundly gifted, other provisions beyond the age-level classroom will be appropriate.

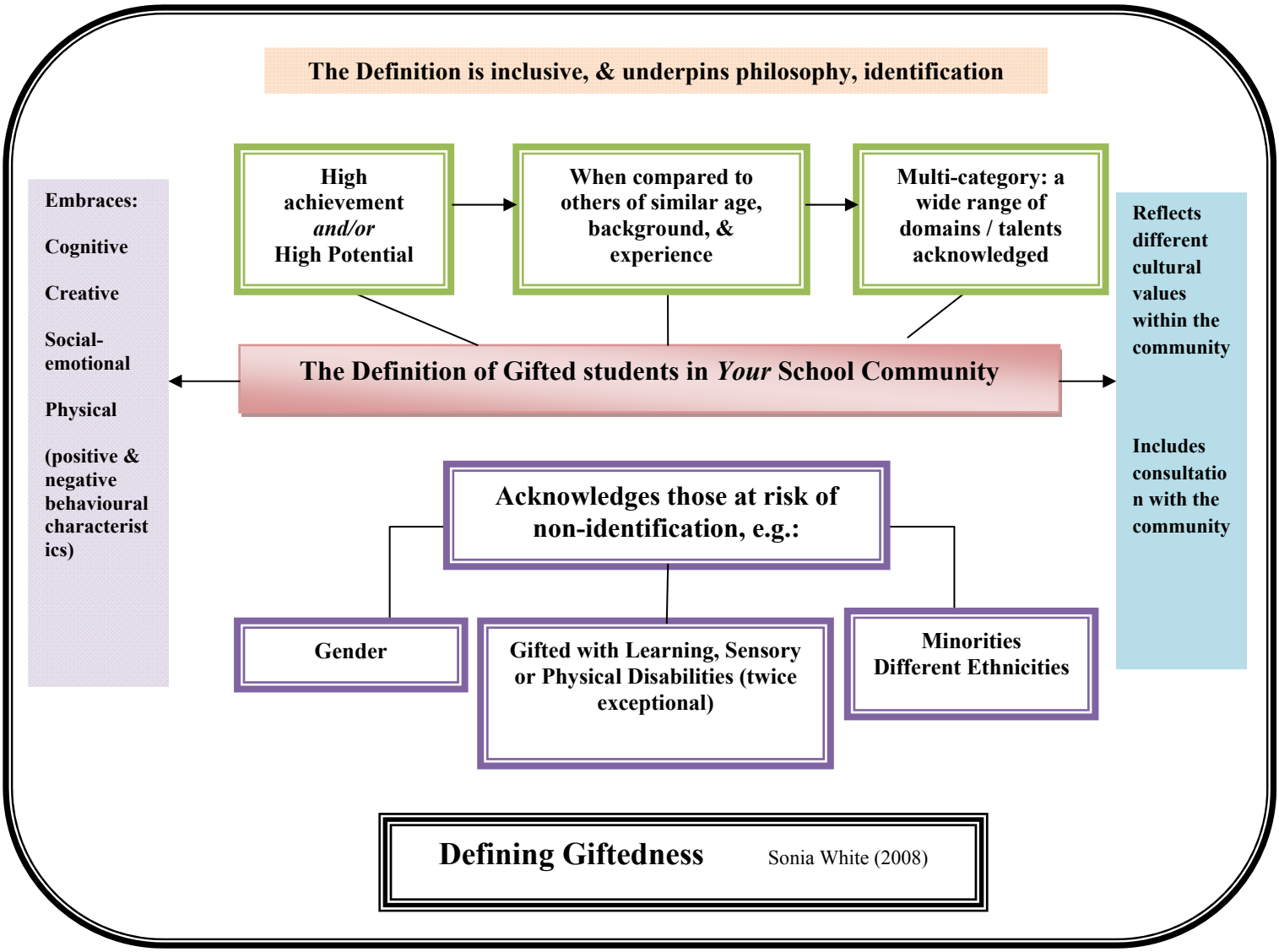

Figure 2: Giftedness.

Most importantly, when a school consults with its communities about the cultural perspectives of giftedness, especially amongst its minority cultures, then discussion about appropriate identification of, and provisions for gifted students from that culture can take place.

The Identification Process

The identification process in our "wow factor" school reflects the definition. All faculties or departments take responsibility for identifying those of very high ability in their curriculum area. Their involvement in and ownership of the identification process means they are also empowered to take more responsibility for appropriate provisions for students gifted in their specific curriculum area.

Overall, there is multi-method approach to identify students: teacher checklists of gifted behaviours; standardised test results and IQ tests where available; student product or portfolios; parent nomination, peer and self-nomination. Identification procedures are dynamic and ongoing, not 'one-off' events, and reflects the school's acknowledgement that giftedness is a developmental process. A record is kept on the student's electronic profile, so that all teachers can access and be aware of identified gifted students' areas of talent and related learning needs.

The school is aiming to identify the full range of giftedness, from mild to profound. Why? So these needs can be met firstly in the classroom. Even mildly and moderately gifted students have learning needs beyond the norm, and if these students aren't identified, then there is an automatic assumption that there are no gifted in the 'average' classroom. Although initially such a broad definition meets with cries of alarm from teachers ("Goodness! We can't possibly run special programmes for all of these students!"), they need to understand the motivation behind the broader brushstrokes will mean that the learning needs of the students are better met through differentiated learning in the classroom, and that provided such differentiation occurs 'special programmes' are not required for this larger group. It is only those whose needs extend beyond the classroom who form 'sub-groups' which may be classified as e.g. the top academics, artists, musicians, sportspersons, etc. There are also those with leadership potential, and socio-affective strengths who may form specific groups with special needs, as well as the twice exceptional (or gifted with learning disabilities) for whom specific programmes or courses may be appropriate. A thorough identification process uncovers all of these students.

Parents & Community in partnership

Parent inclusion in the identification process and subsequent provisions gives them voice and makes them feel valued. Instead of school's fearing parent involvement, an environment of trust can be built.

Many schools have minority groups within their student body. Inclusion of the parents and community of these cultural groups into discussions seeking their perspectives and values of giftedness can be one of the most powerful enablers of gifted minority students. One large secondary school I work with in New Zealand is in a low socio-economic urban area, has a roll of over 2500, and 25% of its students are Maori. The school had already developed an academic academy and a sports academy, but were looking at how they might cater specifically for gifted Maori. Although Maori were already in both of the other academies, the Maori cultural values of giftedness were not reflected in the provisions being offered. An idea was floated to establish a Maori Leadership Academy, and knowing it was important that the Maori parents and community were consulted, community meetings were held, and Maori were consulted upon the characteristics and qualities that they felt were most important. Interestingly, but not surprisingly, the qualities chosen were not reflective of what typically would be selected by the dominant 'western culture' population. Instead, they were qualities and characteristics that are an integral part of Maori culture(Bevan-Brown, 1996). Gifts and talents are not for personal gain, but should be used for the benefit of the Maori community. Giftedness brings with it inherent responsibilities and a commitment to reciprocate and to be accountable (Bevan-Brown, 2003). The Maori Leadership academy sought community assistance to identify Maori students strong in Rangatiratanga (ranga – to weave, tira – a company – leadership that inspires unity). Leadership in Maori is often from behind, and is not always "out front" as is usually the way of western cultures. Nor can an individual push themselves forward. They need to be recognised by the group, to become a leader. A student gifted in Rangatiratanga will:

- be motivated to serve others;
- have mana amongst their peers;
- be visionary and strategic thinkers: their opinions are sought, valued and considered;
- stand up for beliefs and values sometimes against adversity;
- inspire and motivate others to work for the common good;
- show initiative and motivation; see beyond the obvious to recognize what needs to be done;

- often have the mandate from the group as the spokesperson; and
- reflect and present controversial ideas with respect.

(Mahaki & Mahaki, 2007).

The outcome of such community involvement has been the development of an amazing programme for these students which combines the best of gifted pedagogy with the best of Maori culture. The programme interweaves the learning of Te Reo Rangatira (the formal Maori language used in by elders and leaders in the community, on special occasions) with cognitive challenge, self-knowledge, cultural heritage, personal development and responsibility. The students are expected to be role models to other Maori students in their normal classes, to inspire, support and lead, to stand tall in a strong sense of self and place within their own culture. This may sound a small thing, but for urban Maori it is major. There is no truancy from this group; they arrive an hour earlier for school each day to participate in the program, and beg to continue classes in the holidays. These students, in short, are flying. Such is the power of making a determined effort to involve minority groups and community consultation in the identification of giftedness, and appropriate provision.

Summary

In short, a 'wow factor' school for all gifted learners strives to provide a learning environment that promotes and celebrates excellence in all areas of human endeavour. The whole school community is involved in the process and planned ongoing development of the vision. Teachers are supported in their professional growth so that they are increasingly more effective in gifted pedagogy.

Students and parents are excited and stimulated by the wide range of opportunities offered to them, *beginning* in a classroom that differentiates learning appropriately, and extends beyond the classroom into a wide range of opportunities (Basher, Meuli, & Taylor, 2000). Each department focuses upon extending opportunities to those gifted in their domain. The school provides a mix of appropriate provisions for individuals, including whole year acceleration, single subject acceleration, extension and enrichment programmes such as Future Problem Solving, Philosophy for Children, Model United Nations Assembly (M.U.N.A), and other competitions. There are programs that include and address big picture concepts such as environmental sustainability, law and justice, and community / global social issues.

There are cultural groups where students can excel in being who they are as gifted within their own culture. There is mentoring of gifted, and where appropriate, individual educational plans that deviate from the 'norm' of school life are in place to meet the needs of the individual. The school has opportunities for students to be involved in altruistic activities such as:

- Amnesty International, Canteen (a fund raising organisation for youth with cancer), Students Against Drunk Driving (SADD), World Vision - 40 Hour Famine;
- Restorative Justice program;
- Community Volunteer groups:
  - e.g. Rest Homes, Disabled Children, church volunteer groups.
- peer tutoring / peer mentoring; in-school, or beyond:
  - Reading to students in primary school;
  - Coaching younger students in e.g. Maths, Science, Sport; and
  - Mentoring a younger gifted student with a similar interest / area of passion.

A school that values and fosters student community activities beyond the classroom reaps the benefits in immeasurable ways. Gifted students become better equipped to become world citizens, having had their academic, cultural and social-emotional needs met.

Your vision becomes a reality over time.
Time.

The "wow factor" school takes time.
Lots of it.
Give it the time,
and the enormous amount of unfailing energy and commitment it deserves.
Surround yourselves with others who are prepared to embark on this journey,
Believe in it;
take it one step at a time,
and before long you will look at students who are taking flight
and say
"This is right, this is what we should be doing, this is how things should be".

References

Basher, L., Meuli, A., & Taylor, S. (2000, 3-5 October). *A practical overview of Secondary School Programming options.* Paper presented at the Now is the future: the gifted student in today's secondary schools., Auckland NZ.

Bevan-Brown, J. (1996). Chapter 1.5 Special abilities:a Maori perspective. In D. McAlpine & R. Moltzen (Eds.), *Gifted and talented: New Zealand perspectives* (pp. 478). Palmerston North: ERDC Press.

Bevan-Brown, J. (2003, 1-5 August). *Providing a culturally repsonsive environment for gifted Maori learners.* Paper presented at the 15th Biennial World Conference, Gifted 2003: A Celebration Downunder, Adelaide, Australia.

Colangelo, N., Assouline, S. G., & Gross, M. (2004). *A nation deceived: how schools how back America's brightest students (Vol 2).* (The Templeton Nation report on Acceleration): The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development, University of Iowa, and Gifted Education Research, Resource and Information Centre (GERRIC), The University of New South Wales.

Fullan, M. (2006). *Turnaround Leadership*. San Francisco: Jossey-Bass.

Fullan, M. (2007). Turnaround schools / Turnaround systems. Auckland, New Zealand: Michael Fullan: Education in Motion.

Gagne, F. (2002). *A Differentiated Model of Giftedness and Talent (DMGT): Author's notes*.Unpublished manuscript, Montreal.

Gardner, H. (2000). *Intelligence reframed: multiple intelligences for the 21st century*. USA: Simon & Schuster.

George, D., Sir. (1993). *Keynote Speech.* Paper presented at the Gifted Challenge - State Conference N.S.W.Association Gifted & Talented Children, Sydney.

Hattie, J. (1999). *Influences on student learning: Inaugural Lecture*, from www.education.auckland.ac.nz/uoa/education/staff/j.hattie/papers/influences.cfm

Mahaki, P., & Mahaki, C. (2007). Mana tu, Mana ora: Identifying characteristics of Māori Giftedness *Unpublished paper*. Auckland: The University of Auckland.

Ministry of Education New Zealand. (2004). *The extent, nature and effectiveness of planned approaches in New Zealand schools for providing for gifted and talented students: a summary of the research*. Wellington: Ministry of Education.

Tomlinson, C. A. (1999). The differentiated classroom: responding to the needs of all learners. In *ASCD*. Alexandria VA USA.

About the Author

Sonia White (M. Gifted Ed.), is an advisor in Gifted Education, working for the past six years with primary and secondary schools at the school support services division (Teams Solutions) of the Faculty of Education, The University of Auckland, (New Zealand). She provides in-depth, long-term professional development to schools, developing teacher expertise and pedagogy to help meet the needs of gifted students. She identifies the professional development needs of schools/teachers, and assists school management teams to implement long term change in this field. Over the last ten years

Sonia has conducted many seminar presentations, locally and at international gifted education conferences in Australia, New Zealand, and USA. She has been a member of several Ministry of Education (NZ) consultation groups. Prior to her current position, for 14 years Sonia was the gifted education coordinator at a co-educational school with students ranging in age from kindergarten to Yr 13 (Grade 12). She has implemented a wide range of provisions for gifted students to cater for their academic, and social and emotional development.

(B.16)

Paul Cohen; Yu-Han Chang; Shane Hoversten, Modeling and Optimizing Curricula as Markov Decision Processes: Fixed curricula for average students fail very good and very poor students. Ideally, each student should get an individualized learning trajectory. This idea is made mathematically and algorithmically precise as follows: At each moment, the student can choose or be presented with one of many learning events: text, lecture, multimedia, tests, hints, explanations, and so on. The best learning event is the one that changes the student's state in a way that is immediately rewarding and also facilitates future learning. In some states, the most rewarding thing might be a concrete example; in others, the student will be most rewarded by a theoretical argument, or a brief diversion, or practice. However one defines states and rewards, one can model the choice of learning events as a Markov Decision Problem: Let Pr(s(t+1) | s(t),e) denote the distribution of states of the student in interval t+1 given that he or she started in state s in interval t and was expose d to learning event e. Associated with each state is an immediate reward, and a value, which is the discounted sum of expected future rewards. Given sufficient data, one can find an optimal policy that specifies the maximum-value learning event in any state. Experiments with policies for human and simulated students in two areas of mathematics show that optimal policies for individual students outperform average policies for all students. This statistical approach requires no cognitive models, only data, and thus is ideal for the Internet Classroom and other efforts in Web-based education.

(B.17)

Self Education: The missing Dimension in Education
The only break through solution to save the world!

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Abstract

In the quest towards human excellence, I have discovered the science of global mind transformation through Self Education – the answer to UNESCO's genius prescription " If wars are created in the minds of men, then it is in the minds of men that the barriers of peace will have to be erected ! " This science is a one off answer to all the problems of drug addiction, sexual malpractices, mental dishonesty, corruption and any evil that one can imagine of.

If the backbone of any being or system is not redressed and re-established in a sane and healthy state, the result will be catastrophic. Similarly, lame curricula in education systems will continue producing lame and handicapped people - generation after generation of criminals, murderers, intellectual dishonesty, corruption, exploitation, gargantuan desires, sex maniacs and you know the list!

Accordingly, this paper militates to address the missing link in education which over decades has produced lame development of individuals in the name of overall development – by:

(i) showing the actual sad plight of humanity and global concern, the inadequacy of education curricula, the crisis justifying the need for Self Education;
(ii) describing the Self Education Project, its strategies;
(iii) Expected outcome;
(iv) highlighting experimentation with adults & youths and success stories; and
(v) implementation strategy & piloting in schools.

This paper has been scribed as a solemn invitation to all great thinkers of the world to join in efforts for saving our planet through the major discovery, "Self Education"- the solution to the missing link in curriculum which forms the very backbone of the edifice of education of the globe!

Self Education: The key to lifetime self empowerment for all

What is Self Education? It is the science of self knowledge and transformation of human behaviour whereby an individual triggers the process of self discovery - transformation of physical, emotional and mental shortcomings and blockages towards the flowering of his being into a content, self-fulfilled being living in a blissful state in harmony with nature and all its beings – through expansion of consciousness.

Just like a blossoming flower spreads its fragrance and all those within its ambit celebrate its beauty and advent, similarly the virtue, wellbeing and flowering of a Mater in the Science of Self Education cannot stay within the limitations of his own being – they spread out to the entire humanity beyond all barriers of caste, creed, colour, race and nationality.

This is not a dream, tell-tale or utopian fancy; it is a reality that Self Education offers – for I am a Living Example and there are many others in the process.

Justifying the need for Self Education

Current World Crisis:

- Violence: man is fighting himself and others;
- Wars, terrorism, racism, riots, genocides are devastating by thousands;

- Family violence, rapes, incest, sexual abuse, broken marriages, divorce and murders are rampant in society;
- Diseases: New are born before remedy of old ones found;
- HIV/AIDS, Saars, cancer and many others;
- Nature is lashing back for what man has done, through natural calamities in the form of: Earthquakes, cyclones, tsunamis, rising of sea level, global warming

There is no end to how much wrath we have invited by inflicting wounds on the body, plundered the beauty and raped the entrails of Mother Nature! Nobody can claim that he is not in the danger zone.

The concern of genuine thinkers researching over excellence to counteract the social, economic, ecological, political and a gamut of other global challenges through education, is legitimate and right action is long overdue. How can we discover excellence when we are right at this moment seated on the volcano brewing lava of destruction? The only visibility in such crises would be firefighting for survival which is a long way off from proactive enhancement.

The success of every sound and healthy education system is totally dependant on four factors as shown in Table 1.

Table 1: Components necessary for sound and healthy education system

SN	Area of Learning	Leading to
1	how well the individual himself has evolved, open and receptive he is to learning, how much prepared he is to face life, physically, emotionally & intelligently.	Self Development
2	what program of education is offered to ensure that a well balanced education is provided for his overall development.	Academic knowledge
3	academic and vocational education enabling one to face and adjust to changing demands of life situations.	Bread earning skills
4	preparedness to improve and enhance the collective entity –implying readiness to innovate, invent, actualize technological advancement.	Contribution to collective progress of the world

The first one is the very pivot on which the individual can build the edifice of bread-earning and material progress or advancement. Without education of the self, there will be an absence of harmony of the individual with himself, his professional & social environment and his natural habitat – nature or the globe. When he is at conflict with himself, he does not know or understand himself and obviously he ends up becoming an unhappy and unfulfilled person. The end result is that in his vain quest to fulfill himself, he resorts to anger & violence, frustration & stress, and ultimately destroys what he himself arduously created and achieved. During his entire life he fights against whatever comes between him and his unfulfilled desires – as there is no end to his desires. He becomes greedy for power, possessions; he envies the progress and achievements of others and is ready to climb up by even pulling down all those higher up on the ladder and will not hesitate to step on their backs to go up.

The facts speak out for themselves but the saga described above is becoming more dangerous because nowadays instead of individual exploitation, collective exploitation has taken over; therefore the results are going to be more and more frighteningly devastating. The world has started paying the heavy price for the compromise made by sacrificing self-education at the cost of expansion of academic or materialistic education.

The Crucial Need for A New Turn

However much advanced scientific and technological development becomes in providing the topmost comfort to man, whatever be the social, professional and economic status a person attains – he

may still be unhealthy, emotionally disturbed or mentally stressed, thus unhappy because his state of well-being, happiness and fulfillment does not emanate from these or anything outside these, but overflows from his inner self!

Instead of devastating entire countries while fighting terrorists, energy should have been used to transform this destructive mental disposition within those few trouble-makers or terrorists. Look at the result now! Even more terrorists are born all over the world. Not only the people of countries at war are suffering, but the entire world is under vigilance out of fear and terror.

Today the world stands shaken by natural cataclysm, air charged with toxic agents, acid rain, devastating floods on the one hand and on the other - human behaviour disorders, destruction through wars, terrorism, suicide bombing, crumbling down of the family nucleus, sexual perversion and what not! All these tremors cannot be measured and disseminated by even Reuter to reflect the danger zone in which the humanity meteorology of the globe is standing.

If the present trend is maintained, I fear humanity has no future at all. If it has, then it augurs a very bleak face of the globe in its entirety. This present trend has infiltrated in the very core of almost anything that man lays his hands on.

Genuine Global Concern without the Right Solution of Addressing The Human Psyche

Therefore the problem is not outside in the world, it is inside the human psyche. Till when feign indifference to this root cause of global burning issues?

UNDP, UNESCO, SADC, UNICEF and global programs such as the Millennium Development Goals (MDG), Education For All (EFA) goals, Education for Environment & Sustainable Development (EESD) have all proven that education has not been able to produce the calibre of man it always clamours –"overall developed". This is the very source responsible for any world crisis - whether ecological, economical, political, behavioural, emotional or count any.

The founders of UNESCO had seen in their wisdom in all clarity, that to save the world there is only one path – global mind transformation. 60 years ago after the Second World War, UNESCO was born and it in fact bifurcated the gangrene and revealed the seat of *the seed of war* being *in the mind of man*. The wise discovery recorded in the first constitution of UNESCO " *it is in the minds of men that the defenses of peace should be erected"*. But this wise reflection became secondary and eventually got buried in the graves - in the process of reconstructing the world. Scientific progress, industrial revolution, discovery of more lethal weapons so as to gain supremacy as a super power become the priority and took over.

We have now to realize that we have entered the zone where there is no u-turn! Hence, only clamouring about the danger will not save humanity. What is required is action, action, action for transformation!

It should first be acknowledged as a result of a global SWOT, that there is something wrong and missing in education - the foundation of the entire edifice of development and progress of humanity & the world for generating so much concern. Also it should be acknowledged that till now the right solution has not been tapped at international level. Hence whatever action – it should be the right action!

Curriculum : The Solution!

Education digressed from its focus and took man far away to explore the outside world – the entire universe - without teaching him an iota about his very existence, his self evolution. In fact man has

learnt only how to enhance means to satisfy his basic needs - for which he is learning the science of quantum energy, nano technology, is exploring minutest of the minute to study the deep sea transformation, the constituents of ozone, the black hole, multiple curing charismatic technology machines, plans to conquer even other planets - yet the problem stays the same and the situation is back to square one.

Despite investment of trillions on education, mushrooming conferences /workshops/ seminars/ forums, internet knowledge hubs touching the sky – yet the human psyche has not changed – man lives in modernised primitiveness ! Even the animal species, birds and aquatic lives follow an organised pattern of learning and their behaviour has not deteriorated. But, Alas! The most intelligent species – man – has deteriorated ! Why?

The one and only origin root cause of the problem is the imbalance in the school curriculum and therefore the remedy too lies therein. The golden goal of "overall development" does not need to be changed or modified or reconstructed. It simply needs to be adhered to.

Education is being dispensed in bits and pieces to match a few immediate needs, fire fight circumstances, satisfy the donor country fancies or political will or to follow global trends or fashion. Where is the individual in all this? Where goes the golden promise of overall development ?

School curricula spend its total focus on academics; around 40 subjects taught in secondary schools and only scanty music or physical education in a few countries. Talks on leadership and management, social work and benevolence etc are all geared towards others – outside, and the individual himself is left in oblivion. Competitions, trophies, excellence in performance have climbed up the lists even in sports and games leaving far behind health & physical education and relegating totally backstage. These are the sad plights of curricula over which trillions are spent, massive energy and resources are invested globally.

When smoking became a threat to health, "no smoking" campaigns; when drugs started taking their toll, then preventive anti-drug movement took over, which is now being replaced by distribution of syringes meaning you can die, but slowly. When HIV AIDS showed its killer face, sexual education became the word of the day, but then it was combined with the effect of drugs; so joint campaigns have started in schools. Computer technology came up, then IT became the golden rule forgetting all other matters; now rights protection, piracy, bank robbery through internet. Education has become a firefighting arena with a lame curriculum which deals with only the intellectual development and that too quite elementarily, dealing with knowledge on the periphery!

The result of all this is generations of crippled bonsai men and women whose minds are left struggling for fulfilment because of the half-baked curriculum. Emotional development stays thirsty because even the little arts & creativity that has flourished is dumb or have been silenced in school curricula. The science of the harmony between body, heart and mind is not being prioritised and taught. The result is the chaotic state of the universe.

I have been calling upon the world to address this missing link or component of education and I have initiated this project entitled Self Education that gives it the completeness which "overall development" has missed and has been clamouring for since decades. The key problems of the global issues can be summed up in human behavioural disorder. And behaviour is the concrete visible expression of idea or thought that germinates in the mind. Even the term psychology is defined as the science of behaviour and it goes without saying that behaviour is propelled by the mind.

It is the birthright of every individual to know himself. Therefore Self Education is a Human Rights issue! It is related to the overall development of every individual, the sacred duty and mandate of every education provider.

A person needs (i) a sound healthy body to enjoy living (ii) emotional stability and the sense of being fulfilled to be happy and be at peace with himself and his environment (iii) alertness and mental awareness to develop his mental faculties, not only to satiate intellectual quests which are impossible because there is an ocean of knowledge out there, but also to explore his inner self which contains an even vaster realm of unlimited potentials. It is such exploration of the mind that will ultimately give him alongside bounteous knowledge & skills - wisdom and serenity, understanding of his own reality and true goals of this birth within a human body.

My proposal for Excellence in Education is Self Education for All

This is my area of expertise upon which I have researched, experimented and produced results. This is not a download of writings or verbatim repetition of heard information authored by others, but authentic self experience holding the key to transformation of human behaviour through knowledge, understanding, experimentation, fruition and transformation followed by transcendence. Psychology expounds the science of human behaviour and I am advancing it further by advocating for transformation of brute instincts into positive, constructive and sustainable energy and sublimation of human potentials towards self actualization and self-fulfillment.

Our Readiness for Addressing the Missing Link for Excellence in Education

Content of the Science of Self Education

Thus, Self Education aims at evolving an overall healthy individual through the expansion of consciousness which actually operates with only an insignificant quantum of the totality of human potentials. It makes for provision of education for the body, Heart & Mind.

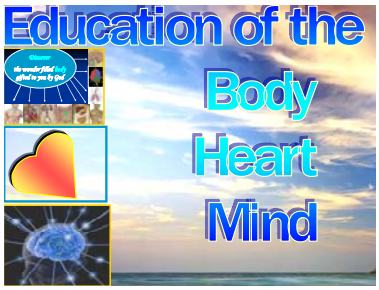


Figure 1: Content of the Science of Self Education.

While Biology continues to play the role of dissecting the gross body and opening it to the eyes, Self Education adds life and reveals knowledge and skills about the energy that generates power for body functioning, its maintenance, overall well being and subtle evolution beyond.

It consists of a modular teaching approach of learning towards discovery of the gross and subtle bodies and the secrets of the energy hidden therein. Each module offers a complete package comprising reading materials, visuals, a repertoire of support materials considering the likes & dislikes of learners and also modern educational technology.

Each module consists of a package comprising a booklet, power point presentations, a brochure, repertoire of clips / movies / downloads, & handouts. All these form a series of training kits.

The following modules reflect a sample of materials produced and the series of modules on way.

Figure 2: Modules proposed for Self Education.

Education of the Body:

- Man is not only a body.
- The body is a gift by nature. It is a temple.
- If our ten senses are not overused, the body can be used as an instrument par excellence to plug in with the whole existence.

Education of the Heart:

- Development of an emotionally stable, healthy person who can positively relate to his environment, face crisis and learn to accept realities of life.
- Transformation of brute emotions - Attachment, sadness, depression, anxiety, anger into love, compassion, forgiveness, generosity, and sympathy.

Education of the Mind:

- Understanding the mind
- Developing the spirit of enquiry, open-mindedness.
- Liberating the mind from fears, beliefs and conditionings.
- Expansion of consciousness
- Love and respect of oneself, for nature and all life.

Pedagogy of the Science of Self Education

(i) Based on willing participation & self experience

Self education is more self-practice based, geared towards gradual elimination of toxins and impurities in the gross & subtler bodies through increasing oxygenation out of yogic breathing techniques and specific therapy for different functions such as opening up, release of toxins, exercises to deal with anger / violent tendencies, dejected moods etc.

Since breathing has a direct impact on the heart, feelings, emotional expressions, nervous blockages and disturbances - the individual experiences a transformation of the negative traits into cumulative calmness, stability, sense of serenity and self reliance through liberation from

blockages. This freedom from innumerable blockages lets loose layers of mental powers, taste for subtler energization of the being.

There are also a series of other therapeutic practices not involving breathing but other techniques and methods to help people out of aggressive and violent tendencies, lethargy, stress, very sad moods etc. These are coupled with close working sessions for knowledge sharing and skills development.

(ii) Enthuses the spirit of in-depth research, rational & logical thinking & discovery of the potentials of the heart & mind.

The self discovery journey prompts further probing about anything that leaves doubt, arouses curiosity or demands enhancement. This trend leads to mind exploration and heart flowering.

Seeking further knowledge, spirit of enquiry, study, discussions, silent digging from within are common practices.

(iii) Exploration of knowledge & skills in the University of Life

The true arena for behaviour transformation being the actual day to day life in its actual setting, Self Education also results in activities - of benevolence, blood donations, door-to-door activities, meeting and working with people of all social and economic backgrounds, supporting community actions, charity – out of a spontaneous overflow of love and understanding.

Expected outcomes

Self Education as The Over-Riding Change Agent

The causes of any misbehavior are directly related to what and who has educated the defaulter. The mindset and thinking pattern of an individual is shaped by the impressions gathered from the environment of the home, society, peers, schools, media, genetic heritage of the body chemistry as well as religious & political leaders.

The over-riding power in all this is education – which has been the agent of change throughout ages. This science-based human-behavior transformation project offers a needs-based, coherent, sustainable and harmonious approach and will with no fail attain the desired strong impact on the young learners and will result in positive behavioral change in man and society.

Reaching the root of behaviour problems

Problem behaviour patterns manifests out of multiple factors not only due to inherited birth related factors, but even beyond the genetic codes from imprints of past lives which are coded in the subtle mind in the unconscious layer out of the following

(i) Depressions from an early age;

(ii) Illiteracy in parenting & unripe readiness to parent a child;

(iii) Complexity of causes related to life situations;

(iv) The impact of media - with all its atrocities, violence, sexual aggression, sex marketing and the aggressive music;

(vi) Mismatch between social & Family readiness versus materialistic development & progress in the world;
(vii) Inadequate & inappropriate Schooling Practices;
(viii) Academic-excellence-centred Curricula disregarding the individual;
(ix) The pressure of imported trends on education systems & curricula & lack of farsight of policy makers to see where reform is required in education;
(x) The death ear of political will to calls of genuine educationists;
(xi) School leadership issues in the present age; and
(xii) Pedagogical Autocracy

Defusing the problems of school indiscipline & violence

It englobes various deep rooted factors even beyond all the above which are related to the inherent freedom seeking nature of every human being – freedom of expression, freedom of thoughts, freedom from limitations and boundaries of place, time and freedom in action.

Human beings cannot stay limited to boundaries of land so he learns to conquer space, to swim and dive to cross the oceans, so he creates ships. He dispenses mammoth efforts to explore the space because his mind wants to cross all boundaries of the unknown. He cannot stay limited with time so he creates airplanes which are faster, he researches the past and wants to predict the future. He wants to have victory over all – absolute supremacy. In this quest, this freedom-seeking nature of the mind will always revolt if its freedom is curbed, challenged or oppressed.

This is why discipline should become spontaneous behavior of mankind out of right knowledge, understanding of himself, transformation of his brute instincts and emotions, and sharpness of mind to take the right decision and action. Self Education makes provision for all this.

Transformation of baser instincts

Baser instincts are linked to basic needs of food, security, shelter, sex, and moods that are still in their primitive form. Transformation of all these will never occur through a one-off workshop, a talk, a noisy sensitization campaign. All these reflect a piece-meal approach, showcased for publicity sake.

For such knowledge, skills and attitude development, one needs to be exposed to them in a holistic manner from a very tender age, from simple to very subtle and complex concepts. This starts from appreciating the beauty of a flower, running after butterflies till seeing the manifestations of nature wherein organic chemistry exists, the laws of physics function and relativity between man and his environment is realized. Thus, knowledge is dispensed in its compendium and gestalt view, leaving study of the details for specialized studies and expertization. Without such transformation man will grow physically, may even accomplish advanced developments in the world, yet his mental and emotional status will be that of a primary school going child – as though at a freeze point.

Harmony between man and his environment

The ecosystem, the beings in it and the self comprising of matter and energy are so miraculously, complexly and yet systematically networked. Through self education a profound realization about the interdependence of the individual with the entire ecosystem – with its people, plants, animals and nature – becomes a gradual inbuilt learning resulting in positive attitude development towards protection, preservation and enhancement of the environment.

Self health concerns assume the vast dimension of collective health concerns – born out of the understanding about the oneness of the globe and the close relationship pervading all humans.

Such a transformation in the mindset automatically causes a change in the behaviour of the individual towards nature and values like respect and love for earth, air, water, fire and so on spontaneously overflow in his life style. A deep feeling of reverence for all these is born in the individual and this aroma overflowing his personality reaches out to all in his immediate environment.

Understanding oneself & others

The behavioral derailment visible in all societies over the globe - starting from sparks of little tantrums to murders and devastating wars, from bathroom peeping and eve-teasing to rapes, from unhealthy eating habits to fatal diseases, from smoking to alcohol to drugs and HIV/AIDS – are the consequences of constant focus on the external world to satisfy sensory desires at the cost of total oblivion of the world within oneself.

Resistance, suppression and oppression through enforcement of rules and regulations or laws cannot remedy our social problems; they can just keep them in temporary abeyance. Defaulters always have recourse to or create other shortcuts and devices to continue the malpractices. More vicious ways of killing, rapes, robbery, money laundering, treachery are devised in retaliation to laws and punishment; but the criminal disposition of the individual does not change.

Change in behaviour will occur through understanding of one's emotions, thought process, attachment and attractions, greed, sensual pleasures-seeking tendencies and shallowness. This is why

self education assists and empowers one to engage in a process and self-discovery journey through self analysis, voluntary improvement and self transformation. After going through such a change process, cleansing and transformation the chances of relapse or regression become negligible.

However, guidance and support during the process are essential because peer company, frank discussion, expression of fears and worries, fits of anger, therapeutic exercises, frustration, self-mortification, anxiety occur all along in this process. These things happen because the blockages are stirred and provoked to enable them come out of the mind.

Just as a child cannot remember his alphabets if he stops schooling after two years, similarly an individual needs to pursue his learning and practices with perseverance, endurance, consultation, regular self-appraisal so as to reach emotional and mental maturity and flowering. It is only then that he will be able to swim in the open world and will be confident to face life circumstances intelligently. It is only then that one can shine forth as a man or woman of wisdom and profound insight into life and its profound subtle goals. This is what self education is capable of – empowerment for life and beyond.

Value –based relationships

As a result of self knowledge and self understanding, the individual develops understanding of human behavior, which in turn triggers understanding of how to handle people with difficult behaviour patterns and critical situations.

A student will understand himself and learn to over-ride critical moments of temptations, peer-pressure and will take the right decision without compulsion or repression. This would be self-discipline. He will not become a victim of his own emotional outburst or fits of anger. He will understand his friends and teachers in turn.

All these will automatically result in a better learning environment, enhanced peer relationship, sense of support, togetherness and collective progress. Adolescent boys and girls will understand their growth period, and observe their emotional status and will be able to relate to each other more intelligently, with mutual respect and assist each other in critical moments.

Empowerment for conscious and intelligent decisions

Can someone with a lucid mind not take the right decisions? Can someone constantly cleaning his emotional and mental fields be frustrated and get angry? Can someone who understands human behaviour not have compassion and love for another being? Can a person with a loving heart make another person suffer? Can a person who understands the sacredness around the human body rape or murder? These are impossible.

These are the expected outcome of Self Education which opens the door to grooming a new man. This is the new man of the millennium who will create a society where every human will compete with himself to evolve towards learning for being-hood. The previous era has focused only on technological advancement and had achieved tremendous heights; this trend will continue by itself, because it is ingrained in the genes now.

Science and I-Tech world is like a super-speed train on the fast track and cannot be stopped. If it can be stopped, it is only through a crash and this crash will be brought about by the destructive minds. Self education offers the healing process to these minds and has the power to take man even beyond in his progress track.

Developing the taste & opening the door to higher & subtler goal attainment

A mind at peace with itself can see through itself and also onwards. A heart which is tranquil, emotions which have sublimated will definitely start tasting higher and subtler extrasensory joy. A human who is in the process of unhampered evolution will certainly search beyond, because the boundaries of shallowness and limitations will fall by themselves one by one. His tastes and way of life will spark off peace and love. He will live in harmony with nature as one loves and cherishes the companion of life. Everything will be in place and will function according to natural law which applies to one and all without any distinction or barriers of place, people religion or economic status.

In such a state, a tranquil mind in perfect equilibrium will stand in the cross roads to peep in the secrets of nature and its laws which speak everywhere in trees, seeds, plants and flowers and birds.

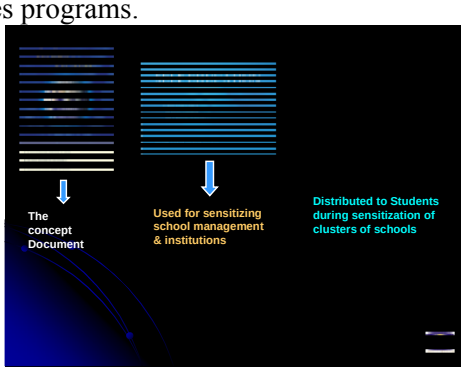
This in depth appreciation of natural gifts in bounty all around will certainly make man celebrate life. This inner joy will open the gateway to bliss that none can defy, decrease nor destroy.

Experimental & Implementation

Our implementation strategy comprises the following :

The proposal is to reach out maximum people in the world to expand the positive zone through the teaching of Self Education as

(i) an integral part of Education curriculum across the board;
(ii) inclusion of Self Education in Teacher Training Programmes;
(iii) through media to the masses so as to attain adults;
(iv) a component of courses offered in Women Centres, management courses, municipalities, professional courses;
(v) courses in rehabilitation centres, prisons, probation homes ; and
(vi) any other.

1. Sensitization programs	2. Actual Field work in Self Education Project
Group, school cluster, media, individual institutional Heads sensitization programs are carried out, for which the PR Team establishes contacts and fixes programs. 	i) Civil Society out-reach programme; ii) School population – Whole school program - On & off programme; iii) Rehabilitation programmes (prison/the disadvantaged group); iv) Inmates programme (Members and Adherents of the centre); v) Out of school youth programme; vi) Adhoc programmes on request; vii) National programmes; and viii) International programmes.

3. Eligibility & conditions for Participation	4. Production and trial out of materials Operating Teams
The conditions & variables of embarking on self Education are the following : 1. Willingness to learn; 2. readiness to embark on a participatory progress together with the expert; 3. Regular attendance; 4. Daily / regular practice of techniques; 5. Democratic choice of appropriate techniques; 6. Accompanied follow-up during difficult moments; 7. Security related to health status during group practices; 8. Seriousness of purpose; 9. Confidentiality of experiences shared; 10. Guided journey of transformation; and 11. Anybody not interested in self transformation is free to leave if he so wishes.	i) Material production team; ii) PR Team; iii) Events Management Team; iv) IT Team; v) Audio Visual Team; vi) Creativity & Graphics and Design Team; and vii) Train the Trainer Team and Follow-up. It is worth noting here that all these teams comprise many professionals, who out of their awe-inspiring transformation towards blissful living, have dedicated every free moment of their lives in assisting me to help others taste the bliss.

5. Production and trial out of materials	6. Media
i) Publication of magazine, books; ii) Publication of leaflets, pamphlets, brochures, posters; iii) Production of power point materials; iv) Production of audio visual materials; and v) Archives and Resources Bank of materials and documentation.	(i) Viewing the positive outcome of these activities, the media including newspapers, radios and televisions are regularly and widely publicizing our activities locally; (ii) a very meager effort at international level also has been attained; (iii) The local knowledge channel has been supportive in the sensitization programmes; and (iv) National activities through press coverage, direct TV transmission, forums and book launching etc attained.
7. Literature	**8. Books Publications**
In order to support this massive effort - books, articles in papers, bi-annual magazines are continuously written and disseminated with wide readership. Brochures, pamphlets, leaflets, posters relevant to the topics on the programme are produced and disseminated on specific occasions.	 
8. Audio Visual Materials	**9. Dissemination and communication**
Production of video clips, short documentary VCDs/ DVDs , power point presentations, audio tapes, video tapes to support the implementation of Self Education project forms an integral part of related activities. The production team continues to constantly update its know-how so as to keep up with new discoveries and innovations in technology.	• All modes of communication have been explored for fast networking and linking up with participants locally and internationally. • Web sites , e-newsletter to 31 countries • Regular, teleconferencing with branches in London and Bahrain, audio text, emails, telephones and occasional chats are in force. • The media is our weekly friend.

10. Residential Workshops for Youths	11. Meditation & Rebirth Therapy
Two approaches are adopted in this area and these have proved to be very efficient in view of informal situational opportunities, open and free participation and voicing out of fears, anxieties, etc. Learning of a different nature is offered, encouraging participants to embark on self introspection for understanding one's own emotions, feelings, behavioral patterns, mental process etc. *Know Thyself* is the motto! (i) School camps where expertise of resource person is solicited and voluntary youth camps are organized where the public of specific age groups are invited. (ii) Participation in Workshops organized by other institutions.	Viewing the urgency of assisting as many people as possible and as quickly as possible, to enable them obtain relief from their stress, I have devised and initiated this therapy which is being practiced by thousands of people (i) who are adherents or members of the Centre; (ii) having followed Mass Meditation & Rebirth Therapy of April 2008 (worth noting more than five thousand people had gathered despite heavy rains in open air); and (iii) practiced through direct transmission of national even broadcast on TV. This reflects the urgency felt by masses to liberate themselves of stress, mental tiredness to face life, thirst for well-being.

The Solemn Invitation to you all!

Let us all join hands – for together we have billion hands.

Let us together pool our resources – for together we have the resources of the entire world.

Let us together deploy all skills and technology – for together the world is reaching the peak in skills, science and technology.

Let us together save humanity and its habitat – for together we have one common mother for is our planet not our Mother, our Mother Earth!

Let us put aside our ego, the mine & thine divisions and become the true children of our collective Mother and heal her wounds that we have inflicted upon her since decades by making her children become crippled, plundering her beauty and raping her entrails!

CONCLUSION

Self Education is not only about knowledge,
but rather feeling, growth, love, peace, freedom, inner transformation.
This cannot be contained in any pedagogy…..
Because you cannot educate the mass,
But the individual!!

About the Author

"Of Course, Science is Fun": A course for teachers

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Abstract

As courses for children at The Royal Institute of Technology (KTH) have worked well for a long time there was a suggestion to implement the pedagogy and experiments used to primary schools. The solution was to construct and deliver continuing education to primary school teachers. The new course for teachers became after a pilot test a university course. The advantage to make it a university course was that the teachers got university credits and that the courses were paid by the university system.

The course consists of two parts - one experimental and one pedagogical part. For the pedagogical part external expertise joined the project both at the construction of the course as well as at the delivery.

The course is based on the ideas of Maria Montessori, Jean Piaget (in some parts), Loris Malaguzzi (the Reggio Emilia model) and books about children activities and our experiences from children's Saturday courses at KTH.

The examination consists of two parts one is an evaluation of different teaching methods and pedagogical models. The other is performing in class with invited children and display how to make creative and interesting experiments.

Background

After several years with courses for children where the children were totally absorbed and delighted by what they were doing there was suggestion that the same work method ought to be used in schools. The question was how to transfer the pedagogy and work methods to primary schools. There were, however, some minor problems to overcome. The major one amongst these was to find interested teachers who were supported by their school and were willing to adopt the new concepts. The problem to find engaged teacher was not a problem at all. The problem was to find the combination of engaged teacher and schools that supported a new way of working. Another problem was to find time when the teachers could join the course and to find schools willing to pay for the course and lunches. One way to minimize the time teachers were away from school was to use distance learning. By making the course as a university course schools only had to pay for printed material.

Other problems were to integrate the philosophy and pedagogic in the existing school curriculum and how to finance additional work material for children. The most important in this course was to make teachers aware of new learning methods and how to communicate with children in our way. The role of the teacher already had would be altered from being a master at the teacher's desk to become an assistant, mate and collaborator working close with children. Very few of the participating teachers had this experience.

The establishment of the course

I was asked if there was a possibility to integrate my course for children (weekend courses for children) at KTH into primary schools curriculum. Then I had to collaborate with school authorities in Stockholm County. The responsibility for organizing primary schools in Stockholm County is "The Stockholm County Association of Local Authorities" and hence a collaboration with the person responsible for school development at "The Stockholm County Association of Local Authorities" was initiated. Mrs. Lotta Valentine, a secondary school teacher and rector, had a leave from her school and was temporarily working on school development for the authority. She and I discussed and planned a course for primary school teachers. We also worked together with the courses.

We decided that there should be both a pedagogical and an experimental part in the course. For the pedagogical part we stressed the interaction between how technology influences our daily life, everyday experiences of science at home and in schools, how to transfer "scientific thinking" to children, critical judgement of teaching methods etc. In order to facilitate for the teachers to join the

course and at the same time continue their ordinary work parts of the course was on Internet with a home page (ftp) and use of e-mail.

Schedule - syllabus

The course has two days for introduction. During these days the participating teachers are divided into two work groups and information about the project tasks for the groups are given. One of the groups will listen to a lecture about children' learning and preparation of work on-line (distance education). The other group will work on suitable experiments to perform in class or for the children to do. Instruction material on how to prepare and run experiments for children is used. I have produced this material and put it in a handbook for my assistants in my weekend course for children and it is a part of the study material in the course.

I give a lecture on how to work on-line for this course. The teachers are informed that they will get experiences from "sit in on a class as a student teacher". The teachers then observe how the collaboration between children and assistant/supervisor (university student) and see how they work together and exchange ideas. The teachers will give comments on how the work with children goes on. The teachers upload their comments to the home page. The distance education will also be used for discussions about the project task should be done and how the outcomes of this course should be integrated in their ordinary teaching. Teachers also use the homepage for their comments on the study material.

The "sit in on a class as a student teacher" is compulsory and the teachers are the only visitors allowed to be in the laboratory room when students and children are working together. The observation of the collaboration is not only to be done but to also to be reported to the home page and will be one part of the assessment of the course. At the same time the teacher can collect ideas for their own project task. The motto for visiting teachers is: See without being seen. Teachers are allowed to discuss the working methods with assistants when the children have gone home.

The course also consists of some more meetings days for learning of practical experiments and discussions about pedagogical matters and work on the project task. On these days there are also discussions in small groups about the way to work with children and pedagogical matters. We also introduce discussion in the form of seminars. These days are also used for preparation of the final assessment. A lecture on how to write a report is also included in the course

The assessment

The course has a final assessment that comprises three parts. All assessment parts are performed in front of other participating teachers and course leaders. The teachers are divided into two groups where the task is to work with a group of children we have invited from a close by primary school. The same children will participate as pupils for all teachers. The teachers have prepared a task they have chosen themselves and run the performance for the children. We responsible for the course and teachers who are not working with the children at this stage will be an observer group. An examination report will be done on how well the sessions for the teachers worked. We will also give suggestion on how to enhance the performance. When all work with children is over we sit together and listen to the report of project tasks. All teachers have a copy of their written material that they will pass on to all other teachers. The tasks are introduced and commented by writers and then discussed in front of the group. An evaluation of the course will also be handed in by all partiticipating. A passed course will give 7,5 ECTS credits at level A and with grading passed or not passed. (Course code SH001V, old code 5A4010). All teachers in the course must have a university degree for teacher before they are accepted as "students" in the course.

Literature

An evaluation of each book is a part of the assessment.

The question to be answered are what is the view on the teachers, what is the view on children in the books? What are the learning outcomes if the intentions of the book is followed? What skills will the children achieve? etc.

Elkind, D: Barn och unga i Piagets psykologi (Children and Youths in Piaget's psychology). Natur & Kultur, Stockholm 1985.
Hanson, L: Montessori och Barns arbete (Montessori and Children's Work). Liber Utbildning, Stockholm 1993.
Kennedy, Birgitta: Glasfåglar i molnen (Glass birds in the clouds). Stockholm, HLS Förlag 1999
Skjöld Wennerström, Kristina & Bröderman Smeds, Mari: Montessoripedagogik i förskolan och skolan (Montessori pedagogic in Nursery and primary School). Natur & Kultur Borås 1999.
Wallin, K: Flygande mattor och forskande barn (Flying carpets and investigating Children). HLS Förlag Stockholm 1993.
Wallin, K: Reggio Emilia och de hundra språken (Reggio Emilia and the hundred Languages). Liber Utbildning, Stockholm 1996.

Additional study material

Handbook for courses for children and youths, includes more than 120 experiments, how to put questions, explain what happens, how to work with children etc. Christer Johannesson.

Summary

The course has been much appreciated and the teachers have added a new concept to their teaching. Why there have only been four courses so far is due to lack of teachers. However, if the courses will be on Saturdays in parallel to the weekend courses for children it would work fine. This suggestion has come from some teachers who want to join the course. Most likely there are more underlying factors as those of economical art.

About the Author

Eric Christer Johannesson has got his Ph.D. in Physics in 1984. He is a Senior Lecturer and the Director of Basic Science Education at the Department of Physics, Royal Institute of Technology, since 2002. In his different activities, there have been more than 20 000 participating young people during the last 30 years. More than 100 schools have been visiting his laboratories, most of them several times. Other activities have been directed to children, girls, young women and young women. He has been granted more than €2.5 million to cover the expenses of his scientific initiatives.

Using Hypertext and Hypermedia in Teaching Art

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Abstract

Educational process used to be a one-way of group communication; a teacher deliberately sends an informative message and students receive it. Students' feedback, which is supposed to help the teachers adjust their coming lectures is neither well studied nor sincerely considered. Despite of knowing that students are neither receivers nor empty pots for teachers to pour information in, this is the way education is in most Middle Eastern institutions today. The essence of teaching process has to be conditionally structured to go from one piece of information to another. Students are active constructors of knowledge; teachers must be continuous learners.

Most art and design instructors in the Middle East depend on 35mm slide-show and individual digital images. Doing comparisons and contrast, formal analysis and juggling between different examples are not easy within technological limitations of having one projector and no internet connection in classroom. There is an urgent need to alter traditional methods of teaching visual art and integrate new advanced computer skills such as pictorial database to assist teachers.

In this paper I designed a structured-model lesson that fits in History of Art & Architecture course that is taught in every school of art. The lesson introduces one of the Dutch Baroque Artists, Vermeer.

Introduction

Creating educational atmosphere is a collective task: designing attractive classroom, planning instructional lesson, motivating students' interest in subject taught, helping them interact in class discussion, listening to their feedback and finally being able to evaluate the course teaching/learning process. To be an effective instructor, teaching skills are to be developed and polished. Each lesson has to be well structured and gradually go from one portion of information to another.

Most art and design instructors in the Middle East work in technological limitations with no access to internet in classroom. There is an urgent need to alter traditional methods of teaching visual art and integrate new advanced computer skills such as pictorial database to assist teachers. Nicholson talks about the effectiveness of Microsoft PowerPoint in class presentation (2002). From his point of view, the use of presentation software can both encourage and activate learning environment to increase the effectiveness of classroom lectures and lends greater clarity to lectures, making them easier to follow.[ii]

According to the researcher's personal experience of teaching visual art to young university students, using Adobe Photoshop to create a visual presentation with hyperlinked text and images is more attractive.[iii] It is interesting to project a window that looks like an internet page with many links and back and forward arrows on the top rather than a traditional slide show done by PowerPoint which looks formal and 'very educational' as most students say. At the same time, it doesn't require server space or special connections because the document is saved in the instructor's computer. "The linear software presentation tools, such as Microsoft PowerPoint, are fundamentally limiting" (Good and Bederson, nd.).[iv] Shapiro and Niedrhauser suggest four defining features that distinguish hypertext and hypermedia as unique approaches: "they are non-linear; they provide the user flexibility of information access; and they provide a higher degree of learner control than traditional media sources" (2003).[v]

Hypertext / Hypermedia

Hypertext refers to any digital document that stems off to many other documents and offers user to read, create or edit links (Ridgway 1998).[vi] This term has been used for few decades to explain the expansion of traditional flat form (Conklin, p. 20).[vii] The first attempt to express hypertext was in 1945 when Vannevar Bush described how the human mind works by associating pieces of information and

applied his new concept to a machine called *Memex*. His application allowed the user to connect two separate pieces of information together. The second attempt was in 1963 by Douglas Engelbart whose work on computer system was the beginning of interaction and creating links between elements and documents. Theodore Nelson is a third pioneer worked on *Xanadu*, a system that only allowed storing documents in their original format. By using links between modifications and original documents, hypertext was created. Similarly, hypermedia is an extension to hypertext, except in linking text to images, audio and video files. "In the early 1980's, second generation system began to emerge, which used workstations with more advanced user interfaces and graphics" (Halasz, p.838).[viii] Almost at the same year, Tim Berners-Lee proposed HTML. After one year he and Robert Cailliau submitted proposals for internet-based hypertext system.[ix]

By means of hypertext and hypermedia teaching process is easier, especially when technological facilities in local institutes are poor. Although creating a class presentation using HTML is all done in one notepad file, it takes more time to prepare. Hyper-linking images and text within Word Document or else is doable, but the instructor has to keep in mind that it can cause several networks problems. When you move a document from one computer to another without its links, the result is dangling links that leads to nowhere. However the researcher will use hyperlink through Adobe Photoshop to design an interesting interface and you may publish your presentation on the web.

Purpose of Research

Most instructors of fine arts and visual communication in the Middle East depend on projecting individual digital images. It is not easy to present definitions, ideas and different examples in one window within technological limitations of having one projector and no internet connection in classroom. In some classes, the screen ends with having tens of open windows, what confuses both instructors and students. There is an urgent need to alter traditional methods of teaching and integrate new advanced computer skills such as hyperlinks to assist teachers in presenting all needed examples through one window. This will ease the teacher's task in classroom and help students concentrate more on the content of what is taught.

Objectives of Research

The paper tends to construct a model lesson by using both hypertext and hypermedia to help instructors of fine arts in most universities of Jordan to enhance the students' understanding and comprehension. Students' learning enhancement is anticipated; the model lesson is more explicit and purposeful than using the traditional approach of one speaker reciting information and puzzling between multiple projected images to many idle listeners. Using both hypertext and hypermedia in teaching art history is more effective and can eliminate such problem.

Educational technologies engage and motivate students in class discussion and interaction, which are mostly considered positive indications of comprehension and understanding. Technological advance enhances educational process, establishes a focused learning environment, nurtures the development of visual vocabulary and supports student's intellectual progression in art. Teaching visual art within its cultural context becomes more accessible in a digital environment, which affords more spaces to construct appropriate settings.

The aim of the lesson is not to amuse students, but to present clear information in an interesting way that opens students' curiosity to ask questions, participate and follow up reading and researching after class activity. There are more goals to be achieved such as to provide more visual materials fast and easy, to help develop more understanding of Vermeer's style and, to explore with students new ideas and various meanings and creative concepts, and to assist students learn how to take aesthetic decisions. The model lesson considers the cognitive load theory as one way of improving traditional instructions. Its instructional module is the instruction itself. According to Feinberg and Murphy,

"information that is adjunct to the instruction must be designed to minimize cognitive load and enhance working memory" (2000).[x] To effectively enhance the structured lesson that is based on hypertext and hypermedia, the graphical user interface and multimedia formats is going to be simple for better concentration on visual examples.

Limitations

- This paper designs a structured lesson that offers multi-layered information for teaching Vermeer's Art as a Baroque artist, a subject fits in History of Art & Architecture II course.
- Adobe Photoshop CS3 is used for hypertext and hypermedia.
- The model lesson discusses the characteristics of Vermeer's style in one theme he painted in six of his artworks that is love letters.
- The lesson covers one session of ninety minutes.
- The website www.essentialvermeer.com created by Jonathan Janson (2001-2008) is used for its excellent images and wealth of information.

The Lesson

Baroque Dutch Life and Art:

Seventeenth-Century Netherlands saw very active sea trade. Men go away for months, while women sit home and write letters to their beloveds. Painting letters are mostly associated with love (Harden 1996);[xi] absent husbands and lovers were missed by their literate women. "Dutch artists were the first to make the private letter a central focus in genre scenes, or paintings of everyday life" (Torres 2004).[xii] Literacy was an important skill for the citizens of a maritime nation. "The ability to read and write kept the seafaring traveler far from home in touch with those who remained behind" (Torres 2004).[xiii] As Sutton states "letter writing was a sign of civility and sociability"(2004).[xiv] Letters had long been used for commercial, military or state affairs; in seventeenth-century Dutch embraced letter writing as a highly personal and intimate form of communication. In 1630, Dirck Hals was probably the first to paint women reading letters.

Vermeer's Paintings of Love Letters:

1- Girl Reading a Letter at an Open Window, 1657.
2- Woman in Blue Reading a Letter, 1662.
3- Lady Writing, 1665.
4- Mistress and Maid, 1666.
5- The Love Letter, 1667.
6- Lady Writing a Letter with her Maid, 1670.

The paintings stand out by simplicity. He always deals with young women who either stand or sit in the center of the composition. His paintings are full of local furniture, Oriental rug, colorful drapery, a map or painting hung on the wall, an open window to the left and many other details. The viewer is confronted with one of Vermeer's sensibility and originality. It is the stillness that stands out, the inner absorption, the remoteness from the outer world.

Vermeer (1632-1675) is a Dutch Baroque artist devoted himself to paint local interiors, domestic lives and females doing simple tasks. His perception of women is always sympathetic and considerate. He painted about forty female figures in his thirty six paintings. He and his painted figures seem similar in many aspects: their precise work, extended time, inadequate space, countless details and silent existence. He stops the time to freeze different moments: happy or tedious. His images are enfolded in expressive quality; unexciting moments are transformed into eternal truth, absolute

devotion and timelessness. John Montias believes that Vermeer's figures engage a timeless presence and convey "an extraordinary dignity and moral gravity comparable to that seen in history painting" (1989).

Expressive Paintings

Although Vermeer's painted figures look static and unexpressive, he created very expressive paintings without putting in any facial gestures. His figures are enveloped in unusual expressive qualities that come from what they do, how the do it and where. He arranges his static figures in a dramatic setting, utilizing lights, colors, interior elements and diminutive details to add expression and dynamicity. He modifies the real world in order to realize the maximum perfection and the most powerful and indirect expression. In Vermeer's art, expression rather comes from all charming details, ultimate truth and technical qualities. For example, he paints in small fatty dabs to model the forms, and obtains the desired effects by the use of glittering impasto, abstraction and glazing to highlight his objects. He also paints very accurate perspective and geometrical lines that support the use of camera *obscura.*

The artist adds more expression to his painting by using deep and sophisticated colors that are described as "dust of crushed pearls" (Wheelock, 1995). He uses lazuli lapis and natural ultramarine,[xv] yellow and grayish white. He also employed the psychological effect of colors to add more expressiveness; the yellow color in the jacket[xvi] is both dynamic and strong that reinforces the perception of intense effort. One clearly observes the unique treatment of light; the artist portrays reflection of real light neither idealized nor decorative.

The influence of his native culture is clearly exhibited in his paintings; Delft tile, pottery, stained glass, laced dresses, textile, wooden box, coal foot-warmer, all add seventeenth-century-Dutch interior intimate warmth.

Discussion

Vermeer's choice of love letters reflected the crucial role of letters in Seventeenth-Century Netherlands. He succeeded in transforming static and expressionless figures into dynamic and expressive paintings. Understanding the psychological effect of colors added different layers of meaning to his paintings. Passionately, he was able to depict every effect of sunlight as it falls upon his objects. These examples drew social and political statements on the status of literate Dutch females. His oeuvres gave a lot of information to understand the Baroque Dutch art. Although his painted figures may look impassive, they reflected unusual grace.

Conclusion

The use of hypertext and hypermedia to present Vermeer's Art made the class more interesting than traditional lecture. Applying such tools helped the instructor to use one window and move freely between different forms. In the structured lesson with neither internet in classroom nor more than one projector, projecting both text and visual images were a doable task. The development of technology stimulates students' imagination by providing visual materials and develops their understanding of more influencing graphical forms. Although the potential to use hypermedia and hypertext in education is significant, it is fairly young; academic research in this field is still developing. Both benefits and potential applications of hypertext and hypermedia in education need more studies.

This research suggests both the instructor and the learner must have corresponding roles in learning process. The way Vermeer was presented can be planned for other artists and different art styles.

Notes

[1] Dawn T. Nicholson, "Lecture Delivery Using MS PowerPoint: Staff and Student Perspectives at MMU," Learning and Teaching in Action, Summer 2002. Retrieved from internet March 28, 2008. http://www.celt.mmu.ac.uk/ltia/issue2/nicholson.shtml

[2] An HTML file is a text file containing small markup tags. The markup tags tell the Web browser how to display the page. An HTML file must have an htm or html file extension. An HTML file can be created using a simple text editor. See: Refsnes Data, (1999-2008). Retrieved from the internet April 20, 2008. http://www.w3schools.com/html/html_intro.asp

[3] Lance Good; Ben Bederson. "CounterPoint: Creating Jazzy Interactive Presentation," Retrieved from internet March 29, 2008. http://hcil.cs.umd.edu/trs/2001-03/2001-03.html

[4] A. Shapiro, A. & D. Niederhauser, "How studies of hypertext-assisted learning inform educational system design," *Proceedings of the 25th annual meeting of the Cognitive Science Society* (Boston, MA: Cognitive Science Society, 2003, p. 57).

[5] Neil Ridgway, "Hypertext and Hypermedia," 1998. Retrieved from the internet March 28, 2007. http://www.mmrg.ecs.soton.ac.uk/publications/archive/ridgway1998/html/node18.html

[6] J. Conklin, "Hypertext: An Introduction and Survey," *IEEE Computer* (Vol. 1 9, September 1987, pp. 17-40).

[7] F. G. Halasz, "Reflections on NoteCards: Seven issues for the next generation of Hypermedia Systems," *Communications of the ACM*, vol. 31, pp. 836-852, July 1988.

[8] Tim Berners-Lee, "Information Management: A Proposal." CERN (March 1989, May 1990).

[9] S. Feinberg; M. Murphy, "Applying cognitive load theory to the design of Web-based-instruction," Proceedings of 2000 Joint IEEE International and 18th Annual Conference on Computer Documentation (IPCC/SIGDOC 2000, pp. 353-360).

[10] Mark Harden, "Vermeer in Washington," *Glyphs* (2001-2008). Retrieved from the internet March 28, 2008. *http://www.glyphs.com/art/vermeer/*

[11] Louis Torres, "Messages from the Heart," *Aristos* (Catalogue of Bruce Museum of Arts and Science, Greenwich, Connecticut, Mach-May 2004). Retrieved from the internet April 8, 2008. http://www.aristos.org/

[12] Louis Torres, "Love Letters: Dutch Genre Paintings in The Age of Vermeer," (May 2, 2004). Retrieved from the internet April 11, 2008. http://www.aris-04/loveltrscat.htm.

[13] Peter C. Sutton, "Love Letters," Catalogue of Bruce Museum (March-May 2004).

[14] His paints were provided by his wealthy patron Ruijven (Montias, 1991, p.55).

[15] The jacket is repeated twice to prove that the model was a family member.

About the Author

Inas Alkholy got her Ph.D. in Comparative Arts in 1995 from Ohio State University. Her thesis is entitled: "A Study of the Poetic Transformation of the Visual Image of Paradise in the Alhambra Palace, in Theophile Gautier's Prose and Poetry of Andalusia". She did her MA studies about graphic design at Helwan University in Cairo-Egypt. She is strongly involved in projects and research studies at both the national and international levels. In addition, she has been in different countries and participated in a large number of conferences. Dr. Inas published a number of articles in refereed journals.

(B.20)

Elnour Hamad, Towards Better Art Programs in Muslim Communities: This presentation explores the ways according to which art education in developing countries, especially Muslim nations of the Middle East, has to change its vision, content, and methods to foster creativity, critical thinking, and tolerance of other cultures. The presentation also touches on the state of apprehension among some Muslims towards the arts and how some interpretations of Islam hinder creativity and hold students back from utilizing their potential with regard to creativity to the fullest. The presentation also touches on the negative impact of gender roles in Muslim communities on creativity. Issues surrounding lagging behind with regard to content taught at the university level, as well as in schools compared to the rest of the world will be touched upon. The presentation is partially situated on Elliot Eisner's work entitled Two Visions of Education combined with Howard Gardner's Multiple Intelligence Theory and Mahmoud Taha's interpretation of I slam and the arts as a conceptual framework that can help in informing newer directions in art education programs in Muslim communities.

About the Author

Education:

- **Doctorate of Education,** University of Illinois at Urbana-Champaign. October, 2001.
- **MA of Arts, in Art Education**, Miami University, Oxford, Ohio, August 1997.
- **Diploma of Fine Art**, College of Fine and Applied Art- Sudan, 1974.

Professional Experience:

2006 – to date	Assistant Professor of Art Education, The College of Education, Qatar University, Doha, Qatar
2005 - 2006	Assistant Professor of Art Education, Department of Education, Mansfield University, PA., USA
2003 - 2005	Assistant Professor of Art Education, College of Education, Eastern Washington University, WA. USA
2002 - 1999	Host Nation Liaison, Cultural advisor, and Linguist to the commander of US Air Force in Kuwait and Saudi Arabia.
1997- 1999	Doctorate Student and teaching assistant, University of Illinois, USA.

General Activities:

Held and participated art shows in many countries; published illustrator and cartoonist; published in a number of Sudanese and pan Arab newspapers including *Al-doha* Magazine; and commissioned to do various artworks.

Publications:

- Review and commentary on Neil Postman's book, "*The end of Education*", *Al-hayat* Arabic newspaper, London 11-23- 1996.
- A paper on *Art Education in Postcolonial Sudan*. Published in the book of proceedings of the 13th Symposium on African Research, Ohio University Feb. 1998.
- An article on religious tolerance at *Al-doha Magazine*, Doha, Qatar
- Review of *The Arts and the Creation of Mind*, by Elliot Eisner at Al-watan Newspaper, Qatar, 2007.
- An article on Sir Henry Moore Art show at VCUQ in Doha Qatar, Al-watan Newspaper.

- An interview with the American illustrator, Chris Payne, *Al-hayat* Arabic newspaper, London 4/22/1996.
- An article in Arabic on *Islam and Human Rights* accepted for publishing in a book along with other articles written by Arab writers edited by, professor, Salma K. Jayyusi.
- Several articles published in Sudanese newspapers, 1970s and1980s.
- Several articles in pan-Arab newspapers 1990s.
- Active contributor to a number of WWW forums.

Media Interviews:

- Qatar TV interview to comment on an autistic student art show, 2007.
- Sudan TV interview on learning through the arts, 2007.
- The Spokesman Review newspaper of Inland Washington on Darfur crises in Sudan
- *The Press citizen* of Iowa City on Sudanese refugees. November, 24th, 2000.
- *Al-Ray Al-akher* Arabic newspaper of Texas on Sudan's Day of Independence, 1996.
- Interview by the Omani TV. on the art show I held in Sultanate of Oman, Muscat, 1992 .
- Sudan TV. two interviews included live demonstration on pastel painting, 1987.
- *Rose Al-Yousif* weekly Egyptian magazine, a group interview with During the visit of the students of the College of Fine and Applied Art to Cairo-Egypt, June 1973.

Conferences:

- Paper Accepted for presentation at ICIE conference in Paris July 2008.
- Participated in a panel at the United States Institute of Peace on January 20th 2006
- Two presentations at the National art Education Association Annual conference in Chicago, March 2006.
- The National Art Education Association Conference in Boston, March, 2005
- African Studies Association's annual meeting, Chicago, October 1998.
- The 13th African Research symposium, Ohio University, Athens, Feb.,1998.
- Ibn Khuldon Society's conference on Muslim Radicalism, Washington DC. 1997.
- Seminar on women in the Middle East, Istanbul, Turkey, June 1997.
- Sudanese Studies Association Annual Conference, Villanova University,
- Pennsylvania, April 1995.
- Participated in a panel on Art Education in post-colonial Africa at The Institute of the African Child- Ohio University 16-19 June 1999.

Awards and Recognition:

- Won a research grant from UREP, Undergraduate Research Educational Program, Qatar, 2008.
- Won the exceptional achievements award in Art Education Department, Qatar University.
- Kappa Delta Pi Award, for excellent academic performance, University of Illinois, 1998.

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(B.21)

Confluences of Mathematics and Psychology: Prototypes, patterns, fractals and structural niches, explaining differentiating aptitudes and dynamics of intelligence and human development

Evgenia T. Meletea; Florian Colceag

Abstract

This paper presents the confluence of two autonomous approaches on a single subject. It is an intercultural approach to knowledge structure, based on prototypes. On the one hand, this paper presents different views based on prototypes and on the other hand presents a systematic approach to dialogue. Types of dialogue are also being investigated by the authors, both as a knowledge structure and also with a focus on defining and developing of student talents. As an example, apart from the case presented in the ICIE PARIS 2008 paper, there will also be an opportunity to approach the dialogue framework in the symposium 3. An example of developing and recording a dialogue between two mathematicians with different cultural backgrounds is presented in this paper. Two different dialogue structures are mainly being used: "*Stochastic Dialogue*" & "*Dynamic Dialogue*" [Meletea 2005]. These will also be further discussed in a forthcoming Paper (E37) and in the Symposium 3. The creation of a prototype, which correlates terms and interprets procedures, called the A7+ Model (An axiomatic approach to human harmonic/balanced development), [Meletea 2003]) is also discussed. This prototype is derived from synthesis/confluence of a) the use (namely the approach) of mathematical terms on one hand and influences from classical Greek literature (mainly that of Pythagoras and Aristotle). Related to the aforementioned A7+ model, is another approach and interpretation on the same subject, presented by mathematician Florian Colceag, who uses the model as a prototype and relates it to other theories of Psychology. Dialogue on this subject commenced during WCGT2007 and through the presentation of this paper, it is hoped to enhance dialogue by systematically recording it. Influenced by dialogue is herein focused in two forms the "*Stochastic Dialogue*" and "*Dynamic Dialogue*".

Introduction

A dialogue on this subject commenced during the conference WCGT2007 and through the presentation of this paper, it is hoped to enhance dialogue by systematically recording it. Influenced by dialogue is herein focused in two forms the "*Stochastic Dialogue*" and "*Dynamic Dialogue*".

1. Comprehensive Mathematics can be search for Harmony

Nature can be observed as a probability deriving from the prevailing empiricist climate in the philosophy of science: experiments performed by external observers trying to refute some hypothesis.

Perception direct to: Creativity, Stochasm, Ethos and Harmony

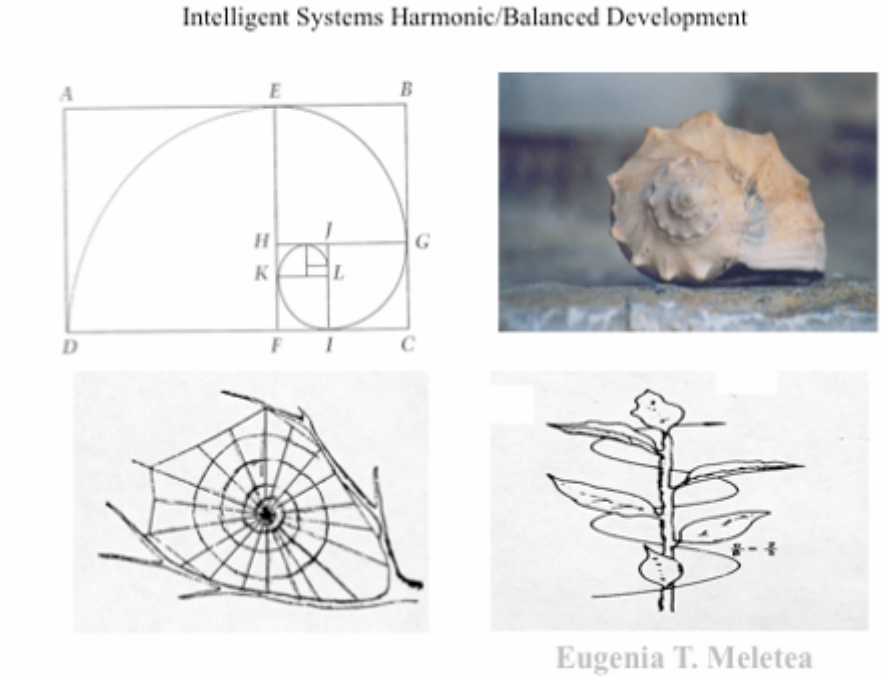

Figure 1: A Mathematical model describes Intelligence Systems Harmonic/Balanced Development

2. Approaching differentiating aptitudes and dynamics in human development

We propose, at least, the next two axes (and the four directions) that mathematicians need to focus on at any time, for any student and in any topic …….., (Meletea, 2003).

Axis 1: Investigating traditional values - Suggesting the future

Axis 2: Student (Inner) – Environment (outer).

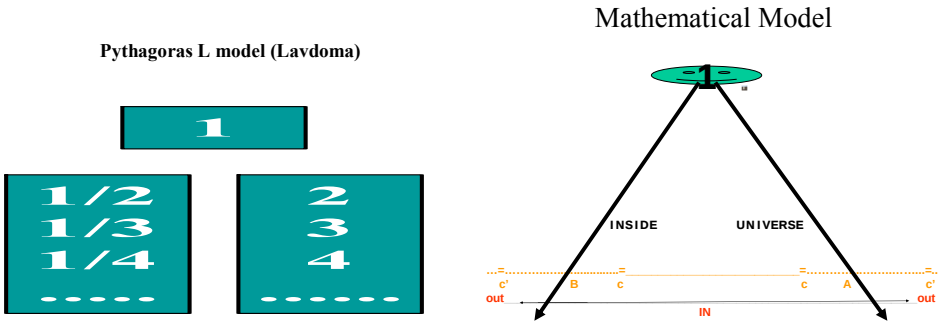

Figure 2: A Mathematical Model based on Pythagoras theories

In this research for harmony "*th*ey *heard numbers"*, Kontaratos (2003) *"They identify quantitatively a qualitative phenomenon, harmony. They identify harmony as meter of quality. The philosophy behind the development of the meaning?? of the concept "number" led the Pythagoreans to very important activities (representative like the concept 'ARXH' (this signifies every beginning of our thoughts and if defines the I as the ARXH, then we have the biggest (1, 2, 3, etc) and smallest numbers (1/2, 1/3, ¼, etc))* .

Lavdoma (Λ) was used to define continuity and all possible Harmonic combinations. In this Model of number development they simulate an internal direction and an external direction.

And this was interpreted in their sophisticated way of thinking as Harmonic going up in a micro world or the way to the deep of the consciousness (or as the sound going up harmonic).

"*Spheres Harmony*" was defined by Pythagoras as the sound of the planets, created by their motion (and as it comes to us from legend of myth, we are able to hear specific sounds).

This model can be compared with today's musical scale.

According to Aristotelian research in his "*Politics"* (A2, 10-13) the main functions of pedagogy are:

INNER: Autonomy,

OUTER Economy (οίκος - νόμος) (οικονομία)

Politics (which Aristotle thought to be the foremost science), urging ..... "to be involved with politics lest the wicked prevail". The management of a household and the division of labour within it, become easier when educated citizens are involved.

In Aristotle's '*Ethical Nicomachea*' Virtue has a double substance, spiritual and ethical. Spiritual mostly appears and grows with teaching experience and time. The ethic develops from them and on them in an experimental way (έθος – εθισμός) and in a small way from "ethos".

In Aristotle's '*Ethical Nicomachea*', Ethic 'ηθική' comes from the word 'έ θ ο ς' and for that reason took this name and only differs a little form the word 'ή θ ο ς'.

Aristotle's '*Ethical Nicomachea*', simulates actions and from them the permanent elements of our character and for that we must for that came and the quality in our actions. Everything has virtue, which *can* be cultivated as to be perfect. Bringing as creative "use to act" "*Παιδεία δημιουργία έξεων'* they can be ethical cultivation.

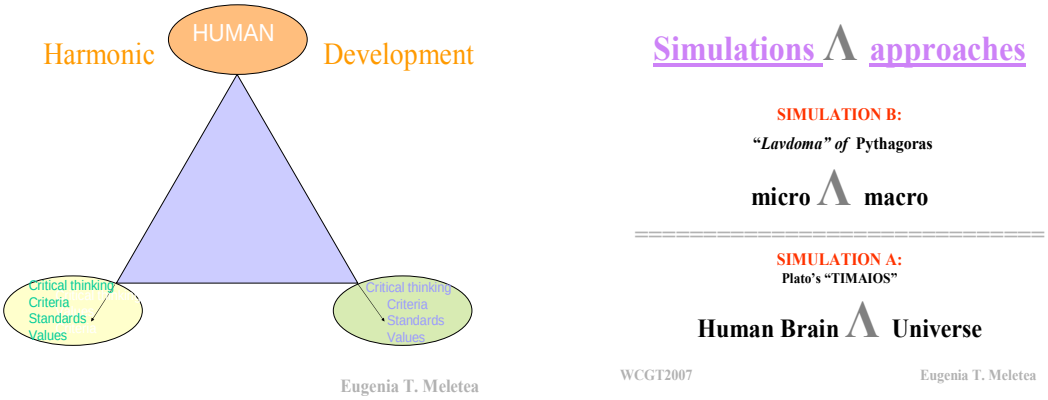

Figure 3: Simulating the directions for human development

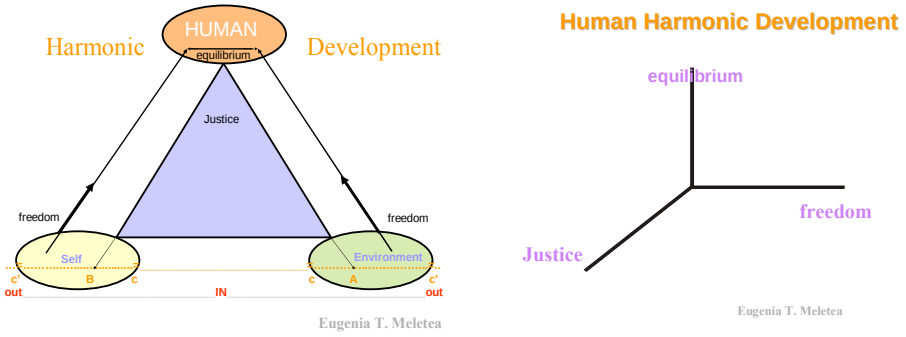

Figure 4: A7+: Modelling an Axiomatic approach for Human Harmonic Development

Meletea (2003), The system (Justice - freedom - equilibrium) works in two directions. Using the semantic term in Greek, *"justice",* means divide,*"freedom", means* past the limit. To achieve harmonic development it is necessary for the two systems (INNER – OUTER) to have balance (*equilibrium*, ίση - ροπή). When these two systems are opposed (ambiguity), this can even lead to their destruction.

Dynamic Dialogues: ex. Sophocles "*Antegoni"*, Antegoni had to choose between two value systems: The main system that she experienced as she grew up (and she chose to follow) and the one that comes from Kreondas (Thebes Tyrannous).

3. Confluences of Mathematics and Psychology

The two ways of approaching the natural phenomena that are a) from general to specific (Deduction – Abduction) and b) from specific to general (Induction – Induction). Applying to our network - from the main point - the exceptional quality of intellect that Gifted Talented Students bring to the Intelligence Systems: (Human: Intelligence – Machine: Artificial Intelligence) and to sub-goals like subject mentoring.

"Humans are choose to know their origin", stated Aristotle, in his *Physics*, (introduction), and that **"***Only then we know, when we know the reasons*".

Knowledge transformation in mathematics (theory and praxis), assisted by other activities (such as photography, poetry, and theatre), and also by existing utilities of the Information and Communication Technologies (ICT), is expected to completely transform the existing educational environment in the future.

Aristotle, in volume eight of his "Politics", and especially in "Ethics Nicomachean", presents his views on Pedagogy. It is the first time in history that there is mention of statutory "common and

individualized", Pedagogy, through which humans become active citizens, embrace virtue and happiness and, through logic, reach perfection.

4. Fractal intelligence development: The "David Star" Model

Many researchers in educational psychology noticed some behaviour patterns that seem to be universal in human terms. Jean Piaget, and Edward De Bono made some observations regarding the repetition of some structural patterns regarding domineering behavior, and group relationships in cooperating environments. Piaget noticed the repetition of a three- position pattern (domineering, dominated, pacifist), De Bono noticed the repetition of a six -position pattern (six thinking hats).

Renzulli also created the three-ring model that characterizes giftedness. Many other models suggest that there are two different kinds of psychological characteristics interfering within a human mental formula, but there are in fact two main generators of characteristics, a natural human set of characteristics, and a socially nurtured set of characteristics.

These observations led to a fractal development in the structural niches model, that can explain both directions of differentiating aptitudes, and the dynamics of intelligence development (see fig 4).

Figure 5: Fractal intelligence model

Fractal intelligence is developed by the interfering of two sets of characteristics, one corresponding to the social characteristics of humans (commitment, intelligence, creativity), and the other one to the natural characteristics of humans (wisdom, balance, optimization). The interference among these characteristics is determined by a certain topology, and will generate other characteristics. For example intelligence and wisdom will generate leadership capacities, and the second set of characteristics will be able to recover the primary characteristics, for example leadership and strategic thinking will generate wisdom. The opposite characteristics will generate dimensions of human intelligence behaviours. For example *wisdom-commitment* will generate the

"**to- do dimension**", *intelligence-balance, the* "**to- be dimension**", *creativity-optimization* the "**to- have dimension**". The second set of opposite characteristics will generate different dimensions: *social skills-success, the* "**to- become dimension**", *leadership-care* the "**to- protect dimension**", and *efficiency-strategic thinking, the* "**to- succeed dimension**"

The main generating model will engender other new characteristics that can be described by smaller David stars models. Those new characteristics will correspond to new structuring dimensions.

For example, *care and success* will not only generate balance, but also self- esteem, creating a new psychic dimension, the "**harmony dimension**".

The main characteristics modelled by the main David Star can be considered as general to the human species. The smaller David Stars can be considered as connected with cultural local models, even smaller David Stars can be connected with family models, or even individual characteristics.

These characteristics are created by the interference between the social-cultural needs expressed in niches of needs, and profiles of personality corresponding to these niches, and the individual personal aptitudes, which can be developed into a symbiotic correspondence with these social niches.

The level of richness of this symbiosis can describe giftedness into a complex socio-cultural, economic, individual context, and can measure success.

The model is non-deterministic, giving a big degree of individual and cultural freedom, but is self- sustainable for each person's logic. There are various degrees of cultural and individual specificities describing both cultural dimensions of thinking, and individual abilities adjusted to various social and economic niches.

This fractal intelligence model allows us the understanding of unity in variability for human differentiation, giftedness, evolution, and adaptation in structuring the individual set of dimensions and values.

We can therefore understand why and how students in a classroom will differentiate their own individual characteristics, and why they have stable roles into the class economy of communication (for example, the leader, the clown, the dumb, etc.). We can also understand why there are two students competing for the same position, each one developing slightly different personal reactions, and skills in the same learning environment. All this is due to the following: the normal tendency for a group of people to structure itself as shown in the David Star model, and to extend the generating model for new characteristics into smaller David Stars in a fractal way. These characteristics explain why a big group of people can be led, why they obey to the same rules or customs, and why there are differences between the David Star dimensions of a nation's leader, and the David Star dimensions of a simple family man. The social development of the intelligence is different from the individual thinking scheme (see figure 2)

One of the main duties of a teacher is to have a good method that provides him with a systematic way to influence the child under development.

From the above model we can deduce two kinds of influencing methods:

(a) Balancing the n^{th} layer by acting on n-1 layer and n+1 layer. For example, an unmotivated child can benefit from an individualized program of education that will value creativity and intuition (see figure2), with direct consequences for motivation. In order to obtain these results it is indicated to work in order to increase both self-tolerance and self-initiation in a child.

(b) Another type of action is possible by acting on the bi-pole. By a bi-pole we define two processes that exist on the same layer and have symmetric **and opposite** functionalities (i.e. emotions and culturally induced patterns). In this case, if we need to project a program that increases the level of emotions of a child, we shall use cultural patterns and focus on self-recognition, self-esteem, self-acceptance, and self-respect.

This teaching strategy is useful in any curriculum area. The intertwining between the social characteristics and the individual mental map that is build under the influence of the social niches can give the possibility for an educator to design individualized programs for every child. These programs may permit to increase the natural gifts of a child in any social context.

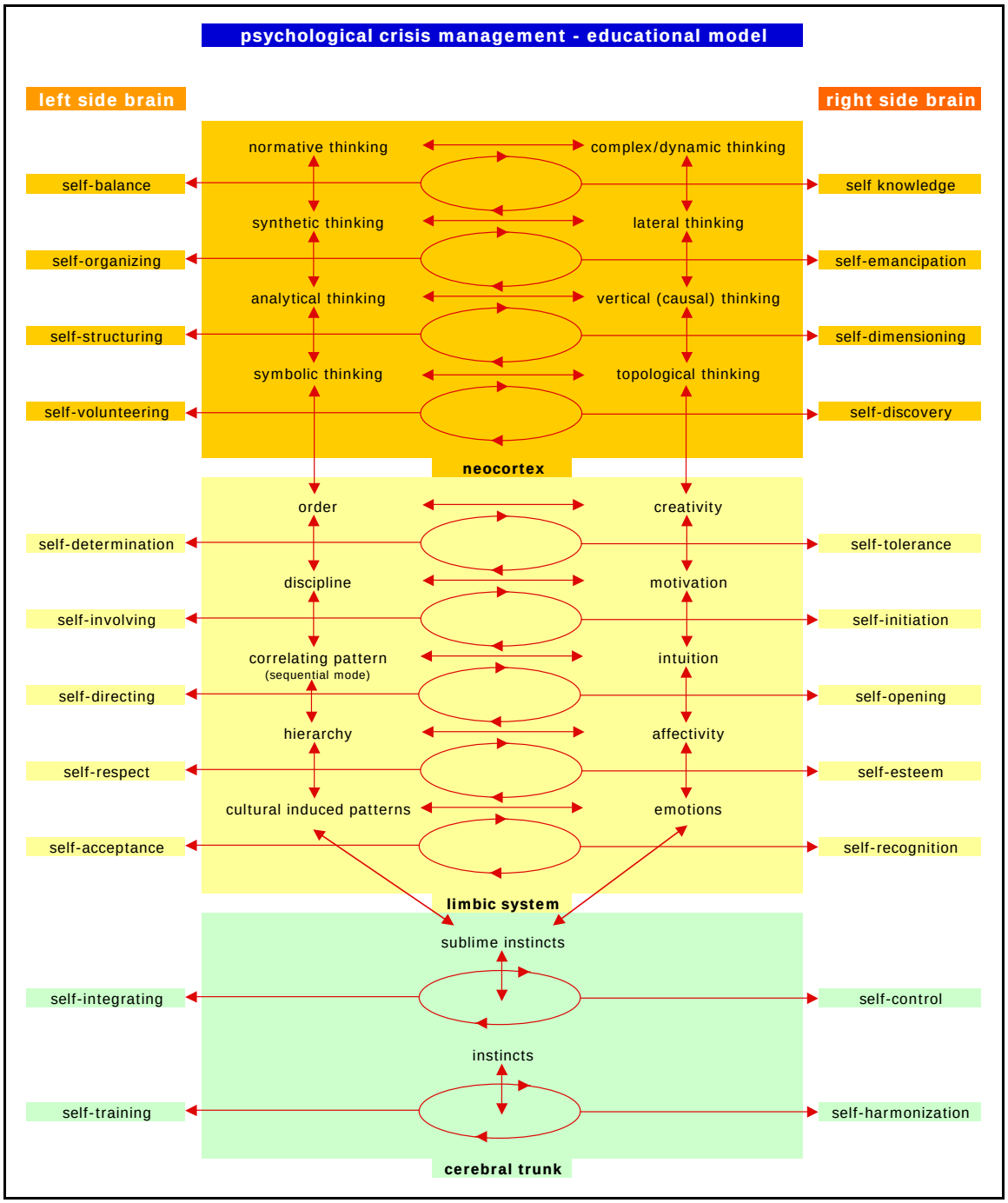

Figure 6: The brain model

Epilogue

Dialoguing: Influenced by dialogue is herein focused in two forms the "*Stochastic Dialogue*" and "*Dynamic Dialogue*".

References

Aristotle "*After the Physics*" (M 4, 1078b and A 6, 978b).

Aristotle, *Ethical Nicomachean* (B1, 1-3 and B6, 10-11).

Aristotle, Physics, Introduction.

Aristotle, *Politics.*

Dabrowsky, K. (1964) Positive Disintegration. Boston: Little Brown & Co. Edi.

Dabrowsky, K. (1967) Personality- Shaping through Positive Disintegration. Boston: Little Brown & Co. Edi.

De Bono, E. (1985) Six Thinking Hats, Boston, Little Brown & Co.

Guilford, J. P.(1967). The Nature of Human Intelligence. N.Y.: McGraw-Hill. Jacobson, W 1979, Population Education, Teachers College Press, New York.

Kontaratos, A. (2003), Αναζητώντας νόημα ζωής, σελ. 447-550, Αθήνα, Γκοβότσης.

McCDonald, K. B. (1998) Evolution, Culture and Five-Factor Model. Journal of Psychology, 29 p. 119-149.

Meletea, E. T. (2003)b *APLOUN - Development of pedagogical reasoning to support intellectual and talented children. Axiomatic and dialogic approach*, APLOYN39 One day Conference on the subject: «Intellectual and Talented Students: Pedagogical Approach» ("Ευφυείς και Ταλαντούχοι Μαθητές: Παιδαγωγική Προσέγγιση"), that took place on 9th February 2003, in the University of Athens, under the aegis of Ministry of Education, with sponsors the Greek Centre of Educational Research (Ministry of Education), the General Secretariat of New Generation (Ministry of Education) and the Department of Congresses of Ministry of Culture.

Meletea, E. T. (2005) "*Stochastic dialogue for the elicitation and the development of students talents"*, Book view: The Φ, periodic publication dialogue and communication in Mathematics, Athens.

Meletea, E. T. (2007) "*Multicultural Interactive Educational Networks Creating Common Languages and Global Activities for Talented Youths"*,

Milgram, R. & Dunn R. (1993) Teaching and Counselling Gifted and Talented Adolescents. An International Learning Style Perspective. Praeger.

Milgram, R. & Goldring, E. B. (1991) Special Education Options for Gifted and Talented Learners. In Milgram (Ed.), Counselling gifted and talented children: A guide for teachers, councelors, and parents, 23-26. Norwoon, NJ: Ablex.

Myers, I. & Mc Caulley, M (1985) Manual for the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.

Myers, I. B. (1962) The Myers- Briggs Type Indicator, Palo Alto, CA.: Consulting Psychologists Press.

National Academy for Gifted and Talented Youths (NAGTY), The World Council for Gifted and Talented Children's (WCGTC), "17th Biennial World Conference, The University of Warwick, England, "World of Giftedness, from Local to Global", 5-10 August 2007, www.worldgifted2007.com.

Piaget, J. (1958) Growth of Logical Thinking, London: Routledge & Kegan Paul.

Power, E.1995. Educational Philosophy, New York, Garland Publishing Inc.

Renzulli, J.S. (1988) The Three-Ring Conception of Giftedness. Baum, S.M., Reis, S. M & Maxfield, L.R. (Eds) Nurturing the Gifts and Talents of Primary Grade Students. Mansfield Center, C.T.: Creative Learning Press.

Sternberg, R. J. (1990) Methaphors of Mind: Conception of the nature of intelligence. Cambridge, University Press.

More able students in the Portuguese school: The MAIS enrichment program

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Abstract

The aim of this study is to present the MAIS (Motivation, Aptitude, Innovation and Socialization) program that has been developed based on the Enrichment Triad Model (Renzulli, 1977), mainly the type II enrichment. The program was implemented along eleven weekly sessions concerning the creative problem solving which are briefly described. The sample has the 68 more able students at a Portuguese public school attending 5th and 6th grades. The evaluation program is carried out using a quasi-experimental design considering the students' results on creativity and academic achievements. For the experimental group, the students' self-evaluations were also considered. Empirical results show a positive impact of the program on Verbal Elaboration and Mathematics. The students' reports concerning the program sessions have also been very positive. Implications of the findings on further studies about enrichment programs and the MAIS enrichment program are discussed.

Introduction

Gifted people have always attracted attention for their exceptional work in the human history (Colangelo & Davis, 1997; Cropley, 1999; Tannenbaum, 2000). Nurturing the talents of the gifted students is a big challenge to our inclusive shools systems because we want schools to educate all students in a fair and equitable way. When we consider the gifted/talented students, we are caught between two educational goals: excellence and equity, because society has ambivalent feelings about these students, resulting in a strong love-hate relationship (Gallagher & Gallagher, 1994).

Europe is a large continent whose countries have a different cultural, social and political background. So, different countries adopted different provisions for the gifted students (Persson, Joswig, & Balogh, 2000). The Salamanca Statement (1994) had an important contribution to this issue because it stands for the inclusion of the gifted students, and alerts for the educational attention that must be given to them. Also, the Counsil of Europe Recommendation 1248 (1994) reminds us a special look to the gifted education recommending each nation to promote educational policies that consider the legislation needs, the investigation, the teachers' professional development, and analyse the provision that is provided in the school system by selecting no segregation and stigamtization methods (Alonso et al., 2003; Pérez & Losada, 2006). Actually, due to recent changes in the Portuguese educative legislation, there is no legal support for gifted students for early entrance in school but there is for grade skipping during Basic School and for enrichment programs for students with exceptional results.

Educational provision

All around the world several identification and intervention proceedings had been done with gifted/talented students (Gallagher & Gallagher, 1994). The three main forms of gifted education are known as acceleration, grouping, and enrichment (Acereda & Sastre, 1998; Freeman & Guenther, 2000; Lombardo, 1997). Acceleration means that the students bennefict grade skipping but there are other kinds of acceleration such as early entrance to school, subject acceleration at a more advanced grade level, or telescoping curriculum to accomplish, for instance, three years of instruction in two (Robinson, Shore, & Enersen, 2007). This is one of the most recommended practices for gifted students in the literature (Colangelo, Assouline, & Gross, 2004). Councerning ability grouping, students may be flexibly grouped within the classroom and across the school day according to their abilities or interests. Students are regularly removed from their normal classroom setting for work in a resource room with a specialized teacher, participating in a mini-course, or interacting with a special guest. But due to the segregation from peers that these options imply, the ability grouping is not compatible with an educational policy of integration and inclusion (Acereda & Sastre, 1998; Lombardo, 1997). The enrichment consists in individualized teaching adapted to the gifted/talented needs, allowing them to work within the class (Genovard & Castelló, 1990; Lombardo, 1997). The enrichment programs can be developed in the curricular activities or outside the class during a few hours, or during extracurricular time with tutoring.

The enrichment investigation is sometimes difficult to analyze due to the large meaning of the term, and the enrichment overlapping with other forms of intervention. Although this difficulty, there are some studies that support the educative option for enrichment (Maker & Nielson, 1995). According to Kulik (1992), the ability grouping programs where the students followed the same curriculum produced a null or almost null effect on them, but the programs that required curricular adaptations produced a clearly positive effect in the students. Rogers (1991) also verified that the ability grouping, as a curricular extension in *pull-out* programs produced an effect size of .65 for the general performance, the critical and creative thought.

Some investigators pointed out the complexity of the curriculum, established in abstract concepts and subjects, in the development of research, in the problem solving, in the decision taking process, and in reflections that lead to the understanding of the *self* and to the learning process (Clark, 1983; Feldhusen, 1989; Maker, 1982; VanTassel-Baska, 1988). Runco and Nemiro (1994) reported the importance of the students' problem finding stimulation beyond the problem solving training. It seems that, when the students are capable to combine the metacognitive aspects of the creative abilities, relating them with specific domains they obtain better results in the transference and in the integration of creative strategies (Feldhusen, 1993; VanTassel-Baska, 1996). Some studies have demonstrated a positive result about the problem finding training (Gallagher, Stepien & Rosenthal, 1992), the science and mathematics development in real laboratories (Tyler-Wood, Mortenson, Putney, & Cass, 2000), and the development of scientific astrophysics concepts (Etkina, Matilsky, & Lawrence, 2003). However, Stake and Mares (2001) had not found, in general, benefits in the students who participated in a science enrichment program. The exception, in this case, was found in the positive results of the girls that had teachers and parents who supported and stimulated them. The Enrichment type III (Renzulli, 1977; Renzulli & Fleith, 2002; Renzulli & Reis, 1997) is, probably, the more known example of teaching through the development of inquiries, showing that the students not only appreciate this type of activities, but obtain products of high level (Baum, Renzulli, & Hébert, 1995).

The Schoolwide Enrichment Model

The Schoolwide Enrichment Model (SEM) (Renzulli & Reis, 1985, 1997) corresponds to the evolution of the Enrichment Triad Model (Renzulli, 1977), initially implemented in Connecticut, but spreading gradually for some states and countries. The SEM offers to the high abilities or high potential students an integrated continuum of special services, in order to promote the excellent accomplishment of the students through acceleration, enrichment or curricular compacting. The application of this model implies a global school improvement, and involves a dynamic of the school intervention at the level of the school structures (involving the continuum of special services, the enrichment clusters and the regular curriculum), at the service delivery components (use of the talent total *Portfolio*, the curriculum modification techniques and the enrichment learning and teaching) and at the organizational components (referring to the necessary procedures, resources and materials) (Renzulli & Fleith, 2002; Renzulli & Reis, 1997, 2000).

More specifically, the Enrichment Triad Model, a component of the SEM as the enrichment teaching and learning, has the purpose to encourage the creative production, through the students' exposure to some subjects and some areas of interest, training them to practise more advanced contents and to develop technique and methodological skills in areas of interest chosen by the students (Renzulli & Fleith, 2002; Renzulli & Reis, 1997, 2000). The enrichment activities always have in mind their adequacy to the real world and the conception of a product or a service adequate for a given situation or as a solution to a concrete problem.

The Enrichment Triad Model includes three types of enrichement. Type I enrichment is designed to expose students to a variety of subjects, topics, occupations, hobbies, people, places and events that are not usually in the regular curriculum. Type II enrichment consists of materials and methods designed to promote the development of thinking and feeling processes where diverse activities of development can be defined. Here are included general training activities as creative thinking, problem solving, and critical thinking; and a variety of specific learning skills ("how-to-learn"), skills required in the correct use of advanced level materials; and visual, oral and written communication skills. Finally, Type III enrichment involves students who are interested in studying a concrete area and are willing to spend the necessary time for the acquisition of advanced content and for the process training, assuming the role of a first-hand inquirer (Renzulli & Fleith, 2002).

This study was carried out in order to evaluate the efficacy of the MAIS enrichment program on creativity and academic achievements in more able students from the second cycle of the Portuguese Basic School.

Method

Participants

A total of 69 students (37 girls, 32 boys) from 5th and 6th grades of a Portuguese public school with an age range of 9 to 13 years (Mean=10.5; SD=.63). From these 30 students (16 girls, 14 boys) were assigned to the experimental group, and 39 students (21 girls, 18 boys) were assigned to the comparison group.

Materials

We used a diverse source of tests for the more able students' identification, and we also asked for the students' classifications and for the teachers' nominations.

Torrance Tests of Creative Thinking, Form A (TTCT). This is the most know and used test to evaluate the creativity in all world. For creative evaluation we used four subtests of the TTCT, two verbal tests: Activity 4: Improve a product and Activity 5: Different uses and two figurative tests: Activity 2: To complet figures and Activity 3: Lines requiring the production of creative answers writing or drawing, according to the stimulus (Torrance, 1976; Wechsler, 2002). When we did this study there were no available standardized Portuguese data about this test. However, we considered some studies where the figural part revealed reliability indices (between judges) up to .90 (except for the figurative Activity 3 that was of .85), and the construct validity inter-test was verified with moderate correlations indices mainly for figurative Activity 2 and 3 (Pereira, 2001).

Also the students' academic classifications and their perceptions about each session, and whole program (qualitative evaluation) have been considered.

The MAIS program

The MAIS (it means"more" in English) designation (the acronym of Motivation, Aptitude, Innovation and Socialization) summarizes the four vertices of our intervention: the development of the students Motivation for the enthusiasm and investment in academic and extra-curricular tasks, the development of the personal Aptitude, the investment in the Innovation through the accomplishment of activities for the students critical and scientific thought development, and the promotion of the Socialization between the elements of the groups, also developing transferable social abilities to other contexts. We believe in the integral development of the person, in this case the more able students, in a holistic perspective, promoting the development of emotional, intellectual and social aspects (Arancibia, 2006; Genovard & González, 1993).

The MAIS training sessions also look for the transversal training of some social skills and self-regulation strategies. The first one is developed in the group activities through role-playing, homeworks presentation, and the proper dynamics of the group. The second one implies the metacognitive development that was implicitly trained through the sessions' organization, and the students' final evaluation carried out each session (Aymes & Pérez, 2006; Pérez, 2006; Zimmerman, Boner, & Kovach, 1996). Here the activity about the "MAIS trick" explaning the problem solving steps was very important because it was used by the students in other activities during the program.

More specific MAIS program aims are to promote the students self-concept, to stimulate the curiosity and the interest for discovery, and to develop some creative and cognitive abilities. The program had the following structure: a first session for presentation and introduction, nine sessions for training, and a last session for finishing and evaluation. The training sessions were based on the creative problem solving, giving special atention to the problem finding and the imagination. Although the specification of each session, they presented themselves very connected working themes from current life and academic settings. We present in Table 1 one brief scheme of the different sessions of the MAIS enrichment program, discriminating for each session the subject, and the main purposes, also mentioning a concrete activity.

The MAIS Program is a flexible program in order to facilitate its application by other educative agents as teachers, since they are motivated and instructed for this matter, changing the teacher

traditional role for a new one as a mediator (Fonseca, 1998; Pérez, 2006; Prieto, 1997). The number of sessions also can be enlarged, allowing them to be widened to others students' interest domains, and the training skills can be intensified. Each MAIS session followed a previously established structure to facilitate the development of the activities and the students mental organization: i) correction of the homework; ii) presentation of the session with the activity "*Summary of the session"* where we placed the session number and the summary; iii) motivation for the subject of the session, through the accomplishment of an introductory activity, followed by the training skills; iv) proposal of a homework; v) presentation of the activity "*Summary of the session",* where were summarized the main points of the session; and vi) finishing, with the students evaluation of the session filling an evaluation form.

Table 1: Enrichment MAIS program scheme.

Session	Subject	Main purposes	e.g. Activities
1	Presentation: Who are we and what are we going to do?	Program presentation. Group elements presentation.	Group rules
2	Problem finding	Presentation of the "MAIS trick". To identify the questions of the given answers. To identify the mistakes and the codified information, following tracks.	*"Mathematically "…*
3	Continuation of the problem finding	Continuation of the previous session.	*Which cake is it?*
4	Problem solving	To alert for the importance of the problem solving method. Training exercices.	Solving… *(Tangram)*
5	Problem finding	To formulate questions and possible difficulties. To anticipate consequences.	*Foreseeing…*
6	Continuation of the problem finding	To meet a blind person and how she solves dayly problems. Training exercices.	*Talking to Sandra…*
7	Developing the imagination	To know the questions and the curiosity importance for the imagination. Training exercices.	*To be curious… to be inquisitive…*
8	Helping the imagination	To know the perceptions and the feelings importance for the imagination. Training exercices.	*My sensations…*
Extra	To imagine and to create	To meet a writer and how he writes his books. Training exercices.	*Meeting a writer! (Nuno Higino)*
9	Stimulating the imagination	To explain the imagination process and techniques. Training exercices.	*Comparing the incomparable…*
10	Finishing: Who are we and what have we done?	Evaluation of the Program.	*Global memory*

Procedures

After the school's principal authorization we started the evaluation of all the students from 5th and 6th grades. We also informed the teachers involved, and with the students agreement we asked them to realize the tests. When the students' academic results were available, we registered them, and we also attended to the teachers' nominations. Then, we defined several items and selected the students on the top 15% best results on evaluation criteria (creativity, reasoning and academic dimensions). Following, we made an experimental group and a comparison group considering the students' extra-curricular time and their willing to participate in the program. The MAIS enrichment program had 11 weekly sessions concerning the creative problem solving, each one lasting 90 minutes. The program

evaluation considers a pretest and posttest model. Data were analysed using the SPSS program (version 15.0 for Windows).

Results

To evalute the efficacy of the MAIS enrichment program several repeated measures analysis of variance (ANOVA) were used to test differences between participants' creative performance, and school achievement. First, we present the means and standard deviations for creative variables at preteste and postteste (Table 2).

Table 2: Means for repeated measures of creative variables at pretesting, and posttesting.

Variables	Pretest	Posttest
	M (SD)	*M (SD)*
Verbal Fluency		
Comparison Group	19.4 (7.92)	24.3 (9.35)
Experimental Group	15.1 (7.99)	19.5 (7.65)
Verbal Flexibility		
Comparison Group	10.0 (3.05)	10.7 (2.85)
Experimental Group	8.7 (3.29)	10.2 (3.27)
Verbal Originality		
Comparison Group	3.4 (3.49)	4.4 (4.20)
Experimental Group	2.8 (2.75)	3.7 (2.95)
Verbal Elaboration		
Comparison Group	7.4 (4.29)	8.4 (4.77)
Experimental Group	4.2 (3.79)	7.5 (5.43)
Figurative Fluency		
Comparison Group	20.8 (7.10)	22.0 (6.33)
Experimental Group	16.7 (6.42)	17.7 (5.33)
Figurative Flexibility		
Comparison Group	15.7 (4.12)	16.3 (4.16)
Experimental Group	12.8 (4.48)	14.8 (4.37)
Figurative Originality		
Comparison Group	6.4 (3.60)	5.8 (2.39)
Experimental Group	5.8 (3.21)	5.9 (3.04)
Figurative Elaboration		
Comparison Group	30.8 (14.86)	29.2 (17.10)
Experimental Group	32.4 (22.14)	28.3 (16.54)

Results of the creative variables show that both groups had better results on the postteste measure for all the variables except the Comparison Group for Figurative Originality ($M_{pretest}$ = 6.4, *SD* = 3.60 and $M_{posttest}$ = 5.8, *SD* = 2.39), and both groups for Figurative Elaboration (Comparison Group: $M_{pretest}$ = 30.8, *SD* = 14.86 and $M_{posttest}$ = 29.2, *SD* = 17.10; Experimental Group: $M_{pretest}$ = 32.4, *SD* = 22.14 and $M_{posttest}$ = 28.3, *SD* = 16.54).

The repeated measures analysis of variance (ANOVA) shows an interaction effect for group (comparison and experimental) and time (pretest and posttest) only for Verbal Elaboration [$F(1,55) = 3.967$; $p = .051$; $\eta^2 = .07$] that can be seen in Figure 1. However, there was a main effect of time for some variables: Verbal Fluency [$F(1,55) = 24.663$; $p < .001$; $\eta^2 = .31$] with better results on posttest for both groups (Comparison Group: $M_{pretest}$ = 19.44, *SD* = 7.92 and $M_{posttest}$ = 24.3, *SD* = 9.35; Experimental Group: $M_{pretest}$ = 15.1, *SD* = 7.99 and $M_{posttest}$ = 19.5, *SD* = 7.65); Verbal Flexibility [$F(1,55) = 7.185$; $p < .05$; $\eta^2 = .12$] with better results on posttest for both groups (Comparison Group: $M_{pretest}$ = 10.0, *SD* = 3.05 and $M_{posttest}$ = 10.7, *SD* = 2.85; Experimental Group: $M_{pretest}$ = 8.7, *SD* = 3.29

and $M_{posttest}$ = 10.2, *SD* = 3.27); and Figurative Flexibility [$F(1,55) = 5.405$; $p < .05$; η^2=.09] with better results on posttest for both groups (Comparison Group: $M_{pretest}$ = 15.7, *SD* = 4.12 and $M_{posttest}$ = 16.3, *SD* = 4.16; Experimental Group: $M_{pretest}$ = 12.8, *SD* = 4.48 and $M_{posttest}$ = 14.8, *SD* = 4.37).

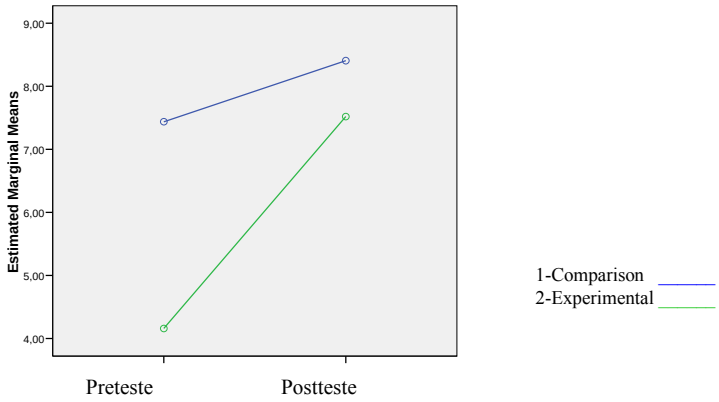

Figure 1: Estimated marginal means of Verbal Elaboration at pretest and posttest for comparison group and experimental group.

Next, we present in Table 3 the means and standard deviations for academic variables at preteste and posttest.

Table 3: Means for repeated measures of academic variables at pretesting, and posttesting.

Variables	Pretest	Posttest
	M (SD)	*M (SD)*
Portuguese Language		
Comparison Group	3.6 (0.49)	3.9 (0.68)
Experimental Group	3.8 (0.53)	4.3 (0.60)
Mathematics		
Comparison Group	4.1 (0.64)	4.2 (0.80)
Experimental Group	4.1 (0.43)	4.7 (0.47)
Nature Sciences		
Comparison Group	3.8 (0.56)	4.4 (0.63)
Experimental Group	4.1 (0.45)	4.6 (0.49)

Results of the academic variables show that both groups improved their school marks on the postteste measure for all the subjects. The repeated measures analysis of variance (ANOVA) shows a interaction effect for group (comparison and experimental) and time (pretest and posttest) only for Mathematics [$F(1,67) = 9.078$; p <.005; η^2=.12] which can be seen in Figure 2. Therefore was found a main effect of time for Portuguese Language [$F(1,67) = 28.417$; $p < .001$; η^2=.30] with better results on posttest for both groups (Comparison Group: $M_{pretest}$ = 3.6, *SD* = 0.49 and $M_{posttest}$ = 3.9, *SD* = 0.68; Experimental Group: $M_{pretest}$ = 3.8, *SD* = 0.53 and $M_{posttest}$ = 4.3, *SD* = 0.60), and Nature Sciences [$F(1,67) = 15.054$; $p < .001$; η^2=.18] with better results on posttest for both groups (Comparison

Group: $M_{pretest}$ = 3.8, *SD* = 0.56 and $M_{posttest}$ = 4.4, *SD* = 0.63; Experimental Group: $M_{pretest}$ = 4.1, *SD* = 0.45 and $M_{posttest}$ = 4.6, *SD* = 0.49).

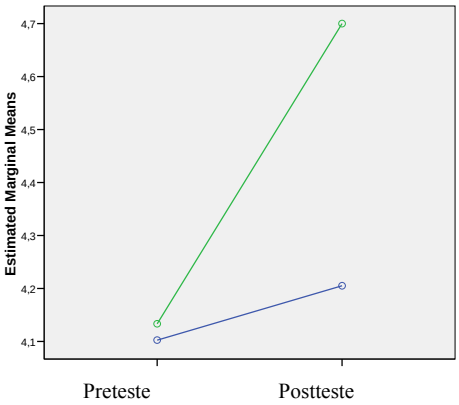

Figure 2: Estimated marginal means of Mathematics at pretest and posttest for comparison group and experimental group.

Discussion

The main purpose of this study was to examine the effects on participating in an enrichment program on the creative thinking and academic achievement of more able students. Results from this study indicate that generally both groups (experimental and comparison) increase their performance from preteste to postteste measure. These diferences are stastically significant only for some creative variables (Verbal Fluency, Verbal Flexibility, Verbal Elaboration, and Figurative Flexibility), and for all the considered academic subjects (Portuguese Language, Mathematics, and Nature Sciences). However, the present findings reveal that there are an interaction effect for group (comparison and experimental) and time (pretest and posttest) only for Verbal Elaboration, and for Mathmatics. This situation of a limited enrichment program efficacy occurred in other studies. Stake and Mares (2001, 2005) defend that students who participate in science enrichment programs can reveal different evolutions that are not visible when the group average is taken. They also say that some program beneficts cannot be immediate, but could be recognized by the students in the following months to the program frequency. Before such fact they presented the notion of *splashdown effect* defined as *"program-related changes the program graduates recognized in themselves that became apparent them you to after reentry you their home high school"* (Stake & Mares, 2005, p. 359). Also Blumen (2006) did not found cognitive improvements in the students after the program frequency, but the program effectiveness was demonstrated on figurative-creative and academic achievement.

Considering the creative variables the situation of not verifying significant improvements in the reteste measure is not very stranger if we do remenber that in some studies with the TPCT the students performances decreases. Cramond (2007) advances a justification for this fact saying that the accomplishment in the creativity tests requires novelty to motivate the students, what in a reteste measure does not happen because the students already had been faced previously with the task. Cropley (1997) reminds that the inquiry on a real creativity increase after programs implementation is limited because the studies are not consensual. Torrance (1972) defends that many procedures lead to positive effects, over all the procedures that beyond the cognitive components also consider emotional components. Other authors point out that the programs that present better results are those that use similar evaluation criteria to trained components during the program (Mansfield, Busse, & Krepelka, 1978; Rump, 1979).

Considering the results for Mathematics we think that these can be associated with the Trick MAIS steps internalization, valued for many students. The Mathematics is one subject where metacognition is important for the knowledge acquisition regulation and evolution. Pasarín and Feijoo (2005) reported that a training Mathematics problem solving program for talented students lead to

beneficts in the problem solving strategies and work methodology, as well as in the thought flexibility, developing a critical and reflective thought face to Mathematics. In the same way the MAIS training could have helped the students to develop a better methodology organization to deal with the mathematical contents, allowing some procedures automatization facilitating new learnings (Sternberg & Prieto, 1997). In literature, the problem solving appears frequently associated to Mathematics (Baroody, 1993; Polya, 1978; Schoenfeld, 1992) regarding not only academic contents, but also students' accomplishments when they participate in diverse competitions developed in the area (Pasarín & Feijoo, 2005).

When we consider a more qualitative evaluation of the MAIS program, taking students' self-evaluations, we see that it is globally positive as it was for other students who participated in other programs, pointing out the used strategies and the learning oportunities (Maia-Pinto & Fleith, 2004; Virgolim & Gubbins, 2001). The most liked session was the session 6 (*Continuation of the problem finding*), following it extra session (*To imagine and to create*). We think this preference can be due to the direct contact with "experts" (a blind person and a childish book writer) for the novelty they brought, for the practical sessions characteristics and for the active students role. On the other hand, the most disliked session was the session 10 (*Finishing: Who are we and what have we done?*), and the students justificated it by the fact of being the last session. This seems to be a good sign of the students' interest in the MAIS program participation, also considering that 20 students judged that the sessions' number was not enough. Corroborating the interest of the students in the activities, 24 of them would like the MAIS program to be continued the following school year.

The assiduity and the motivation of the students MAIS participation happened because they said that they liked to participate, they considered it interesting and an important experience and they perceived it as an enjoyable and learning moment. Similar results emphazising the learning opportunity and the amused moment were found by Fernández (2005). Nogueira (2006) beyond the interest in the type of activities found reference to the contact with peers and monitors.

Conclusion

We think the enrichment is the most complet strategy, the one that stands for the development of the students in all areas, and valid for all the forms of giftedness and talent. However, it could be a very expensive provision because it requires diverse resources and specific teachers training (Acereda & Sastre, 1998; Lombardo, 1997). For example, the implementation of the Schoolwide Enrichment Model (Renzulli & Fleith, 2002; Renzulli & Reis, 1985) requires internal and external school collaborators. The implementation of each type of enrichment according to the Enrichment Triad Model requires diverse professionals, materials, and spaces (type I - exploratory activities; type II - group specific training activities; type III - inquiry of real problems individually or in group).

In this study we followed closely the Type II enrichment activities. Our findings do not allow us to conclude on the creative improvement of the students who participated in the MAIS program considering the usually creative abilities evaluated by the TTCT, that is, flexibility and originality. However for the Mathematics the MAIS participants showed better results. As the creative process is frequently seen as a special case of problem solving, being described trough sequential stadiums (Lubart, 2001-2002) it would be expected modifications in the performances of the students about problem solving but also in the skills required by that process. We think the MAIS sessions number was not enough to allow more measurable changes. So further studies should enlarge the sessions' number and intensify the training skills, according to the students' interests.

References

Acereda, A., & Sastre, S. (1998). *La superdotación* [Giftedness]. Madrid: Editorial Síntesis.

Alonso, J. A., Alvarez, M., Cretu, C., Ary, J., Peixoto, L. C., Varela, J. E., & Morgan-Cuny, S. (2003). Políticas educativas internacionales para alumnos com sobredotación intelectual [International educative policies for intelectual gifted students]. In J. A. Alonso, J. S. Renzulli, & Y. Benito, *Manual internacional de superdotados: Manual para profesores y padres* (pp. 175-209). Madrid: Editorial EOS.

Arancibia, V. (2006). La educación de talentos. El programa PENTA-UC [Talents education: PENTAC-UC program]. In L. F. Pérez (Ed.), *Alumnos con capacidad superior: Experiencias de intervención educativa* (pp. 215-240). Madrid: Editorial Síntesis.

Aymes, G. L., & Pérez, L. F. (2006). Enriquecimiento curricular. La experiencia del programa "La aventura de aprender a pensar e a resolver problemas" [Curricular enrichment. The experience of the "Thinking and

problem solving adventure" program]. In L. F. Pérez (Ed.), *Alumnos con capacidad superior: Experiencias de intervención educativa* (pp. 117-158). Madrid: Editorial Síntesis.
Baroody, A. J. (1993). *Problem solving, reasoning, and communicating, K-8: Helping children think mathematically*. New York: Macmillan.
Baum, S., Renzulli, J. S., & Hébert, T. P. (1995). *The prism metaphor: A new paradigm for reversing underachievement.* Storrs, CT: National Research Center on the Gifted and Talented, University of Connecticut.
Blumen, S. (2006). Identificación del talento y la superdotación e intervención en entornos multiculturales [Talent and gifted identification, and multicultural environment intervention]. In L. F. Pérez (Ed.), *Alumnos con capacidad superior: Experiencias de intervención educativa* (pp. 89-116). Madrid: Editorial Síntesis.
Clark, B. (1983). *Growing up gifted: Developing the potential of children at home and at school.* Columbus, OH: Merrill.
Colangelo, N., Assouline, S. G., & Gross, M. U. M. (2004). *A Nation deceived: How schools hold back America's brighest students* (Vol. 2). Iowa City, IA: The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.
Colangelo, N., & Davis, G. A. (1997). Introduction and overview. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 3-23). Boston: Allyn & Bacon.
Cramond, B. (2007). How can we assess creativity? An invitation to the Torrance tests of creative thinking. *Sobredotação, 8,* 45-66.
Cropley, A. J. (1997). Fostering creativity in the classroom: General principles. In M. A. Runco (Ed.), *The creative research handbook* (Vol. I, pp.83-114). Cresskill, NJ: Hampton Press.
Cropley, A. J. (1999). Definitions of creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of Creativity* (Vol. I, pp. 511-524). San Diego, California: Academic Press.
Etkina, E., Matilsky, T., & Lawrence, M. (2003). Pushing to the edge: Rutgers Astrophysics Institute motivates talented high school students. *Journal of Research in Science Teaching, 40*, 958-985.
Feldhusen, J. F. (1989). Thinking skills for the gifted. In J. F. Feldhusen, J. VanTassel-Baska, & K. Seely (Eds.), *Excellence in educating the gifted* (pp. 239-259). Denver, CO: Love.
Feldhusen, J. F. (1993). A conception of creative thinking and creative training. In S. C. Isaksen, M. C. Murdock, R. L. Firestien, & D. J. Treffinger (Eds.), *Nurturing and developing creativity: The emergence of a discipline* (pp. 31-50). Norwood, NJ: Ablex.
Fernández, M. T. (2005). Enriquecimiento cognitivo extracurricular para alumnos superdotados [Extacurricular cognitive enrichment for gifted students]. *Faísca, 12,* 5-15.
Fonseca, V. (1998). *Aprender a aprender* [Learning to learn]*:* A educabilidade cognitiva. Lisboa: Notícias Editorial.
Freeman, J., & Guenther, Z. C. (2000). *Educando os mais capazes: Ideias e acções comprovadas* [More able education: Confirmed ideas and actions]. São Paulo: E.P.U.
Gallagher, J. J., & Gallagher, S. A. (1994). *Teaching the gifted child* (4th ed.). Boston: Allyn & Bacon.
Gallagher, S. A., Stepien, W. J., & Rosenthal, H. (1992). The effects of problem-based learning on problem solving. *Gifted Child Quarterly, 36,* 195-200.
Genovard, C., & Castelló, A. (1990). *El límite superior. Aspectos psicopedagógicos de la excepcionalidade intelectual* [Higher limit: Intellectual exceptionality psychopedagogical. aspects]. Madrid: Pirámide.
Genovard, C., & González, J. P. (1993). Intervention [Intervention]. In L. Pérez (Ed.), *Diez palabras clave en superdotados*. Navarra: Verbo Divino.
Kulik, J. A. (1992). *An analysis of the research on ability grouping: Historical and contemporary perspectives* (Research Monograph No. 9204). Storrs, CT: National Research Center on the Gifted and Talented, University of Connecticut.
Lombardo, J. R. (1997). *Necesidades educativas del superdotado* [Gifted special needs]. Madrid: Editorial EOS.
Lubart, T. I. (2001-2002). Models of the creative process: Past, present and future. *Creativity Research Journal, 13,* 295-308.
Maia-Pinto, R. R., & Fleith, D. S. (2004). Avaliação das práticas educacionais de um programa de atendimento a alunos superdotados e talentosos [Evaluation of the educational practices of a gifted and talented program]. *Psicologia Escolar e Educacional, 8*, 55-66.
Maker, C. J. (1982). *Curriculum development for the gifted.* Rockville, MD: Aspen.
Maker, C. J., & Nielson, A. B. (1995). *Teaching models in education of the gifted.* Austin, TX: Pro-Ed.
Mansfield, R. S., Busse, T. V., & Krepelka, E. J. (1978). The effectiveness of creativity training. *Review of Educational Research, 48,* 517-536.
Nogueira, S. M. (2006). MORCEGOS: A Portuguese enrichment program of creativity pilot study with gifted students and students with learning difficulties. *Creativity Research Journal, 18*, 45-54.

Pasarín, M. J. & Feijoo, M. (2005). Desarrollo del talento matemático. Un programa de intervención. [Developing mathematical talent. An intervention program]. *Faísca, 12,* 5-15.

Pereira, M. (2001). Inteligência e criatividade: Duas trajectórias alternativas para as crianças sobredotadas? [Intelligence and creativity: Two alternative ways for gifted children?] *Psicologia: Teoria, Investigação e Prática, 1,* 171-188.

Pérez, L. F. (2006). Programas de enriquecimiento extracurricular: El programa estrella [Extracurricluar enrichment programs: Star program]. In L. F. Pérez (Ed.), *Alumnos con capacidad superior: Experiencias de intervención educativa* (pp. 183-214). Madrid: Editorial Síntesis.

Pérez, L. F., & Losada, L. (2006). Perspectiva internacional en la educación de alumnos con capacidad superior [International view about high ability students]. In L. F. Pérez (Ed.), *Alumnos con capacidad superior: Experiencias de intervención educativa* (pp. 393-431). Madrid: Editorial Síntesis.

Persson, R. S., Joswig, H., & Balogh, L. (2000). Gifted education in Europe: Programs, practices, and current research. In Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotnik, R. F. (Eds.), *International handbook of giftedness and talent* (pp. 703-734). Oxford: Elsevier.

Polya, G. (1978). *A arte de resolver problemas* [The art of problem solving]. Rio de Janeiro: Editora Interciência.

Prieto, M. D. (1997). Evaluación del potencial de aprendizage [Learning potential evaluation]. In G. Buela-Casal & J. C. Sierra (Eds.), *Manual de evaluación psicológica: Fundamentos, técnicas y aplicaciones.* Madrid: Siglo XXI de España Editores.

Renzulli, J. S. (1977). *The enrichment triad model: A guide for developing defensible programs for the gifted and talented*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Fleith, S. M. (2002). O Modelo de Enriquecimento Escolar [The Schoolwide Enrichment Model]. *Sobredotação, 2*, 7-40.

Renzulli, J. S., & Reis, S. M. (1985). *The Schoolwide Enrichment Model: A comprehensive plan for educational excellence.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). The schoolwide enrichment model: New directions for developing high-end learning. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd. ed., pp. 137-154). Boston: Allyn & Bacon.

Renzulli, J. S., & Reis, S. M. (2000). The schoolwide enrichment model. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 367-382). Oxford: Elsevier.

Robinson, A., Shore, B. M., & Enersen, D. L. (2007). *Best practices in gifted education: An evidence-based guide.* Waco, TX: Prufrock Press.

Rogers, K. B. (1991). *The relationship of grouping practices to the education of the gifted and talented learner* (*R*esearch Monograph No. 9101). Storrs, CT: National Research Center on the Gifted and Talented, University of Connecticut.

Rump, E. E. (1979). *Divergent thinking, aesthetic preferences and orientation towards arts and sciences.* Unpublished doctoral dissertation, University of Adelaide.

Runco, M. A., & Nemiro, J. (1994). Problem finding, creativity, and giftedness. *Roeper Review, 16,* 235-264.

Schoenfeld, A. H. (1992). Learning to think mathematically: Problem solving, metacognition, and sense making in mathematics. In A. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 334-370). New York: Macmillan.

Stake, J. E., & Mares, K. R. (2001). Science enrichment programs for gifted high school girls and boys: Predictors of program impact on science confidence and motivation. *Journal of Research in Science Teaching, 38*, 1065-1088.

Stake, J. E., & Mares, K. R. (2005). Evaluating the impact of science-enrichment programs on adolescents' science motivation and confidence: The splashdowndown effect. *Journal of Research in Science Teaching, 42*, 359-375.

Sternberg, R., & Prieto, M. D. (1997). Evaluación de las habilidades de la inteligencia: Teoria triárquica de la inteligência [Evaluation of the intelligence abilities: The triarch theory of intelligence]. In G. Buela-Casal & J. C. Sierra (Eds.), *Manual de evaluación psicológica: Fundamentos, técnicas y aplicaciones*. Madrid: Siglo XXI de España Editores.

Tannenbaum, A. J. (2000). A history of giftedness in school and society. In Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotnik, R. F. (Eds.), *International handbook of giftedness and talent* (pp. 23-53). Oxford: Elsevier.

Torrance, E. P. (1972). Predictive validity of the Torrance Test of Creative Thinking. *Journal of Creative Behavior, 32,* 401-405.

Torrance, E. P. (1976). *Tests de pensée créative de E. P. Torrance: Manuel* [Criative thinking tests of E. P. Torrance. Manual]. Paris: Les Éditions du Centre de Psychologie Appliquée.

Tyler-Wood, T. L., Mortenson, M. Putney, D., & Cass, M. A. (2000). An effective mathematics and science curriculum option for secondary gifted education. *Roeper Review, 22,* 266-269.
Van Tassel-Baska, J. (1988). *Comprehensive curriculum for gifted learners*. Boston: Allyn & Bacon.
Van Tassel-Baska, J. (1996). The process of talent development. In J. VanTassel-Baska, D. T. Johnson & L. N. Boyce (Eds.), *Developing verbal talent* (pp. 3-22). Boston: Allyn & Bacon.
Virgolim, A. M. R., & Gubbins, E. J. (2001). *Creativity and intelligence: A study of Brazilian gifted and talented students*. Comunication presented in the World Conference for Gifted and Talented Children (14th), Barcelona, Spain.
Wechsler, S. M. (2002). *Avaliação da criatividade por figuras e palavras. Testes de Torrance: Versão brasileira* [Creativity evaluation by figures and words. Torrance Tests: Brazilian version]. Campinas, SP: Laboratório de Avaliação Psicológica, PUC-Campinas.
Zimmerman, B. J., Boner, S., & Kovach, R. (1996). *Developing self-regulated learners: Beyond achievement to sel-efficacy*. Washington, DC: APA.

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(B.23)

Michael F. Shaughnessy; Sal Mendaglio, Perfectionism in the Gifted: The Pros, Cons and Concerns: This presentation will focus on the perplexing problem of perfectionism with the gifted. Perfectionism will be examined and various aspects of this elusive, problematic construct will be explored. The most recent theorizing and research will be reviewed.

(B.24)

Ema P. Oliveira; Leandro S. Almeida, A differential education for highly able students: A study on academic acceleration in Portugal: In 2004 Colangelo and his colleagues published an American Report on acceleration, called *"A Nation Deceived: How schools hold back America's brightest students"*. In this report, the authors appeal educators' attention for the positive impacts of the various forms of acceleration, and the need for deconstruct misconceptions and develop more favourable attitudes toward acceleration. In this communication, we analyse the impact of academic acceleration in terms of the psychosocial and academic adjustment of Portuguese students, with some data from a study developed with 227 students who were attending the 2nd Cycle of Basic Teaching (5th and 6th grades), in public and private schools. The experimental group was comprised of 107 accelerated students (by early entrance to grade school or skipping one year of primary schooling). A comparison group was comprised of 120 students from the same classes of the previous group, who did not however benefit from academic acceleration. Several instruments of psychosocial and educational evaluation were considered, including interviews with parents and a scale for teachers. The results suggest significant differences in favour of the accelerated students in the psychological tests applied (self-concept, creativity and reasoning), as well as in teachers' perceptions about students' learning abilities and academic motivation. This superiority occurs, also, in the generality of the curricular matters classifications, excepting Visual and Technological Education and Physical Education. Finally, parents show satisfaction with this educational provision, and the four (4) cases of parental dissatisfaction are associated with acceleration practices more related to the child's age than in function of effective precociousness of development. So, we can conclude that the academic acceleration seems to be a good practice for the gifted children, even other educational provisions should be considered in order to attend their special needs.

(B.25)

A Tutorial-Based System for Children with Intellectual Disability

J.M. AL-Ja'am, S.A. E-Seoud, A. Edwards, M. A. Garcia Ruiz, B.B. Lazarus, H. Alsuwaidi, N. Alkuwari and H. Aldosari

Abstract

This work proposes a tutorial-based system using the Arabic language for mentally disabled children who are resident at *Shafallah* Center for children with special needs in Doha, Qatar. The system is flexible and can be used by teachers, students and parents. The contents are developed by special education instructors and can easily be uploaded to the system. The tutorials cover a range of topics including basic mathematics and sciences. The interactive, animated images used in the tutorials are taking from the children's environment, so they can feel more comfortable and confident when using the system. After studying the tutorials, children can solve puzzles based on the topics that they learned. A simple intelligent algorithm is used to guide children to a solution. Many other features are being added to the system to enhance the learning process.

Introduction

The number of disabled people in the world is increasing dramatically. *Sik Lányi et al.* mentioned in [13] that around 10% of the world's population has been identified with some kind of disability. In the USA about 14% of the population suffers from disabilities [11]. According to the forecast in Europe at least 18% of the population will be disabled during the next 20 years. The present population of Europe is 450 million. This means that more then 81 million people will have disabilities by 2040. Unfortunately, there is limited statistical information about people with disabilities in the Arab countries. A recent study conducted by *Al Gain* and *Al Abdulwahab* [1], estimates that 3.73% of Saudis have functional disabilities. In the state of Qatar, a new census process is being conducted by the Qatari planning council to determine the effective number of disabled people in the country. We think that there is at least 5% of the population requires personal assistance in their daily lives due to developmental, intellectual or physical challenges. Qatari children with disabilities currently receive excellent services and care at *Shafallah* Center in Doha city.

It is well known that information technology assistive tools improve the living of disabled people and increase their abilities to independently manage their lives. Extensive research has been carried out since 1995 to develop assistive tools for intellectually disabled children. *Mechling* [10] has conducted an extensive literature survey on research (1990-2005) on assistive technology as a self-management tool for prompting students with intellectual disabilities to initiate and complete daily tasks. She mentioned that, "although *Kimball*, *Kinney*, *Taylor* and *Stromer* (2003;2004) outlined instructions on how to create computer-based activity schedules with photographs and video models using Microsoft Power Point, to date, no research base exists to support this new and creative use of high-tech systems in providing students with visual, auditory, and animated cues for following and transitioning between activities or use in other forms of self-management".

We propose a tutorial-based system that can enhance the capabilities of the children with intellectual disabilities to learn concepts and communicate more effectively with others and receive fair access to education. In addition, these tutorials are used also to allow disabled students to initiate and complete daily tasks (i.e., preparing a school day). This would play an important role in accelerating the integration of these students into society and improve their self-reliance, self-esteem, and independence. Whether children from emotional, physical, or cognitive disabilities, interactive tutorials can assist them perform many everyday tasks. The multimedia tutorials can allow children to practice pronunciation, spelling, grammar, word meaning, and reading comprehension skills. With improved language skills inevitably comes better social interaction which helps children sharpen their language skills. Note that, there are no available interactive educational programs to train Qatari children with special needs. Thus, there is significant need for an interactive tutorials based system. Our project was initiated in May 2007 by a group of Qatari students whose goal was to develop a prototype and test it on a set of specific children from *Shafallah* Center. In the next phase of the project, we plan to develop a version for a PDA and a mobile phone devices as these tools can be acquired by the majority of the students.

Background

Researches in the Arab world to develop assistive tools for children with special needs are at the rudimentary level. *Al-Salman et al.* from King Saud University have developed a prototype of an Arabic Braille system for blind people [2]. They have also launched a new project to develop Arabic Sign Languages education tool. Another research project to use modern techniques in teaching children with Dyslexia is carried out in the Prince Salman Center for Disability Research, Saudi Arabia [12]. *Jemni and Elghoul* presented in [8] an untested web based tool called *WebSign* that translates text to sign language. It may allow people with hearing impairments to understand written texts thru sign and gesture. This tool needs to be validated by the deaf community. *ALjawaer* from King Saud University has recently developed an educational web-based tool entitled *TAHLEM* for children with Autism. In addition, many special needs instructors have individually developed Arabic tutorials for children with special needs.

However, these educational tutorials are very primitive and not very attractive, as they are developed mainly in *Microsoft Power Point* with low quality images [10].

Most of the Arab software engineering companies do not develop multimedia programs and tutorials for special users because they do not see great financial benefits from this market. Commercial software proposed by *Sakhar* [14] like *IBSAR* assigned to help blinds to use the computer is expensive (i.e., $3000 for a single license) and few families of the disabled can afford such expensive software. The Arab world needs to develop advanced tools for disabled and make them freely available to this community.

Effective research about people with disabilities has been done primarily in USA, Europe and other western countries. Government and private sector companies highly supported research through specific funds and grants. Hundreds of researchers conduct research to develop software and multimedia tutorials to assist the people with disabilities and help them integrate into society. The European Commission supported the pan-European project proposed by the adaptive system research group of the School of Computer Science, University of Hertfordshire, United Kingdom [3], which involves several partners across Europe. The project recognizes the important role of play in child development as a crucial vehicle for learning about the physical and social environment, the self, and for developing social relationships. It targets children who are prevented from playing, either due to cognitive, developmental or physical impairments which affect their playing skills, and is investigating how robotic toys can empower children with disabilities to discover the range of play styles from solitary to social and cooperative play. This family of robots has been used in the Aurora project [5] which investigated the possible use of robotic systems as therapeutic or educational tools to encourage social interaction skills in children with Autism.

The Spanish project *AmIVital* [4] creates and develops communication tools and devices for elderly and disabled people. Seventeen top Information and Communication Technology companies and research groups take part in this initiative. The total allocated funds from the Spanish Ministry of Industry, Tourism and Trade exceeds 20 million Euros

Scott [15] launched the *Archimedes* project which promises accessible technology for the disabled. *Archimedes* has expanded and now includes the Archimedes Foundation to raise money for research and development, as well as Archimedes Access Research and Technology International Inc. to bring the project's products to market.

Chelin et al. proposed a system that uses natural language to assist visually handicapped people in writing compositions [6]. *Dunlop et al.* proposed a digital library of frequent conversational expressions to help profoundly disabled people communicate more effectively [7].

Sik Lányi et al. [13] spent 10 years writing more than 30 programs for people with disabilities in Hungary. Around 70 Masters Theses have been realized as a result of these programs, many of which received grants from the government and private sectors. They proposed some tutorial and entertainment programs for children with disabilities respecting their own language, culture and tradition, in addition to rehabilitation programs for stroke patients and persons with phobias. These multimedia programs were mainly for handicapped children having different impairments: partial-vision, hearing difficulties, loco-motive difficulties, mental retardation, Dyslexia, etc. They are also accessible to the potentials users with the necessary help.

LifeShare Assistive Technology project [9] (Mississippi, USA) aims to better the lives of children with disabilities through the use of technology. It offers free download all of the software and resources it develops, and in Mississippi currently offers one-on-one consulting with children, parents, teachers and therapists, also free of charge.

Curriculum for Children with Disabilities

The current curricula used at *Shafallah* Center for children with special needs are divided into three main categories as follows:

(1) Pre-Academic;
(2) Academic; and
(3) Post-Academic and professional qualification.

These curricula cover a wide variety of topics including: body movement and body control, reactions, object and pattern recognition and differentiation, speech expression and control, memorization and information retrieval, self-confidence, clothing, cleaning, toiletry, possession, playing, social relationships, transportation means, animals and plants, foods, use of tools, safety, time and date, emotions, travel and circulation, entertainment, sports, quantities and qualities, counting, measures, clothing, images and symbols, communication means, simple reading and writing, music and songs, and sports. The instructors are currently using the traditional ways of teaching. They use *MS-Power Point* to present their materials to the children. These instructors face a major problem in knowledge transmission. They have to keep the focus of the children, repeat the same lesson many times and re-ask the same questions many times. An assistive computerized system will significantly help these instructors more effectively deliver the lessons. It will also help students gain self-confidence and improve their learning skills.

The System Features

The expected features of our system can be summarized as follows:

1)
2) To develop short Arabic tutorials for children with intellectual disabilities on different topics. The

tutorials should give short and simple sentences, clips, images and sounds. The background and images used in the tutorial should be from the children's environment. For instance, the user should see the desert, the males that he goes with his family to purchase goods the local street, etc. We propose drawing outlines of local images by hand and use Photoshop to add the necessary effects. In addition, a digital camera is used to make short clips of the local environment. We selected a character from the Qatari environment to be used in the tutorial. Children will see their favourite personalities like *'BaBa Linga'* in Qatar. This will help children feel familiar and confident.

3) To assist children write simple Arabic words correctly by offering a list of items and words to select from. These words and items are split into rubrics according to their meaning and belongings;

4) To allow Arabic word prediction and abbreviation expansion. Whenever the child begins to type a word or pronounce a word, the system will display a list of frequently used words that begin with those letters. The child can then select the appropriate word from the display. We add also the corresponding images to validate the word choice;

5) To integrate a group of strategies and techniques, such as picture boards to enhance the disabled communication and interaction with their surroundings. Children can select pictures or symbols that communicate what they feel or think. A similar manual technique is currently used in the center;

6) To store and retrieve phrases and sentences which have been grouped according to subjects, such as family matters, sports, personal needs, food, transportation mean, etc; and

7) To be interactive by using attractive multimedia which have effect on more then one sense, and would be more effective. The display presentation should be adjustable to fit with the special needs of the children (i.e., size, contrast, color).

Designing Teaching Models

When designing a tutorial based system for children with special needs, one can think of basing it mainly on the ordinary curriculum that is taught in normal schools. We can then use the text and interactive animations. However, children with intellectual disabilities need specific treatment and deep care. In order to improve their understanding skills, the tutorials should attempt the maximum number of their senses. In addition, to seeing, hearing and eventually reading, the children should taste and touch whenever possible. For instance, if we want to teach them the concept of "coldness", drinking cold water and touching ice would greatly increase their understanding.

The images used in the tutorials should also be from the children environment so they can recognize them more easily. Thus we input first the outlines of the images by hand, and we then input them to Photoshop to add the effects as shown below. The following images are used in the tutorials to teach the child about the day schedule, from getting up in the morning till going to bed in the evening. For each displayed picture, the child can hear a clear message about the activity. For instance, the children can be asked about what they have to do when they get up in the morning.

An explanation is given with each picture. Students are then prompted to realize the next activity to perform. The system tracks the children and shows their progress in remembering the tasks to perform. Note that mentally disabled children often have difficulties remembering and tend to quickly forget. Instead of repeating the same lesson in the traditional way, the computer based system provides a help to overcome this problem. The following figure shows the images used in the daily activity concept to be taught to the children.

The content of the tutorial can be customized to allow individualized teaching. The images can be

taken from the real environment of children like their house, family, local streets, etc. depending on the tutorial's topic which are then stored in an independent database. The system can then retrieve the images relative to each child and displays them in the tutorial's activities.

Puzzles and Greedy Algorithms

After learning a specific concept through the tutorial, like for instance the school day, children are then asked to solve puzzles with different levels of difficulties. These puzzles include assembling parts of pictures and images, ordering the tasks to be performed during a specific activity, matching images, assigning the corresponding images to text and vice versa, listening to a dialogue or specific audio sentence and then selecting the right image and text, etc.

The puzzles are seen as optimization problems and we solve them using a local greedy algorithm which guides the children in their move to finally converge to the solution. At each move they perform, they are alerted through sounds and animated messages to either encourage them to go forward or change their move. In the second paragraph, we will discuss the greedy algorithm that we are using.

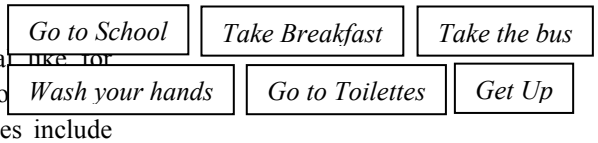
An *optimization problem* is formulated as follows:

Minimize f(x) subject to x in D

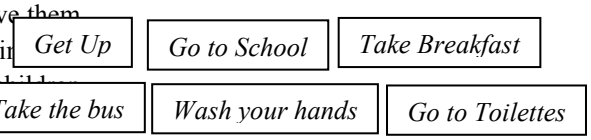
We call *f* the objective function, *D* the feasible region that satisfies all the given constraints, and a solution *x* in *D* a feasible solution. If *D* has combinatorial features, then the problem is called a combinatorial optimization problem. The set of solutions of an optimization problem, which may be potentially visited in a local greedy algorithm, is called the search space. The simple local greedy algorithm starts from an initial solution or configuration *x*, generated randomly or by a greedy algorithm, and repeat replacing it with a better solution *x'* (i.e., $f(x') < f(x)$) in its neighborhood $N(x)$ until no better solution is found in $N(x)$, where $N(x)$ is a set of solutions obtainable from *x* by slight perturbations. The algorithm can be presented as follows:

```
LocalGreedySearch()

Begin

        x = Initial Solution
        Repeat
```

The algorithm randomly generates the puzzle parts (i.e., *x*) and calculates then the value of the objective function *f*. function represents the number of conflicts between the puzz The higher the value of *f*, the far the solution is. Children th rearrange the parts of the puzzle by moving them one at a tin are then prompted at each move they perform. Whenever t of *f* decreases, the students will know they are advan expected. For instance, after learning the daily morning c students will then try to solve the following puzzle about the concept which is generated randomly. The value of the objective function is the number of conflicts of the activities. Let us assume $f(x) = m$.



The student will then make a move. For instance, he may put the *Get Up* activity at the first position. Thus, the value of the objective function will be decreased and the student will be prompted accordingly. He will see a pictorial prompt encouraging him to continue in this way.



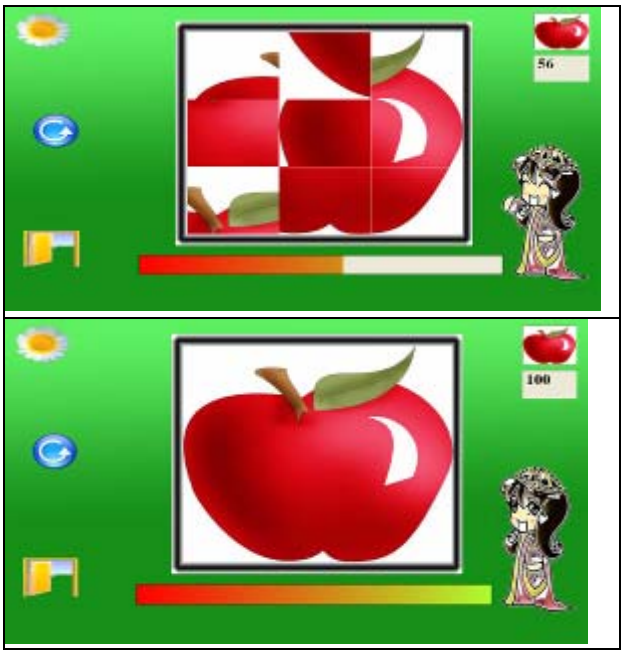
If the student puts the activity, "Take the breakfast" in the first position, the value of the objective function will be increased. The student is then prompted that she/he is going in the wrong direction.

This process is repeated until the student reaches the solution. The system will then display the number of moves carried out and the time.

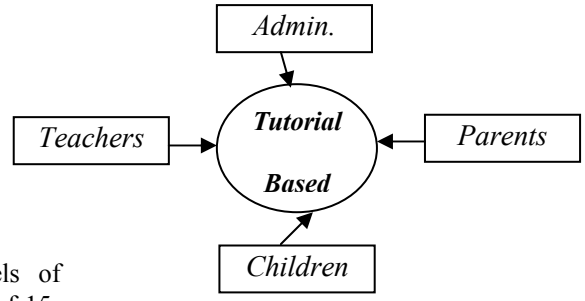
A score is then provided to the students and stored in a personal file in the database. The student can then repeat the same puzzle with a different random pseudo-solution and self-test and evaluate. The teacher and the parents can consult the database to see the performance of each student.

The following figures show a simple puzzle to be assembled by the children. It consists of grouping together the different parts of an apple. The mascot is used to explain to the child what to do in each step. It gives him some encouragement when performing a right move. A progress bar is displayed below the puzzle. It indicates the work progress using red and green colors.

An indicative number is displayed in the small box to indicate the percentage of the current state of the solution.



assigned task. Children then assemble the puzzle in order to recognize the characters. The greedy algorithm is used to help children converge toward the solution. When children make a right move, a bar with growing up green color is used to show them the progress they have made to reach the solution. A sound of encouragement is announced through a well-known local personality. The system allows users to easily change the content of the sound files and the character. We have adopted this strategy due to the fact that the children in the same level may have different understating of the Arabic words. In fact, these children are of different nationalities and use different dialects. The following figure shows the potential users of the system.



Children Levels

The children in the *Shafallah* center have different levels of intellectual disability independent of their ages. We can have of 15-year-old children with the cognitive and maturity level of a 6-year-old. Thus, the designed tutorials should take into consideration the different levels of the handicapped children. These levels are as follows:

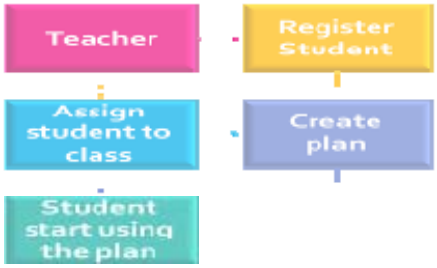
- *Level 1*: The children can understand one picture at a time with sound effect.
- *Level 2*: The children can understand one picture at a time with sound effect and one word.
- *Level 3*: The children can understand some pictures with sound effect and short sentences of three words.
- *Level 4*: The children can understand pictures with sound effect and long sentences of six words.

The developed tutorials are taking into consideration all the four levels. The main difficulties we are facing in designing a tutorial that is suitable to the cognitive and maturity levels of the individual students. Individual differences are important in conventional classrooms, but they can be critical when dealing with students with special needs. For this reason, we have made the system open to accept updated content in terms of texts, sounds and images.

Potential Users of the System

The system allows three categories of users. Teachers can use the system during instructional sessions. They can upload their materials which are stored in a separate database and retrieved by the system. The parents can use the system at home to help children review the lessons taught at school. In addition, they can send images from the children's environment and upload them to the system. For instance, to teach children about their family, parents can take their photos and let the system use them in puzzles. Moreover, humanist teaching principles maintain that learning should be safe and meaningful. By using familiar pictures, parent introduce familiar, safe and meaningful object that motivate children to complete the

Teachers can create accounts for their students and assign them to the class. They can then set a plan for the course indicating how it should be delivered to the students. The students can log in to the system either by themselves or assisted (i.e., a parent). They can then study the lesson and repeat it at their convenience. Teachers can track the students and check the progress of each student. Parents also can be updated about the progress of their children.



Conclusion

We have developed the first prototype of the system that currently offers some tutorials on different topics. We have also designed the corresponding puzzles using multimedia and greedy algorithms to guide children toward reaching a solution. The first feedback we have received from potentials users (i.e., teachers and students) is very promising. We intend to continue the development of the system features in our next research work. We think that the system will be fully operational in the coming months. The potential users of the system are teachers, children and parents. We think that, involving the parents as active teachers can help developmentally challenged children gain more confidence and increase the learning skills.

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REFERENCES

[1] Al-Gain, S.I. & S.S. Al-Abdulwahab: "Issues and Obstacles in Disability Research in Saudi Arabia. Riyadh, Kingdom of Saudi Arabia: Prince Salman Centre for Disability Research.

[2] Al-Salman S. AbdulMalik and Hend S. Al-Khalifa: "Towards a Computerized Arabic Braille Environment. In Software Practice and Experience", John Wiley & Sons (2003).

[3] Adaptive system research group of the School of Computer Science, University of Hertfordshire, United Kingdom http://www.iromec-project.co.uk.

[4] AmlVital Spanish Project (2007). http://www.innovations-report.com/html/reports/communication_media/report-84220.html

[5] Aurora Project for disabled people. www.aurora-project.com

[6] Chelin J., L. Kosseim and T. Radhakrishnan, "Using Natural Language Processing to Assist the Visually Handicapped in Writing Compositions", *L. Lamontagne and M. Marchand (Eds.): Canadian AI 2006, LNAI 4013, pp. 300–311, 2006.*

[7] Dunlop H. S., S. J. Cunningham and M. Jones: "A Digital Library of Conversational Expressions: Helping Profoundly Disabled Users Communicate." *Marchionini, G. and Hersh, W. (eds), Proc. Second ACM/IEEE Joint Conference on Digital Libraries (JCDL'02), Portland, Oregon, ACM Press, New York*, (2002), pp. 273-274.

[8] Jemni M. and O. Elghoul: "Towards Web-Based Automatic Interpretation of Written Text to Sign Language". In *Proceedings of ICTA'07*, April 12-14, Hammamet, Tunisia, (2007), pp. 43-48.

[9] LifeShare Assistive Technology project, The LifeShare Foundation in Jackson, Mississippi USA http://www.internet4classrooms.com/assistive_tech.htm

[10] Mechling L.: "Assistive Technology as a Self-Management Tool for Prompting Students with Intellectual Disabilities to Initiate and Complete Daily Tasks: A Literature Review". In *Education and Training in Developmental Disabilities, 2007, 42(3),* pp. 252-269.

[11] Nielesen J.: Web-Design, Typotex, (2002), pp. 298-311.

[12] Prince Salman Center for Disability Research, Saudi Arabia http://www.pscdr.org.sa/ar/research/Pages/OngoingPorjects.aspx

[13] Sik-Lányi Cecília, Ágnes Molnár-Lányi: "Psychological and Pedagogic Testing of Handicapped Children with Locomotion Disorder using Multimedia Programs. In *the 3rd International Conference on Disability, Virtual Reality and Associated Technologies*, Alghero, Sardinia, Italy, (2000), pp.99-106

[14] Sakhr IT Company (2002). The Reading Machine User Manual, Cairo, Egypt. www.sakhr.com

[15] Scott: Project Archimedes. http://archimedes.standford.edu

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(B.26)

How to become an e-learning tutor when you are an adult trainer: Analysis of the modalities of the transformations.

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Abstract

The aim of this paper is to analyse the conditions of the setting up of e-learning in preparation for the entrance examination for the profession of medical secretary under the hospices of a partnership between Education Nationale (Ministry of Education) and the "Association Nationale de la Formation Hospitalière" for adults (National Association for Hospital Training).

The research is based on the study of interviews with adult trainers, questionnaires completed by trainees and the accounts of meetings about the setting up of e-learning.

This article focuses mainly on the identity transformations undergone by adult trainers when they become e-tutors and also on the difficulties they encounter in the process, our goal being to highlight the pathways to professionnalization that are available to them and the conditions which promote the acceptance of their new status.

Introduction

For the last twenty years the educative new technologies have largely entered the training field and the FOAD (French abbreviation for Open and Distance Learning Programme) (ODLP) has developed a lot in the field of higher education. The use of new technologies in adult training is more unobtrusive but it is becoming a necessity particularly for the organisation financing the programme. The job of a trainer is undergoing massive changes. It is in this case that Jacquinot (2003) questioned the conditions on which the teaching innovation took place. As the teaching innovation consists in implementing distance-learning programmes in the French universities via e-campus. Therefore, we would like to analyse what is happening in adult training from a research which occurred in some GRETA[40] centres.

Jacquinot pointed out some difficulties regarding the link between several authorities concerned by this innovation: "differences even conceptual disagreements, conflicts between people, power disputes, heterogeneousness of issues and of values at each of the levels, underscored constraints and contradictions of the system". Particularly she noticed " the various changes of players" status and role which lead to organizational, structural and institutional alterations…But also a repositioning of professional or even personal identity. How did the change take place in the system which is offered in adult training? How were the issues perceived? What effects did they have on the tutors' professionalization?

In order to define the tutors' activity and experience we attended meetings which dealt with the set-up of the device and we organized interviews with each tutors. We also presented some questionnaires to a group of trainees in order to find out their expectations towards tutors.

Thus, we will firstly present the results of this research and then we will think about the pathways to professionnalisation (referring to Wittorski, 2007). Therefore we will try to throw into light the changing methods from one identity to the other, at an individual level but also institutional one.

1. Presentation of the context and methodology of the survey.

1.1. Presentation of the OLDP

1.1.1. The origins of the project.

The National Association for Hospital Training in France (ANFH) has commissioned the French National Education system to put 'on-line' the preparation for the competitive examination for Medical Secretaries. This project has been managed in association with the DAFPIC (The Academic Delegation of Professional Training in Further and Higher Education) in Rouen, Caen, and Corsica. The Academy of Rouen has taken responsibility for the 'Synthesis' (note de synthèse) module and has asked three trainers, already involved in this area, to create a sequence of training sessions, whilst a

[40] GRETA : public establishment of adult training (Further Education)

trainer from the Academy of Caen has created the 'Medical Terminology' (terminologie médicale) module. The Academy of Corsica is taking charge of the final evaluation.

1.1.2. The organization of the training programme

The pilot scheme only involves three GRETAs in the region of Upper Normandy (Haute Normandie), other Academies only having proposed this training programme belatedly. A single training program concerns these three GRETAs:

- Four modules are offered: 'Medical Terminology' (35h, of which 6h are mock exams), 'Synthesis' (25 sessions totaling 60h, of which 6h are mock exams), Hospital Legislation (20h) and Training for the Oral Exam (20h). However only the first two modules involve the OLDP ;
- The amount of face to face tuition in the training programme is extremely variable: it does not exist in "Medical Terminology", but is spread out over 14h (divided into six sessions) for the "Synthesis" module. This module has been divided up into units (e.g., introduction to the method, the make up of plans, editorial aspects, etc…) and a consolidation session is scheduled at the end of each unit. The rhythm of these meetings depends on an appraisal of the time required to deal with the Distance Learning sequences;
- The AOLDP (FOADA) part of the training programme is spread out over a five month period. It should be noted that the first "A" of AOLDP stands for "accompanied" and thus underlines the role of the tutor;
- Pedagogical teams are made up of trainers (for the two modules that require face to face teaching) or tutors for the four modules, as well as a pedagogical coordinator, the Head of the Resource Centre, and a CFC (Further Education Advisor) who is both responsible for the sector and also a Technical Director;
- In addition, and at an academic level, a qualified web-site designer from the CAFEL (Diploma for a Designer and Advisor of Further Education Training Programs On-Line) will oversee the technical efficiency and performance of the platform and will be "on-call" for the tutors if any problems should arise;
- The training was preceded by a session led by the coordinator who presented the organization to the trainees, and they did an evaluation and filled in a questionnaire about their performance concerning the OLDP and their method of learning. At a second session, taken by the coordinator and the Head of the Resource Centre, the platform was presented to the trainees. The tutors for their modules of "Synthesis" and "Medical Terminology" came to present themselves, and to give back the evaluations, to the trainees; and
- The groups are made up of 10 to 13 women ranging in age from 22 to 40 years-old. They have been informed that they are taking part in a pilot scheme for this device and that they are actively encouraged by the training centres to make constructive remarks so that the training course can be improved in the future.

Our study will be conducted on a group of trainees coming from the same GRETA, that is to say 11 people, and on their tutors from three GRETAs in the region of Upper Normandy (Haute Normandie); that is to say 6 trainers. Thus, it can be seen that the tutors differ from one another in the following ways:

- Participation, or non-participation, in the development of the resources on the platform;
- Possibility, or impossibility, to meet trainees face to face;
- Personal choice, or institutional pressure, to participate in this training programme by becoming a tutor/ mentor;
- Prerequisite knowledge, or complete unawareness, of face to face training for the preparation towards this concours (competitive examination);
- Use of an digital environment for pedagogical aims; and
- The level of presence of the pedagogical team working on this project.

1.2. <u>The methodology of the pilot scheme</u>.

1.2.1. Study of the preparatory phase.

The evolution of trainers concerning the conception of modules and their orientation towards tutoring was monitored over a period of a year and a half.

1.2.2 Study of the trainees expectations in regard to the pedagogic tutor and the relationship between them and him/her

A questionnaire concerning the final assessment of the training programme was handed over to the CFCs (Further Education Advisors) who had overlooked the preparation of the competitive exam for Medical Secretaries in the three aforementioned GRETAs. Intended for the trainees at the end of their training (before taking their exams), it contains a first part on 'Time Management', a second part on 'Administration of Resources', a third part on 'Communication Management', and finally a fourth part on the expectations concerning the tutor's activities(an evaluation based on a scale of 1-10.) We will dwell on the last part.

1.2.3. The viewpoints of potential tutors and active tutors

Here what we have called 'Potential tutors' are permanent trainers already working at the GRETA. A compendium of datum was given:

- At internal meetings in the training centre and at a meeting organized by the DAFPIC to mobilize the members of staff liable to be involved with the OLDP (15 trainers present, but different subjects represented.); and
- At non-directive interviews with 6 trainers already working as pedagogic tutors and through two articles published in the GRETA's in-house news-sheet. These interviews focused on the ways in which the new tutors appreciated their new activity: the conditions of the task, their previous experience, pedagogic modifications and their relation to knowledge.

2. Results: perception of required evolution

2.1 <u>Implication and questions of trainers during the preparatory phase</u>

First of all it should be noted that none of the trainers invited to the first meeting (where the objective was the presentation of the OLDP at the GRETA and the census of people interested in this type of training programme) assisted. The reasons given were multifarious : the wish not to change pedagogy at the end of a career where the pedagogy already being used worked well, a wish not to become dissipated in different activities and not be able to continue to dedicate a lot of time to trainees in face to face training (in particular carrying out very formative corrections). Thus it can be seen that there is a perceived idea that the OLDP demands a lot of time and that it is probably less efficient.

In a more implicit yet deeper way there seemed to be an idea that by not participating in this job evolution, the evolution would be put an end to: "If no-one participates the job of a trainer will not become the job of a tutor", and moreover the caliber of the training would stay the same and there would not be any suppression of teaching posts. It is true to say that for the training course for the competitive exam for Medical Secretaries, in the 'Synthesis' module the amount of face to face intervention has been reduced from 70 to 14 hours, whilst for the 'Medical Terminology' module it is non – existent.

With the passing meetings the attendance was reduced. The causes being: unavailability, mediocre mastery of the Information Technology tool, unawareness of the specific content to be adapted, and an activity much less well-paid than face to face pedagogy.

Furthermore at a meeting organized by the DAFPIC with the intention of mobilizing trainers from the Academy to intervene in Mathematics, French, Accountancy, Office Automation, and Biology/ Medical Terminology, the principal questions were about the terms and conditions of the training of trainers, the integration, or not, of the OLDP with existing modules, and the new terms and conditions of work and the corresponding salary.

2.2. <u>Study of students' expectations with regard to their pedagogic tutor and the relationship they maintained with him/her</u>

2.2.1. Presentation of the questionnaire and preliminary remarks.

At the end of the training programme a questionnaire was handed out to the trainees. Excluding questions about time management, communication tools to follow the preparation of the competitive exam with the OLDP, they were offered the possibility to agree with statements about the proficiency of a tutor on a scale of 1 to 10.

At this point it seems interesting to note that a institutional block wall was encountered; one which manifested itself in several ways:

- A refusal to hand out the questionnaires to the first GRETA;
- An acceptance to hand out the questionnaires but truncating the last part about the expectations in respect of the tutor at the second GRETA;
- An acceptance to hand out the complete questionnaire for the third GRETA but after the suppression of the following three items judged to be embarrassing, or not pertinent, by the DAFPIC:
  * The tutor should have taken part in the development of the sequences/sessions;
  * The tutor should know the sequences/sessions by heart; and
  * The tutor should be an integral part of a united pedagogical team.

It might be supposed that these refusals, at whichever level, were made to stop certain small anomalies, at an internal level, from coming to light, and at the same time to avoid certain trainees becoming aware of them.

2.2.2. Results concerning the expectations of the trainees in respect of the tutor.

First of all it can be said that all the items received a very positive evaluation: 7.83 (on a scale of 1 to 10) that is to say expectations are high. The dispersal is on the whole weak even though one trainee (who was very favourable towards the OLDP and the autonomy that it offers) gave a "1" to the items concerning non-didactic aspects and also the attitude of the tutor which was judged to be too interventionist.

If the results are analysed in detail, it can be seen that the help and monitoring activities of the tutor are very sought after. This help can be in the nature of either:

- Cognitive: explanation of finer points (9.36), understanding of eventual difficulties for the trainee (8.64), and giving clues before giving the precise answer (6.82):
  * Through emotional and motivational support: encouragement in cases of difficulties (8.82), showing each trainee that he or she can progress (9.09), and quickly answering questions that are asked (in less than 48hrs) (8.45); and
  * Through the improvement of self-esteem praising good results (8.18) and to a smaller degree allowing others to witness a good piece of work (6.64).
- Technical (8.64): that this help is either direct (resolution by the pedagogic tutor) or indirect (referred to the competent person). It may therefore be remarked that it is important for the trainees to obtain a rapid response to their problem / question. The conclusion can be drawn that it is necessary for the tutor to be on hand so that not only motivation but the pedagogic progression can be encouraged.
- Organisational/ metacognitive: help the trainees to organise their work (7.55) imposing the work-rhythm with more sensitivity (5.54). They also ask the tutor to adapt their personal evolution (7.9) and allow them to make self evaluations (8.27). Besides, this activity of evaluation and tests is very much in demand: correction of exercises on-line (8.9), check the progression of each trainee at least once a week (8.09), evaluate each trainee (7.9). These expectations place the trainee in the position of that of a trainer but with one particular difference : that of being able to be re-launched by the tutor if the progression does not conform with the training programme (8.73). There is one small discrepancy: the trainees do not really want the rhythm to be imposed but do want to be helped to respect it.
- Relational: in terms of the development of relationships within the group (7.36) and in a smaller measure the development of group work (6.09). In fact the establishment of a warm relationship with the tutor does not seem to be primordial. However after the interviews with the tutors, the plethora of cordial emails and answers of a quasi-private nature (pregnancy, activities outside the training programme, divorce…) would seem to put this result into perspective ; in other respects, the assessment meetings between the tutor and trainees threw into light the importance of this essential communication ; as in the eyes of Haeuw and Coulon (2001).

To sum up, one can see that the trainees expect the tutor to help them, especially at a conative and cognitive level, but also that he or she checks their progress. On the other hand they adhere less (scores less than 7) to more innovative activities such as : giving indices to orientate towards the

correct answer, giving value to a successful piece of work in front of everyone, favouring the development of group work, establishing a warm relationship with each trainee and neither are they disposed to having a work rhythm set by the tutor. One can therefore surmise that the trainees would like to take advantage of a possible personalization in the training course but within the logic of a competitive examination.

2.3. The point of view of potential tutors and real ones

First of all as we underlined it in the preparatory period, doubts and fears affect trainers who are asked to put a lot into the Open and Distance Learning Programme.

2.3.1. The change or the identity loss

The notion of identity can be defined as "a mental discursive construction that the main organized forces in society create around themselves or around social beings with whom they are in contact with in a situation having for immediate dominant issue the relation they are maintaining" (Barbier, 1996). Some identity fears exist because the activity of the tutor affects the representation that the trainer has of his/her job but also and mainly of the communication with the others. Regarding the job of a trainer, Fernandez (1990) draws two main activities: The one of how to transmit the knowledge and the other of how to lead a session. In the pattern of the Open and Distance Programme:

- Trainers (potential tutors) fear that the face-to-face teaching known as the core of the job will be shorten even if attending some regrouping sessions are scheduled.. Two consequences emerge:
  * They regret that most of the synchronous communication disappears (except for the case of phone calls or during regrouping session)
  * In the same way, at the beginning, they feel that the role of leader disappears as they hardly see the trainees all together and they do not think about the virtual group class. Those two reactions are part of the representation that the ODLP, through digital environment requirement, dehumanize the training, at least as long as they have not started tutoring yet.
- Trainers feel dispossessed of their role of "transmitter of knowledge" since they are tutoring for modules which were not always created by them.

However a trainer who does individualized teaching and therefore uses already documents which he may not have created is less bothered by this change of role. We can then imagine why they do not feel well when their knowledge is not taken into account. And this also applies to creativity in the process of didactisation and the mediation of the knowledge.

2.3.2. The fear of the unknown

This fear applies primarily to the people who did not have a tutoring training and who have difficulties in imagining exactly their new role and the conditions in which they can do their job. Several fears more or less linked are underlying:

- The fear of not mastering well enough the digital environment: partial mastery of useful softwares for word processing, e-mailing, production of tools, browsing on the platform… Besides Wallet (2002) points out that teachers hesitate to use the TICE (French abbreviation for Information and Education Communication Technologies) because these technologies "appear as a factor in further intricacy" and a study of Daguet (2005) showed that the young teachers did not use a lot the TICE; it is maybe for this reason and also for a lack of time at the beginning of their career. The levels here ranged from a partial mastery of word processing software to the mastery of multimedia interactivity ones as well as the mastery of e-mailing and the ability to analyse the sound and the picture;
- The necessary availability for the implication in the system (Kim, Barbier, Verrier, 2007). Generally trainers are not able to measure the time they need to do tutoring and they worry about the difficulties they can meet in managing their usual activity at the same time as the tutoring. Thus they wonder when they would be in a position to do tutoring: specific slots? in the evening at home? At the weekend? It is too vague; and
- The recognition of this activity in terms of salary. How will the tutoring be paid? Will the number of real hours be taken into account? What will be the applied rate (teaching hourly rate or associated activities whose rate is roughly divided by three)? Or can a flat rate be applied?

It is worth noting that the three GRETAs centres manage themselves this issue. But everywhere a flat rate is applied: in the first GRETA centre there is a budget which amounts to 80 hours of level IV for exam (equivalent to A levels) ; in the second centre the budget amounts to 6 hours of tuiton by followed-up trainees and in the third one the budget is equivalent to 10 hours of associated activities (the rate is divided by three) which is granted per trainees. We realize that the pay is not well set up : do we have to count the number of trainees even if there are some tutoring sessions which do not depend on the number of trainees (writing of correct versions, information on the platform…)? Are we talking about face-to-face teaching or not? How do we count the tasks when the tutor has to be present i.e. regrouping hours or when the tutor is on call? How do we recognize the work done thanks to one's own equipment used during unusual slots (late in the evening, during the bank holidays…) for the sake of answering quickly to the adult learners? How do we recognize the required time to take over the various sessions created by somebody else?

We perfectly understand that the questioning of the trainers about this issue is legitimate, because the institution also wonders about it as this is due to the difficulty to realize the real work of tutors and to conciliate the payment with the budget constraints. We have to point out that the tutors were advised of their wages after starting the tutoring.

2.4. <u>The real task of tutoring</u>.

Only one GRETA centre has kept its two tutors (for the synthesis and the medical terminology) during the whole session the two supply tutors were there for different reasons : a maternity leave and a desertion. Then the "supply tutor", who was there for maternity leave, was also replaced. Becoming a tutor is not an easy change for a trainer.

Thanks to those gathered information, we will try to analyse the difficulties and obstacles met by the tutors; therefore we will be able to draw the elements which made it easier to this change of activity.

These difficulties are:

- prior unawareness to this type of competitive entrance examination : the difference is sometimes great between the competitive competitive entrance examination profile in the official bulletin and the tests which are given to the trainees. A lot of implicit and subjectivity are often present. The fact that the team did not belong to the training in the classroom session is a drawback because the exact criteria are unknown;
- non-specialization in the taught subject : the problem occurred in the medical terminology session. Which reference subject is it connected with? Is it better to choose nursing or trainers in biology?
- non-involvement in the conception processus : as the tutors did not create the module of medical terminology they had to take over the various sessions and find the logic of the training progression which can be different from theirs;
- non-practice of the individualized training : the schedule in medical terminology is not imposed so the trainees did not choose to work at it in the same order. Therefore the tutor discovered a lot of sessions at the same time in order to answer them. As soon as the tutor discovered the sessions, he/she had the impression that he/she jumped from one subject to another without any link ; this is an usual way to behave in individualised trainer. Besides the adaptation to the courses according to the characteristics of the learner is less spontaneous;
- partial mastery of computer tools required to do tutoring. This situation is not a curb if a support even informal (colleagues, parents, friends…) is possible but it becomes an obstacle if the tutor does not have this support;
- lack of training to do tutoring : the trainees' expectations are unknown and the pro-active and control attitude necessary to the learners' progression does not exist. In fact some tutors have overestimated the possibilities of the module available on the platform, they did not elaborate follow-up tools and they remained in a reactive attitude of "person-resources";
- pedagogical team working in a GRETA which has different sites : several scattered training premises do not allow informal discussions which are often quite rich . Indeed, the feeling of partial incompetence and the tiredness are more easily accepted psychologically if some

colleagues are present to give a moral and technical help and even sometimes while collaborating during difficult periods;

- lack of being present during a regrouping class in your subject : it seems that regrouping class has two main functions : pedagogical and human. On one hand the tutor, who does not meet his/her trainees, feels that he /she does not know them very well, on the other hand he won't be able to do adjustments and to offer as efficient corrections as he would wish without deploying an incredible energy to transmit those ones through e-learning;
- non-respect, from the organisation of the competitive entrance exam, of the reckoned date for the tests whereas the dates of the training were set in order to have the most possible efficient preparation for the competitive entrance exam. Thus the tutor struggled with the fact that, at the beginning, the trainees lost quite quickly some motivation and then this training ended eight months before the competitive entry exam; and
- activity which runs over the family life: if we put forward the fact that e-learning training allows to better manage the working hours, this assertion is not completely true. If it is true that any institutional organisation forces the tutor to work on a precise slot, she/he feels obliged to answer as quickly as possible to the learners and thinks about the training on a daily basis ; she/he goes instinctively on the platform, on a regular basis (even several times a day). Thus one tutor said that tutoring is quite like being tied down.

On one hand, we throw into light the main expectations of the trainees towards the tutors and on the other hand, the real difficulties they met. The comparison of these results will allow us to find out if there are or not at the same levels.

3. The comparison of the results.

3.1. The expectations of the trainees / the job seen by the tutors

We noticed that the trainees expected help and assessment from the tutor. This assistance has different and more or less strong aspects: firstly cognitive and conative but also technical, organisational (important results found by Kim, Barbier and Verrier at the university level) and to a less extent relational aspect. We recognize here the standard profile of a trainer in individualized training (Renoult and Wittorski, 2004) who would also use the TICE. But we can also add that she/he must have an experience in the dynamic of group for attending the regrouping session which are so important so that the tutor can check if the trainees understand the device at the beginning and the tutor can adjust the working methods but also develop the group cohesion which is favourable to keep the trainees motivated and to allow them to be reassured (Ardouin, 2007). For her part, Thouroude (2007) emphazises that the tutor when she/he creates relationship (with the trainees and between them) she/he contributes to their ability to work alone and in autonomy if they have internalized the provided support. Support and mediation are then at the centre of the tutoring as Lescouarch (2007) points it out.

Those different aspects of the tutoring are only partial difficulties that the tutors met in class. Of course, we find again the difficulties linked with the personalization of the training and eventually the relation to the knowledge that the tutors, who were not involved in a face-to-face training and above all did not design it, have. Besides this result is close to the one of Cretin, Bouzidi and Marini (2007) who stress "the need to associate the teachers in the conception, set-up and updated stages in order to perpetuate the use of technological tools in the activity of the university."

We can also bring together the desire of the learner to get the answers quickly and the feeling of the tutor to be tied down.

All in all we can highlight three main points of similarity between the wishes of the trainees and the way the tutors feel about the difficulties:

- **the required adaptation of the teaching methods used;**
- **a different relation to the knowledge; and**
- **a paradoxical time management which is tinged with freedom but above all constraints.**

Even if the trainer can surpass these difficulties while being accompanied, she/he finds it more difficult to overcome obstacles which are external to the training relation but rather linked to explicit

or implicit ideologies (if they do not suit her/him) and to the integration of the ODLP in the politico-economic environment.

3.2 Integration of the activity in the political/economical and institutional environment.

3.2.1 The political, economical and social stakes.

First it should be noted that the OLDP entered into the work code with the circular DGEFP n°2001-22 of the 20th of July 2001, being defined as "a flexible training programme catering for individual and group needs (individuals, companies, districts) and made up of individualized learning procedures with access to local and remote resources and competences that are not necessarily carried out under the supervision of a trainer." With the circular DGEFP n°2006-18, the OLDP became a means to support the development of employment, skills and qualifications in the districts. The annexe VI (on the individualization of the modes of acquiring new skills) even stipulates that it has become a way to fight against social exclusions and to aid participants with access to qualifications. The APP (Personalized Pedagogy Workshops) and the FORE programme (Open remote training programme) are widely cited.

Thus while it can be observed that the individualization of the training programme fulfills the consequential new demands imposed by economic, social and demographic changes, the OLDP is only one means to achieve these aims. However, the circulars emanating from the Ministry of Employment, Social Cohesion and Housing have wide bearing repercussions on the finances of the training programme. More and more, Regions finance the projects that integrate the OLDP, for the above mentioned reasons. Other economic players will consider that the flexibility of the training programme as well as the reduction in traveling costs can only be beneficial: employees are more available and their training programmes are less costly.

At the preparatory meetings the trainers asked questions about the reduction in costs, being left to think that it was not necessarily compatible with the quality of the training programme. Moreover, pushing individuals to self-evaluation places responsibility for the training programme with each individual whereas many trainers think that this responsibility should remain a collective one.

3.2.2. The institution's role.

The individual interviews highlighted the fact that the institution's role concerning the tutorial plays mainly on three levels:

- Firstly the choice of tutor and the underlying reasons for it. Having been chosen for his or her level of expertise is not at all equivalent to a choice by default or as a result of financial considerations (completing hours). It may be supposed that the representation and acknowledgement of his or her function are very different: enhanced value in the first case and a form of "subservience" in the second, compatible with an eventual feeling of lack of skills;
- Secondly at a level of remuneration: Indeed the mode of calculation varies from one training centre to another and as Blandin and Duveau-Patureau (2003) remarked it is often based on the charge of transmission of knowledge whereas the OLDP requires more the tutor a charge of activities, exchange and standing back. It is not surprising therefore that the trainers should ask questions about this point in the meeting concerning potential tutors. And this work, with the necessary investment it entails does not always seem to them to be recognized, neither in terms of the transformation of their identity (new level of expertise), nor in terms of remuneration; and
- Finally the tutor's role is not always considered as being different from that of a trainer, the training needs of whom are not always taken into account, and new tutors often spend a lot of time training themselves.

4. The professionalization of the players.

4.1. The conditions favouring the exercise of tutoring.

We would like to point out the fact that none of these difficulties mentioned above seems to represent in itself a real block. On the other hand the combination of several of them or even all of the difficulties becomes a factor for stopping the tutoring.

But the iterviewss revealed favourable factors like:

- the prior knowledge of the tests (or of the contents of the training) as well as the involvement in the scripting of the module;
- the satisfying mastery of the digital environment;
- the use of the individualized training and the group leading;
- the technical and pedagogical support of the team (Lafortune,2007);
- the respect of the exam or competitive entrance exam dates; and
- The great availability of the tutors and its recognition by the institution.

Thus we notice that those conditions are from various sources: characteristics prior to the trainer but also characteristics of the device. Some of these assets can besides compensate some weak points of the system (device and tutor) ; for example some colleagues can attend the technical tutor training or also have the information about precise tests submitted by the exam. Besides:

- a training to do tutoring can allow to evolve more easily; and
- the possibility do improve the device during the experimentation is essential so that the tutor adheres to the training and commits himself/herself completely. Here, the module of terminology has been improved during the course of the training (we have to point out the importance of the reactivity of the pedagogical tutor but also the administrator on the platform). And for the next course, some regrouping are planned for this module. It is therefore necessary that the tutor is able to intervene in the configuration of the device so that she/he has the feeling of not being a simple executing person who has not got the grip on the knowledge and the transmission. This feeling according to Gendron (2007) represents a factor of important stress, and this situation affects also her/his professional identity. Moreover what Perrenoud (1999) thinks about the training can be adapted to the tutoring:" No more than the talent of a player can save a bad play, the skills of a teacher (here tutor) can not do miracles in a badly thought out device of teachers (e-learning). It is therefore unfortunate to limit the role of teachers (here tutors) to those of players.They have the right and the duty to participate in the writing and the successive rewritings of the script."

4.2. Pathways to professionnalization: The transition from trainer to tutor

From the information gathered in the interviews, it would seem that several pathways to professionnalisation (Wittorski, 2007) are conceivable and complimentary.

- in terms of action (1): the tutor adapts him or herself without having to think about the new situation. For example: when he/she consults the platform and clicks pertinently on a button that he/she has not been aware of before and notices that it is necessary to attach a file before writing the message on the forum so that it can be taken into account on the platform;
- in terms of the reflection on the action (2): this pathway is described as being an iteration between the research for information and the use of it to take effect. For example: mentioning the consultation of on-line assistance;
- in terms of the reflection on the action (3): active experience transforms itself into mental experience thanks to a retrospective reflection taken after the action. This situation comes about in the groups of the analysis of the practice but here, it is the meetings between the tutors of the same subject who have played this role. For example when a tutor had spontaneously taken the initiative to solicit the trainees who had not advanced sufficiently, putting the action into words gave the opportunity to discover a pro-active attitude adapted to the situation in hand;
- in terms of the reflection on the action (4): This consists of formalizing the new practices; in training it means defining the new process of action through an anticipatory reflection. It was notably decided to build up a wiki[41] in which each participant (pedagogic team and trainees) presented themselves in order to create bonds and a better sense of being part of a group. This practice figured in the meeting report. It was the same for the files that were created by the tutor to make the monitoring of the learners easier;
- in terms of the cultural transition in relation to the action (5): in training this consists of resolving the problem by "shifting representations" but with the help of a third party. For example : the tutor

[41] A wiki is a collaborative tool of joint effort writing and publishing of documents on the Internet, allowing internet users to modify freely the content of pages published in a simple way with the idea that anyone can be a news editor

might think that the learners find themselves isolated by the distance that separates them but thereafter becomes aware of the closeness of the learners thanks to their emails and their telephone conversations. It is all part and parcel of the OLDP culture; and

- in terms of integration/ assimilation (6): this relates to the acquisition of necessary parts of knowledge before taking part in the training programme or in self-tuition for example: reading articles and books or by meeting experienced tutors who can share their experience.

In accordance with these situations and their environment it can be seen that the ways in which professional intervention is addressed can differ. In the case of the OLDP technology is an integral part of the environment but the human element is not negligible. Indeed they can be present in the last five pathways. Communicative and listening skills are therefore indispensable.

In addition it would seem that the professional pathways of the tutor can also be delineated partially:

- By his/ her cognitive characteristics such as motivation, representation of the OLDP and the tutorial, and self-esteem. A very motivated tutor will be inclined to train himself (pathway 6) whereas a tutor who lacks self-confidence will rely rather on a third party (pathways 2 and 5) whenever he/she encounters a problematical situation; and
- By the institution. Indeed the institution can intervene beforehand at many levels: at an individual level by encouraging the tutors' motivation and not only by helping them transform their performance but also by encouraging an easily assimilated analysis of practices at group meetings. That being said thinking about the professional life of a tutor before the training programme is essential. How would a trainer convened to a two-hour meeting feel about having to cancel a four-hour lesson? (A feeling of guiltiness at not being able to assure his/her lesson, and also a not negligible loss in salary).

Blandin and Duveau-Patureau (2003) laud resorting to a training programme for trainers for the OLDP and then a "hands-on training which allows new tutors to be accompanied in their work and their evolution".

Conclusion

The presentation of this experimentation brought to light the non-insurmountable difficulties to become a tutor when you are a trainer, in order to draw their needs (gap between the current situation and the desirable situation). However, we are obliged to recognize that the expectations of the trainees remain similar from what they would expect from a trainer mainly from an experienced trainer with a one-to-one teaching (putting the learning adult at the centre of the training). And even if the task sometimes seemed difficult for new tutors, according to another questionnaire which was distributed to a large number of trainees at the beginning and at the end of the training, the trainees say, at the end of the cursus, that they enjoy working with the open and distance learning programme and become more autonomous while seeking information. Nevertheless this result depends on the stability of the trainers and on keeping the date of the entry exam.

Nonetheless we have to notice that the tutors who reckoned to have well fulfilled their role developed a feeling of self-efficiency upon which they could use it for a new session or to guide new tutors. Futhermore the fact that we do not put barriers between the conception of tools and the pure tutoring is an important element - without revising radically the modules and the training programme -

it is necessary that the tutor who did not take part in the conception is able to adapt the module according to the needs. Contrary to a book, a module in the Open and Distance Learning Programme is then a training tool adaptable as long as there is a consensus between the tutors. This implies availability of a technical tutor in order to make changes on the platform.

Besides we noticed some resistances from the potential tutors. Those had two main origins : on one hand a distorted representation of the Open an Distance Learning Programme which is not seen as complementary to the existing training but in competition with them and on the other hand a great worry about the condition of work and the continuity of the trainer's identity.

It seems then that the institution has an essential role to play in the recognition of the tutor's new activities but also in the information/training of this partially new job. The subject of a new study could then be the impact of a training prior to a tutoring and even the influence of an individualized giving support to these new tasks.

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References

Ardouin, T., (2007) Ce qui compte le plus dans les dispositifs à distance, c'est la présence ! Le cas du Master ICF,. *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH.

Barbier, J-M., (1996), De l'usage de la notion d'identité en recherche, notamment dans le domaine de la formation. Education Permanente, 128, 11-26.

Blandin, B. et Duveau-Patureau, V. (2003), Formations Ouvertes et A Distance: l'opportunité de réinterroger nos pratiques ? *In crefor.asso.fr*, http://www.crefor.asso.fr/ranfor/4/dossiers/foad2003/DossierDocFoad2003Ranfor.pdf (14.09.07)

Crétin, R., Bouzidi, L., Marini, J-L, (2007), Mise en place de l'environnement numérique de travail au sein de l'Université Jean Moulin Lyon 3 : l'enseignant au cœur d'une dynamique de changement. *In Informations, Savoirs, Décisions et Médiations, Revue permanente en ligne des utilisateurs des Technologies de l'Information et de la Communication* http://isdm.univ-tln.fr/PDF/isdm29/CREBOUMAR.pdf (10.03.08).

Daguet, H. (2006), « environnement numérique de travail et d'apprentissage en éducation », colloque Savoirs et acteurs de formation, Rouen, 18-19-20 mai 2006.

Fernandez, J. (1990), Réussir une activité de formation, Editions Saint-Martin, Montréal.

Gendron, B., (2007), Des compétences au capital émotionnel et bien-être et mal-être des enseignants, Actes du congrès AREF.

Haeuw, F., Coulon, A. (2001), Elaboration d'un référentiel de compétences, In Algora, http://app.algora.org/publications/pdf/refcomp.pdf (20.06.07).

Jacquinot-Delaunay, G., (2003), « Du présentiel à la distance : comment former les enseignants-chercheurs à un changement d'identité professionnelle ? », *Colloque international de l'AFIRSE, Former les enseignants et les formateurs, une priorité pour l'enseignement supérieur ?,* Unesco, CDROM/AFIRSE.

Kim, S-M., Barbier, R. et Verrier, C. (2007), Implication et enseignement en ligne, Actes du congrès AREF.

Lafortune, L., (2007), Dimension affective, travail en équipe de collègues et bien-être des personnels scolaires, Actes du congrès AREF.

Lescouarch, L., (2007) « De l'intérêt de la pédagogie Freinet transposée à un dispositif à distance », *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH

Perrenoud, Ph., (1999) De quelques compétences du formateur expert, http://www.unige.ch/fapse/SSE/teachers/perrenoud/php_main/php_1999/1999_15.html (5.8.07)

Renoult, C. et Wittorski, R., (2005) De la professionnalisation des formateurs à celle des stagiaires dans un parcours de formation personnalisée. *In* R. Wittorski (dir.*) Formation, travail et professionnalisation,* L'Harmattan, Paris.
Renoult, C., (2007) De la pédagogie personnalisée à la FOADA, il n'y a qu 'un pas…, Actes du congrès AREF.
Thouroude, L., « Etudier en Licence », *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH.
Wallet, J. (2002), Point de vue des Sciences de l'Education, Symposium Technologies informatiques en éducation. 31 janvier et 1er février 2002, http://www.moddoulearning.com/info/index.php?q=node/28 (1.09.07).
Wittorski, R. (2007), Professionnalisation et développement professionnel, L'Harmattan, Paris.

About the Author

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"Analyse des modalités de passage d'une activité de formateur à une activité de tuteur dans un dispositif de e-learning"

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Résumé

Cet article propose d'analyser les conditions de la mise en place d'une Formation Ouverte et A Distance pour préparer au concours de secrétaire médical(e) dans le cadre d'un partenariat Education Nationale / Association Nationale de la Formation Hospitalière pour un public adulte.

La recherche repose sur l'exploitation d'entretiens avec les formateurs, de questionnaires distribués aux stagiaires et de comptes-rendus de réunion concernant la mise en place du dispositif.

Il interroge particulièrement les transformations identitaires que vit le formateur lorsqu'il devient tuteur et les difficultés qu'il rencontre ; cela dans le but de dégager les voies de professionnalisation qui s'offrent à lui et les conditions qui favorisent l'acceptation de son nouveau statut.

Introduction

Depuis une vingtaine d'années, les nouvelles technologies éducatives sont largement entrées dans le domaine de la formation et la FOAD (Formation Ouverte et A Distance) s'est beaucoup développée dans l'enseignement supérieur. Son entrée dans la formation d'adultes est plus discrète mais devient une nécessité en particulier au regard des financeurs. Le métier de formateur est donc en pleine mutation.

Ainsi que Jacquinot (2003) s'interrogeait sur les conditions dans lesquelles s'effectuait l'innovation pédagogique qui consiste à mettre en œuvre des dispositifs de formation à distance dans les universités françaises via les campus numériques, nous aimerions analyser ce qui se passe en formation d'adultes à partir d'une recherche effectuée dans des GRETA. Jacquinot relevait des difficultés au niveau de l'articulation des diverses instances concernées par cette innovation : « différences voire désaccords conceptuels, conflits de personnes et de pouvoirs, hétérogénéïté des enjeux et des valeurs à chacun des niveaux, mise en évidence des contraintes et des contradictions du système ». En particulier, elle notait « les divers changements de statut et de fonction des acteurs (qui) entraînent de leur côté des modifications organisationnelles, structurelles, institutionnelles… mais aussi des repositionnements d'identité professionnelle voire personnelle ». Comment ce changement s'est-il effectué dans le dispositif proposé en formation d'adultes? Comment les enjeux ont-ils été perçus ? Quels effets ont-ils eu sur la professionnalisation des tuteurs?

Afin de mieux cerner l'activité et le vécu des tuteurs, nous avons assisté à des réunions concernant la mise en place du dispositif et réalisé des entretiens avec les tuteurs. Nous avons aussi fait passer des questionnaires à un groupe de stagiaires pour connaître leurs attentes à l'égard de ceux-ci.

Nous présenterons donc dans un premier temps, les résultats de cette recherche et nous interrogerons ensuite sur la manière dont l'évolution du métier peut s'opérer en faisant référence aux travaux de Wittorski (2007). Nous essaierons donc de dégager les modalités de passage d'une identité à l'autre, au niveau individuel mais aussi institutionnel.

1. Présentation du contexte et méthodologie de l'enquête.

1.1. Le dispositif FOADA

1.1.1. L'origine du projet.

L'ANFH (Association Nationale de la Formation Hospitalière) a mandaté l'Education Nationale pour mettre en ligne la préparation au concours de secrétaire médical. Ce projet a été co-piloté par les DAFPIC (Délégation Académique à la Formation Professionnelle Initiale et Continue) de Rouen, de Caen et de Corse. L'académie de Rouen s'est chargée de la conception du module de note de synthèse en demandant à trois formatrices, intervenant déjà dans ce domaine de créer les séquences de formation tandis qu'une formatrice de l'Académie de Caen concevait le module terminologie médicale ; l'Académie de Corse devant se charger de l'évaluation finale.

1.1.2. L'organisation de la formation.

L'expérimentation ne porte que sur trois Greta de Haute-Normandie, les autres académies ayant proposé cette formation plus tardivement. Un même plan de formation concerne ces trois GRETA:

- quatre modules sont proposés : Terminologie médicale (35h dont 6h de concours blancs), Note de synthèse (25 séquences d'une durée totale de 60h dont 6h de concours blancs), Législation Hospitalière (20h) et entraînement à l'épreuve orale (20h) mais seuls, les deux premiers reposent sur la FOAD.
- la part de formation en présentiel est très variable : elle n'existe pas en Terminologie Médicale mais s'étale sur 14h (réparties en 6 séances) pour le module concernant la note synthèse. Pour ce module, un découpage par blocs a été réalisé (ex : découverte de la méthode, constitution de plans, aspects rédactionnels…) et un regroupement est prévu à la fin de chaque bloc. Le rythme des rencontres repose donc sur une évaluation du temps nécessaire pour traiter les séquences à distance.
- la formation s'étale sur cinq mois pour la partie en FOADA. Notons à ce propos que le « A » final insiste sur le rôle du tuteur puisqu'il signifie « accompagnée ».
- les équipes pédagogiques se composent bien sûr des formateurs (pour les deux modules en présentiel) ou des tuteurs représentant les quatre modules mais aussi d'un coordonnateur pédagogique, du responsable du Centre de Ressources, du CFC (Conseiller en Formation Continue) qui chapeaute le secteur et le directeur technique.

Par ailleurs, au niveau académique, un titulaire du CAFEL (diplôme de Concepteur Animateur de Formations En Ligne) veille au bon fonctionnement technologique de la plateforme et se met à la disposition des tuteurs pédagogiques en cas de problème. A la DAFPIC, deux CFC font le lien avec le commanditaire du dispositif (ANFH).

- la formation proprement dite a été précédée d'une première séance menée par le coordinateur pour présenter aux stagiaires l'organisation, leur faire passer un positionnement et remplir un questionnaire sur leurs représentations concernant la FOAD et leur façon d'apprendre. Une seconde séance, animée par celui-ci et le responsable du CDR, a permis la prise en main de la plateforme. Les tuteurs pour les modules « note de synthèse » et « terminologie médicale » sont venus se présenter et rendre les positionnements.
- les groupes comprennent de 10 à 13 femmes âgées de 22 à 40 ans. Ils sont prévenus qu'ils participent à l'expérimentation de ce dispositif et que les centres de formation les engagent à formuler des remarques constructives en vue de l'améliorer.
- Notre étude portera sur un groupe de stagiaires émanant du même GRETA, soit 11 personnes, et sur les tuteurs des trois GRETA de Haute-Normandie concernés, soit 6 formateurs et deux coordonnateurs.
- Ainsi, nous remarquons que les tuteurs se différencient déjà en fonction des variables suivantes :
- implication ou non-implication dans l'élaboration des outils placés sur la plateforme.
- possibilité ou impossibilité de rencontrer les stagiaires en présentiel.
- Mais aussi:
    - choix personnel ou pression institutionnelle de participer à cette formation en devenant tuteur.
    - connaissance préalable ou méconnaissance de la formation entièrement en présentiel pour la préparation de ce concours.
- utilisation d'un environnement informatique à des fins pédagogiques.
- plus ou moins grande présence de l'équipe pédagogique travaillant autour de ce projet.

1.2. <u>La méthodologie de l'expérimentation</u>

1.2.1. Etude de la phase préparatoire

Pour ce faire, nous avons suivi pendant un an et demi, le cheminement des formateurs vers l'activité de conception des modules puis leur orientation vers le tutorat.

1.2.2. Etude des attentes des stagiaires à l'égard du tuteur pédagogique et des relations qu'ils entretiennent avec lui

Un questionnaire concernant le bilan final de la formation a été transmis aux CFC qui chapeautaient la préparation du concours de secrétaires médicaux dans les trois GRETA précités.

Destiné aux stagiaires en fin de formation (et n'ayant pas encore passé les épreuves), il comprenait une première partie sur la gestion du temps, une deuxième sur la gestion des outils, une troisième sur la gestion de la communication et une quatrième sur les attentes concernant les activités du tuteur (évaluation de l'importance sur une échelle de 1 à 10). Nous nous attarderons sur cette dernière partie.

1.2.3. Le point de vue des tuteurs potentiels et des tuteurs effectifs

Tout d'abord, nous nommons ici « tuteurs potentiels », les formateurs permanents travaillant dans des GRETA.

Le recueil de données s'est fait:

- lors de réunions internes au centre de formation et lors d'une réunion organisée par la DAFPIC pour mobiliser les personnels susceptibles de s'investir dans la FOAD (15 formateurs présents, toutes matières confondues).
- lors d'entretiens non-directifs avec les 6 formateurs déjà en situation de tuteurs pédagogiques et à travers deux articles publiés dans le journal interne d'un GRETA. Ces entretiens ont porté sur la manière dont les nouveaux tuteurs appréciaient leur nouvelle activité: leurs conditions d'exercice, leur expérience antérieure, les modifications pédagogiques et leur rapport au savoir.

2.Les résultats: la perception des évolutions nécessaires

2.1. Implication et interrogations des formateurs lors de la phase préparatoire

Tout d'abord, il est à noter que tous les formateurs conviés à la première réunion (dont l'objet était la présentation de la FOAD au GRETA et le recensement des personnes intéressées par le développement de ce type de formation) n'y ont pas assisté. Les raisons données étant diverses : désir de ne pas changer de pédagogie en fin de carrière alors que celle qui est utilisée fonctionne bien, désir de ne pas se disperser dans des activités variées afin de continuer à consacrer beaucoup de temps aux stagiaires en présentiel (en particulier, réaliser des corrections très formatives). On relève donc l'idée que la FOAD demande beaucoup de temps et qu'elle est sans doute moins efficace.

De façon plus implicite mais aussi plus profonde, apparaît l'idée que ne pas participer à cette évolution du métier va peut être la bloquer : « Si personne n'adhère, le métier de formateur ne va pas se transformer en métier de tuteur » et surtout, la qualité de la formation restera la même et il n'y aura pas de suppression de postes. Il est vrai que pour cette formation au concours de secrétaire médical, en note de synthèse, la partie en présentiel a été réduite de 70 à 14h et pour la terminologie médicale, elle a complètement disparu dans un premier temps.

Au fil des réunions, l'effectif s'est réduit : indisponibilité, médiocre maîtrise de l'outil informatique, méconnaissance des contenus spécifiques à scénariser, activité nettement moins rémunératrice que du face-à-face pédagogique en ont été les causes.

D'autre part, lors d'une réunion organisée par la DAFPIC et destinée à mobiliser les formateurs de l'académie intervenant en Mathématiques, en Français, en Comptabilité-gestion, Bureautique et Biologie-Terminologie Médicale, les principales questions ont porté sur les modalités de formation des formateurs, l'intégration de la FOAD à partir de modules existants ou non, les nouvelles modalités de travail et la rémunération associée.

2.2. Etude des attentes des stagiaires à l'égard du tuteur pédagogique et des relations qu'ils entretiennent avec lui.

2.2.1. Présentation du questionnaire et remarques préalables

A la fin de la formation, un questionnaire a été distribué aux stagiaires. En dehors de questions portant sur la gestion du temps, des outils et de la communication pour suivre la préparation du concours en FOAD, on leur proposait de noter leur degré d'accord (de 1 à 10) avec des propositions concernant les compétences attendues chez un tuteur.

A ce stade, il nous semble intéressant de préciser qu'un blocage institutionnel s'est produit, se manifestant de plusieurs façons :

* refus de faire passer les questionnaires pour le premier GRETA.
* acceptation de faire passer les questionnaires mais en tronquant la dernière partie concernant les attentes par rapport au tuteur, pour le deuxième GRETA.
* acceptation de faire passer les questionnaires complets pour le troisième GRETA mais après la suppression des trois items suivants jugés non-pertinents ou embarrassants par la DAFPIC:

- Le tuteur doit avoir participé à l'élaboration des séquences.
- Le tuteur doit parfaitement connaître les séquences.
- Le tuteur doit lui-même être intégré à une équipe pédagogique soudée.

On peut faire l'hypothèse que les refus, à quelque niveau que ce soit, avaient eu pour but de ne pas mettre en lumière certains petits dysfonctionnements repérés au niveau interne et de ne pas favoriser la prise de conscience ou le rappel de ceux-ci aux stagiaires.

2.2.2. Résultats concernant les attentes des stagiaires par rapport au tuteur

Tout d'abord, on remarque que l'ensemble des items a été évalué très positivement : 7,83 (échelle de 1 à 10) c'est à dire que les attentes sont fortes. La dispersion est globalement faible bien qu'une stagiaire (très favorable à la FOAD et à l'autonomie qu'elle offre) applique un « 1 » pour les items concernant les aspects non-didactiques ou les attitudes jugées trop interventionnistes de la part du tuteur.

Si nous analysons dans le détail les résultats, nous constatons donc que les activités d'aide et de contrôle de la part du tuteur sont très recherchées. Cette aide peut être d'ordre:

- cognitif : expliquer des points délicats (9,36), comprendre les éventuelles difficultés du stagiaire (8,64) ou encore donner des indices avant de donner la réponse exacte (6,82);
- -conatif: * à travers le soutien affectif et motivationnel: encourager en cas de difficultés (8,82), montrer à chaque stagiaire qu'il peut progresser (9,09), répondre vite (moins de 48h) aux questions qui lui sont posées (8,45);
- à travers la valorisation personnelle : féliciter en cas de bons résultats (8,18) et dans une moindre mesure face aux autres mettre à la disposition de tous un bon travail (6,64),
- technique (8,64): que cette aide soit directe (résolution par le tuteur pédagogique) ou indirecte (renvoi à la personne compétente). On remarque donc qu'il est important pour les stagiaires d'obtenir une réponse rapide à leur problème/question. Nous dégageons alors la nécessaire disponibilité du tuteur pour favoriser non seulement la motivation mais aussi la progression pédagogique;
- organisationnel voire métacognitif: aider les stagiaires à organiser le travail (7,55) et avec plus de frilosité imposer le rythme de travail (5,54). Ils demandent aussi au tuteur d'adapter leur parcours (7,9) et de leur permettre de s'auto-évaluer (8,27). D'ailleurs, cette activité d'évaluation et de contrôle par le tuteur est très recherchée : corriger les exercices en ligne (8,9), vérifier l'avancement de chaque stagiaire au moins chaque semaine (8,09), évaluer chaque stagiaire (7,9). Ces attentes le placent dans la position habituelle de l'enseignant mais avec une variante particulière: celle d'être relancé par le tuteur si la progression n'est pas conforme au plan de formation (8,73). On note alors un léger décalage: ils ne souhaitent pas vraiment que le rythme soit imposé mais veulent qu'on les aide à le respecter;
- relationnel: au niveau du développement des relations à l'intérieur du groupe (7,36) et dans une plus faible mesure de l'élaboration d'un travail commun (6,09). Enfin, l'instauration d'une relation chaleureuse avec le tuteur ne semble pas primordiale (5,64). Pourtant, d'après les entretiens réalisés avec les tuteurs, l'abondance de mails très cordiaux et les réponses d'ordre quasi-privé (grossesse, activités en dehors de la formation, divorce…) semblerait relativiser ce résultat, les réunions de bilan dégageant par ailleurs l'importance de cette communication tuteur/stagiaires indispensable aux yeux d'Haeuw et Coulon (2001).

Pour résumer très brièvement, on s'aperçoit que les stagiaires attendent particulièrement du tuteur qu'il les aide au niveau conatif et cognitif mais aussi qu'il exerce une activité de contrôle. Par contre, elles adhèrent moins (scores inférieurs à 7) à des activités plus novatrices telles : donner des indices pour orienter vers la bonne réponse, valoriser aux yeux de tous un travail bien réussi, favoriser l'élaboration d'un travail en commun, établir une relation chaleureuse avec chaque stagiaire mais elles ne sont pas enclines à se voir imposer un rythme de travail par le tuteur. On peut donc avancer l'idée qu'elles ont envie de profiter de la personnalisation possible de cette formation mais ici dans une logique de concours. Voyons maintenant comment les formateurs conçoivent leur rôle de tuteur.

2.3. <u>Le point de vue des tuteurs potentiels et des tuteurs effectifs</u>

Tout d'abord, ainsi que nous l'avons vu dans la phase préparatoire, des doutes et des craintes affectent les formateurs à qui l'on propose de s'investir dans la FOAD.

2.3.1. La transformation ou la perte d'identité.

La notion d'identité peut être définie comme « une construction mentale et discursive que les acteurs sociaux opèrent autour d'eux-mêmes ou autour d'êtres sociaux avec lesquels ils sont en contact, dans une situation ayant pour enjeu immédiat dominant, la relation qu'ils entretiennent. » (Barbier, 1996). Des craintes identitaires existent dans le sens où l'activité de tuteur touche à la représentation que le formateur se fait de sa profession mais aussi et surtout de la communication avec les autres. Concernant le métier de formateur, Fernandez (1990) dégage deux grandes fonctions : celle de transmetteur de savoir et celle d'animateur de séance. Dans le cadre de la FOAD,

- les formateurs (tuteurs potentiels) craignent que le face-à-face pédagogique reconnu comme le centre du métier soit largement tronqué même si des séances de regroupement en présentiel sont prévues. Deux conséquences apparaissent:
  - ils regrettent que la communication synchrone disparaisse en grande partie (sauf en cas de communication téléphonique et lors du regroupement).
  - de la même façon, dans un premier temps, ils considèrent que leur fonction d'animateur disparaît puisqu'ils voient rarement tous les stagiaires ensemble et qu'ils ne pensent pas à la classe virtuelle. Ces deux réactions s'inscrivent en fait dans la représentation que la FOAD, à travers le recours à un environnement numérique, déshumanise la formation, tout au moins tant qu'ils n'ont pas encore effectué de tutorat.
- les formateurs se sentent dépossédés de leur rôle de « transmetteur de savoirs » puisqu'ils exercent le tutorat pour des modules qui n'ont pas toujours été conçus par eux. Ceci dit, un formateur qui pratique la pédagogie personnalisée et donc s'appuie déjà sur des documents qu'il n'a pas obligatoirement créés est moins gêné par ce changement de rôle. On peut alors imaginer qu'ils vivent mal une forme de négation de leur savoir et de leur potentiel de création dans les processus de didactisation, de médiation des savoirs.

***2.3.2. La peur de l'inconnu*.**

Cette peur concerne en priorité les personnes qui n'ont pas reçu de formation au tutorat et qui ont peine à se représenter exactement leur nouvelle fonction et les conditions dans lesquelles elles vont l'exercer. Plusieurs inquiétudes, plus ou moins liées sont sous-jacentes :

- la peur de ne pas maîtriser suffisamment l'environnement numérique : maîtrise partielle des logiciels utiles pour le traitement de texte, les mails, la production d'outils, la navigation sur la plateforme…Wallet (2002) note d'ailleurs que les enseignants hésitent à utiliser les TICE (Technologies d'Information et de Communication en Education) car elles « apparaissent comme un facteur de complexité supplémentaire » et une étude de Daguet (2005) a montré que les jeunes enseignants n'utilisaient que très peu les TICE sans doute pour cette raison et par manque de temps en début de carrière. Ici, les niveaux allaient d'une maîtrise incomplète d'un logiciel de traitement de texte à la maîtrise des générateurs d'interactivité multimédia en passant par la maîtrise du courrier électronique, la capacité à traiter l'image et le son.
- la disponibilité nécessaire à l'implication dans le dispositif (Kim, Barbier, Verrier, 2007). En général, les formateurs sont incapables d'évaluer le temps que le tutorat leur demandera et craignent d'avoir des difficultés à gérer leur activité habituelle en même temps que celui-ci. Ils s'interrogent alors sur le moment où ils pourront exercer le tutorat : plages spécifiques ? le soir à la maison ? au week-end? Le flou règne.
- la reconnaissance de cette activité au niveau salarial. Comment sera rémunéré le tutorat ? Le nombre d'heures effectives sera-t-il pris en compte? Quel sera le taux appliqué (heures de cours ou d'activités périphériques, dont le taux est environ divisé par trois)? ou bien encore un forfait sera-t-il attribué?

Il est à noter ici que les trois GRETA ont eu une gestion propre de cette question. Mais partout, la rémunération a été forfaitaire : dans le premier GRETA, une enveloppe équivalant à 80h de cours de niveau IV, dans le deuxième, un forfait équivalant à 6h de cours par stagiaire suivi et dans le troisième GRETA, 10h périphériques (taux divisé environ par trois) allouées par stagiaire. On s'aperçoit bien

que la rémunération est hésitante : faut-il prendre en compte le nombre de stagiaires bien qu'il y ait des activités tutorales qui ne dépendent pas de cet effectif (rédaction de corrigés-types, informations sur forum…) ? Se réfère-t-on à du face-à-face pédagogique ou non ? Comment sont comptabilisées les heures de regroupement ou de permanence téléphonique qui impliquent la présence ? Comment est reconnu le travail effectué grâce à du matériel personnel dans des créneaux horaires inhabituels (le soir tard, les jours fériés…) par souci de répondre vite aux demandes des apprenants ? Comment est considéré le temps nécessaire à s'approprier les diverses séquences conçues par un tiers ?

On s'aperçoit bien que le questionnement des formateurs à ce sujet est légitime car l'institution se pose elle aussi des questions du fait de la difficulté de se représenter le travail réel d'un tuteur et de concilier sa rémunération avec des contraintes budgétaires. Il est à noter que les tuteurs n'ont été avertis de leur rémunération qu'après avoir pris leurs fonctions.

2.4. L'exercice effectif du tutorat

Un seul GRETA a gardé ses deux tuteurs (pour la note de synthèse et la terminologie médicale) pendant toute la session, les deux remplacements ayant été faits pour des raisons différentes : un congé maternité et un abandon. Puis, le « remplaçant » pour congé maternité a lui-même été remplacé. Devenir tuteur n'est donc pas une chose qui va de soi pour un formateur.

Essayons donc, d'après le recueil d'informations effectué, d'analyser les difficultés et les obstacles rencontrés par les tuteurs pour ensuite dégager les éléments facilitateurs pour ce changement d'activité.

Voici donc ces difficultés:

- méconnaissance préalable de ce type de concours : en effet, l'écart est parfois grand entre la description du concours dans le J.O et les épreuves qui sont proposées aux candidats. Beaucoup d'implicite et de subjectivité règne souvent. Ne pas avoir auparavant fait partie de l'équipe qui participait à cette formation en présentiel est un handicap car les critères exacts de sélection sont méconnus;
- non-spécialisation dans la discipline enseignée: le problème s'est posé pour la terminologie médicale. A quelle discipline de référence la raccrocher ? Vaut-il mieux choisir des soignants ou des formateurs de biologie?
- non-implication dans le processus de conception : le module de terminologie médicale n'ayant pas été conçu par les tuteurs, il a d'abord fallu que les tuteurs s'approprient les différentes séquences et trouvent la logique de la progression pédagogique qui peut différer de la leur;
- non-pratique de la pédagogie personnalisée: l'ordre des séquences en terminologie médicale n'étant pas imposé, les stagiaires n'ont pas toutes choisi de les travailler dans le même ordre. Le tuteur a donc dû découvrir de nombreuses séquences en même temps pour pouvoir répondre. Une fois ces séquences découvertes, il avait perpétuellement l'impression de « sauter du coq à l'âne », gymnastique quotidienne en individualisation. Par ailleurs, l'adaptation des parcours aux caractéristiques de l'apprenant est moins spontané;
- maîtrise incomplète des outils informatiques propices à l'exercice du tutorat. Cette situation n'est qu'un frein si un soutien même informel (collègues, parents, amis…) est possible mais devient un obstacle si le tuteur n'a pas ce soutien;
- absence de formation au tutorat : méconnaissance des attentes des stagiaires et de l'attitude pro-active et de contrôle nécessaire à la progression des apprenants. En fait, certains tuteurs ont surestimé les possibilités du module présent sur la plateforme, n'ont pas élaboré d'outils de suivi et sont restés dans une attitude réactive de « personne-ressources»;
- équipe pédagogique travaillant dans un GRETA très éclaté : plusieurs lieux de formation, ce qui ne favorise pas les rencontres informelles souvent très riches. En effet, le sentiment d'incompétence partielle et la fatigue sont plus faciles à supporter au niveau psychologique si des collègues sont présents pour apporter un soutien technique et affectif parfois même en collaborant dans les périodes difficiles;
- absence de regroupements en présentiel dans sa matière: il semble que les regroupements aient deux fonctions principales: pédagogique et humaine. Le tuteur qui ne rencontre pas ses stagiaires a le sentiment de moins les connaître d'une part, et surtout de ne pas pouvoir faire des mises au point, des corrections aussi efficaces qu'il le souhaiterait sans déployer une énergie incroyable pour transmettre ces éléments à distance;

- non-respect de la part des organisateurs du concours de la date prévue pour les épreuves alors que les dates de formation avaient été fixées pour que la préparation à ce concours soit la plus efficace possible. Le tuteur a donc dû lutter contre un phénomène de démotivation des candidates qui, d'abord avaient eu un rythme rapide pour ensuite terminer cette formation 8 mois avant le concours;
- activité qui déborde sur la vie familiale: si l'on met souvent en avant le fait que la formation à distance permet de mieux gérer son temps de travail, cette affirmation n'est que très partiellement vraie. S'il est exact qu'aucune obligation institutionnelle n'oblige le tuteur à travailler sur une plage horaire précise, il se sent généralement une obligation morale pour répondre vite aux apprenants et pense chaque jour à cette formation, prend le réflexe d'aller fréquemment (voire plusieurs fois par jour) sur la plateforme. Ce qui a valu la comparaison du tutorat à un « fil à la patte » par l'un des tuteurs.

D'un côté, nous avons dégagé les principales attentes des stagiaires à l'égard des tuteurs, de l'autre, les difficultés vécues par ceux-ci. La confrontation de ces résultats va nous permettre de dégager le fait qu'elles se situent ou non dans les mêmes registres.

3. La confrontation des résultats.

3.1. Les attentes des stagiaires / le métier vu par les tuteurs

Nous avons pu remarquer que les stagiaires attendaient du tuteur aide et contrôle, cette aide prenant plusieurs colorations plus ou moins fortes : d'abord cognitive et conative, mais aussi technique, organisationnelle (résultats importants relevés par Kim, Barbier et Verrier au niveau universitaire) et dans une moindre mesure relationnelle. Nous retrouvons donc ici le profil type du formateur en pédagogie personnalisée (Renoult et Wittorski, 2004) qui pratiquerait en outre les TICE. Mais on peut en outre ajouter qu'il doit aussi avoir une expérience de la dynamique de groupe pour les regroupements en présentiel si importants pour vérifier sa compréhension du dispositif au départ et ajuster les méthodes de travail mais aussi développer la cohésion groupale propice au maintien de la motivation et permettant la réassurance des apprenants (Ardouin, 2007). De son côté, Thouroude (2007) insiste sur le fait que le tuteur lorsqu'il construit du lien (avec les stagiaires et entre eux) favorise leur capacité à travailler seuls et en autonomie s'ils ont intériorisé les aides apportées. Accompagnement et médiation sont alors au centre du tutorat ainsi que le note Lescouarch (2007).

Ces différents aspects du tutorat n'entrent que partiellement dans les difficultés rencontrées par les tuteurs en situation. Bien sûr, nous retrouvons les difficultés liées à la personnalisation de la formation et éventuellement au rapport au savoir pour les tuteurs non impliqués auparavant dans une formation identique en présentiel et surtout non-concepteurs. Ce résultat rejoint d'ailleurs celui de Crétin, Bouzidi et Marini (2007) qui insistaient sur « la nécessité d'associer les enseignants dans les phases de conception, de mise en place et d'actualisation afin de pérenniser l'exploitation des outils technologiques dans l'activité de l'université. »

Nous pouvons aussi faire le rapprochement entre le désir de l'apprenant d'obtenir rapidement des réponses et l'impression du tuteur « d'avoir un fil à la patte ».

En somme, nous pouvons dégager trois principaux points de concordance entre les souhaits des stagiaires et la perception que les tuteurs ont de leurs difficultés :

* l'adaptation nécessaire des méthodes pédagogiques utilisées;
* un rapport au savoir différent;
* une gestion du temps paradoxale empreinte de liberté mais surtout de contraintes.

Cependant, si le formateur peut dépasser ces difficultés en étant lui-même accompagné, il peut plus difficilement vaincre des obstacles extérieurs à la relation pédagogique mais plutôt liés aux idéologies explicites ou implicites (si elles ne lui conviennent pas) et à l'intégration de la FOAD dans l'environnement politico-économique.

3.2. L'intégration de l'activité dans l'environnement politico-économique et institutionnel.

3.2.1. L'enjeu politique, économique et social.

Tout d'abord, il est à noter que la FOAD entre dans le code du travail par la circulaire DGEFP n°2001-22 du 20 juillet 2001, la définissant comme « un dispositif souple de formation organisé en

fonction des besoins individuels ou collectifs (individus, entreprises, territoires), comportant des apprentissages individualisés et l'accès à des ressources et compétences locales ou à distance et n'étant pas exécutée nécessairement sous le contrôle d'un formateur». Par la circulaire DGEFP n°2006-18, la FOAD devient un moyen de soutenir le développement de l'emploi, des compétences et de la qualification dans les territoires. L'annexe VI (sur l'individualisation des modes d'acquisition des nouvelles compétences) stipule même qu'elle devient un moyen de lutter contre les exclusions sociales et de favoriser l'accès des actifs à la qualification (publics éloignés pour des raisons géographiques ou culturelles ou par manque de disponibilité). Les APP (Ateliers de Pédagogie Personnalisée) et le programme FORE (formation ouverte à distance) sont alors largement cités.

Ainsi, nous constatons que l'individualisation de la formation répond aux nouveaux besoins découlant des mutations économiques, sociales et démographiques, la FOAD n'étant qu'un moyen d'y parvenir. Cependant, ces circulaires émanant du Ministère de l'emploi, de la cohésion sociale et du logement ont des répercussions non-négligeables sur les financeurs de la formation. De plus en plus, la Région finance les projets qui intègrent la FOAD, pour les raisons mentionnées ci-dessus. D'autres acteurs économiques vont considérer que la souplesse du dispositif ainsi que la réduction des déplacements n'ont que des avantages : les salariés sont plus disponibles et leur formation est moins coûteuse.

Lors des réunions préparatoires, les formateurs avaient alors posé des questions sur la réduction des coûts, laissant penser qu'il n'était pas forcément compatible avec la qualité de la formation. De plus, pousser les individus à s'auto-former revient à transférer la responsabilité de la formation sur chaque individu alors beaucoup de formateurs pensent qu'elle doit rester collective.

3.2.2. Le rôle de l'institution.

Les entretiens individuels ont mis en évidence le fait que le rôle de l'institution concernant le tutorat se jouait principalement à trois niveaux:

- d'abord au niveau du choix du tuteur et des raisons qui sont sous-jacentes. Avoir été choisi pour son niveau d'expertise n'est pas du tout équivalent à un choix par défaut ou résultant de considérations financières (compléter un service). On peut imaginer que la représentation de sa fonction et de sa reconnaissance est alors très différente : valorisation dans le premier cas, forme de « soumission » dans le second, celle-ci étant assortie d'un éventuel sentiment de faibles compétences.
- ensuite au niveau de la rémunération : en effet, le mode de calcul diffère d'un centre de formation à l'autre et comme le font remarquer Blandin et Duveau-Patureau (2003), il est souvent basé sur la mission de transmission des connaissances alors que la FOAD requiert davantage du tuteur une mission d'animation, d'échange et de prise de distance. Il n'est donc pas étonnant que les formateurs aient posé des questions sur ce point, dans la réunion concernant les tuteurs potentiels. Et ce travail, avec la forte implication qu'il demande, ne semble pas toujours assez reconnu à leurs yeux tant au niveau de la transformation de leur identité (nouveau niveau d'expertise) que de sa rémunération.
- Enfin, la fonction de tuteur n'étant pas toujours considérée comme différente de celle de formateur, les besoins en formation de celui-ci ne sont pas toujours pris en compte ni en charge et le nouveau tuteur passe souvent beaucoup de temps à s'auto-former.

4. La professionnalisation des acteurs.

4.1. <u>Les conditions favorisant l'exercice du tutorat</u>.

Nous tenons à mentionner le fait qu'aucune des difficultés mentionnées auparavant ne semble à elle seule constituer un réel blocage. Par contre, l'association de plusieurs d'entre elles voire toutes devient un facteur d'abandon du tutorat.

Mais les entretiens ont révélé comme facteurs favorables :

- **la connaissance préalable des épreuves (ou du contenu de la formation) ainsi que la participation à la scénarisation du module,**
- la maîtrise satisfaisante de l'environnement numérique;
- la pratique de la pédagogie personnalisée et de l'animation de groupe;
- le soutien technique ou pédagogique de l'équipe pédagogique (Lafortune, 2007);
- l'intégration de séances de regroupement en présentiel;

- le respect des dates d'examens ou de concours;
- la grande disponibilité des tuteurs et sa reconnaissance par l'institution.

Nous remarquons donc que ces conditions sont de plusieurs natures : caractéristiques préalables du formateur mais aussi caractéristiques du dispositif. Certains de ces atouts peuvent d'ailleurs compenser certaines défaillances du système (dispositif et tuteur) : par exemple, les collègues peuvent participer à la formation technique du tuteur ou encore à l'information sur les épreuves précises soumises à l'examen. Par ailleurs,

- une formation au tutorat peut permettre d'évoluer plus facilement
- et la possibilité d'améliorer le dispositif en cours d'expérimentation est essentielle pour que le tuteur adhère lui-même à la formation et s'y engage pleinement. Ici, le module de terminologie a été enrichi en cours de route (à noter l'importance de la réactivité du tuteur pédagogique mais aussi de l'administrateur de plateforme). Et, pour la prochaine session, des regroupements sont prévus pour ce module. Il est donc important que le tuteur puisse intervenir dans la configuration du dispositif pour ne pas avoir l'impression qu'il n'est qu'un simple exécutant qui n'a pas la main sur le savoir et sa transmission. Ce sentiment représente pour Gendron (2007) un facteur de stress important ; et cette situation atteint aussi son identité professionnelle. D'ailleurs, on peut transposer au tutorat ce que Perrenoud (1999) pense : « Pas plus que le talent d'un acteur ne sauve une mauvaise pièce, les compétences d'un formateur (ici tuteur) ne peuvent faire de miracles dans un dispositif de formation (à distance) mal conçu (et qu') il est donc regrettable de limiter le rôle des formateurs (ici tuteurs) à celui d'acteurs. Ils ont le droit et le devoir de participer à l'écriture et aux réécritures successives du scénario. »

4.2. Les voies de professionnalisation : le passage de formateur à tuteur

A partir des informations recueillies dans les entretiens, il semble que plusieurs voies de professionnalisation (Wittorski, 2007) soient envisageables et complémentaires :

- dans la logique de l'action (1) : le tuteur s'adapte sans avoir à y réfléchir à une situation nouvelle. Par exemple, lorsqu'il navigue sur la plateforme et qu'il clique de façon pertinente sur un bouton qu'il ne connaissait pas encore ou qu'il s'aperçoit qu'il faut joindre le fichier avant de rédiger le message sur le forum pour qu'il soit pris en compte sur cette plateforme.
- dans la logique de la réflexion sur l'action (2) : cette voie est décrite comme étant une itération entre la recherche d'informations et leur utilisation pour agir. On peut par exemple citer la consultation d'une aide en ligne.
- dans la logique de la réflexion sur l'action (3) : l'expérience en actes se transforme en expérience mentalisée grâce à une réflexion rétrospective menée sur l'action. Cette situation survient dans les groupes d'analyse de pratique mais ici, ce sont les réunions entre tuteurs de même discipline qui ont joué ce rôle. Par exemple, alors qu'un tuteur avait spontanément pris l'initiative de solliciter des stagiaires qui n'avaient pas assez avancé, verbaliser cette action a été l'occasion de découvrir une attitude pro-active adaptée à cette situation.
- logique de réflexion pour l'action (4) : elle consiste à formaliser des pratiques nouvelles ; en formation, il s'agit de définir de nouveaux process d'action par une réflexion anticipatrice. Dans ce dispositif, il a notamment été décidé de constituer un wiki[42] dans lequel chaque acteur (équipe pédagogique et stagiaires) se présenterait afin de créer plus de lien et le sentiment d'appartenance à un groupe. Cette pratique a figuré dans le compte-rendu de réunion. Il en est de même pour les fiches qui ont été créées par le tuteur pour faciliter le suivi des apprenants.
- logique de la traduction culturelle par rapport à l'action (5): en formation, il s'agit de résoudre un problème en « déplaçant ses représentations » mais à l'aide d'un tiers. Par exemple, le tuteur peut penser que les apprenants se trouvent isolés par la distance qui les sépare mais peut par la suite s'apercevoir de leur proximité grâce à leurs mails ou à leurs échanges téléphoniques. Il s'agit de la culture FOAD.

[42] Un wiki est un outil collaboratif de rédaction collaborative et de publication de documents sur Internet, permettant à tout internaute de modifier librement le contenu des pages publiées d'une manière simple avec l'idée que tout le monde est rédacteur en chef. : http://fr.wikipedia.org/wiki/Accueil

- logique de l'intégration/assimilation (6) : elle concerne l'acquisition des savoirs avant leur utilisation en suivant une formation ou en s'auto-formant par exemple en lisant des articles et livres ou encore en rencontrant des tuteurs confirmés qui font part de leur expérience;
- Nous constatons qu'en fonction des situations et donc de l'environnement, la manière d'aborder une action professionnelle peut différer. Dans le cas de la FOAD, la machine fait partie intégrante de l'environnement mais la place des hommes n'est pas négligeable. En effet, ils peuvent être présents dans les 5 dernières voies. Les aptitudes à la communication et à l'écoute sont donc indispensables;
- Par ailleurs, il semble que les voies de professionnalisation du tuteur puissent aussi être partiellement déterminées;
- par les caractéristiques conatives de celui-ci telles la motivation, la représentation de la FOAD et du tutorat, l'image de soi. Le tuteur très motivé va être enclin à s'auto-former (voie 6) tandis que celui qui manque de confiance en lui va plutôt s'en remettre à une tierce personne (voie 2 ou 5) lorsqu'il rencontre une situation-problème;
- par l'institution. En effet, celle-ci peut intervenir en amont à plusieurs niveaux : au niveau individuel en favorisant par exemple la motivation du tuteur ou en l'aidant à transformer ses représentations mais également au niveau collectif en favorisant les réunions assimilables à de l'analyse de pratique. Ceci dit, penser la professionnalisation des tuteurs en amont de la formation est essentiel. Comment un formateur convoqué à une réunion de 2h va-t-il considérer le fait de devoir annuler 4h de cours ? (culpabilité de ne pas assurer son cours et perte de salaire non négligeable).

Blandin et Duveau-Patureau (2003) prônent le recours à une formation de formateurs à la FOAD puis à « une formation-action qui va permettre aux nouveaux tuteurs d'être accompagnés dans leurs travaux et évolutions »

Conclusion

La présentation de cette expérimentation a mis en lumière les difficultés, non-insurmontables, de devenir tuteur quand on est formateur, afin de dégager leurs besoins (écarts entre la situation présente et la situation souhaitée). Pourtant, force est de constater que les attentes des stagiaires restent relativement proches de ce qu'elles attendraient d'un formateur, en particulier d'un formateur expérimenté en pédagogie individualisée (plaçant donc l'apprenant au centre des apprentissages). Et, même si la tâche a parfois paru ardue aux nouveaux tuteurs, d'après un autre questionnaire distribué en début et en fin de formation, à une très grande majorité, les stagiaires déclarent en fin de parcours avoir pris du plaisir à travailler en FOAD et être devenus plus autonomes dans la recherche d'informations (Renoult et Tomeh, 2008). Ce résultat dépend toutefois de la stabilité des tuteurs et du maintien de la date de concours.

Il est quand même à noter que les tuteurs qui ont eu l'impression de bien remplir leur fonction ont développé un sentiment d'auto-efficacité sur lequel ils pourront s'appuyer pour une nouvelle session ou pour guider de nouveaux tuteurs. De plus, le fait de ne pas placer de frontières entre la conception d'outils et le tutorat pur est un élément important : sans remanier fondamentalement les modules et le plan de formation, il est indispensable que le tuteur, qui n'a pas participé à la conception, puisse adapter le module en fonction des besoins. A la différence d'un livre, un module FOAD est donc un outil de formation adaptable dès lors qu'il y a consensus entre les tuteurs. Cela suppose donc la disponibilité d'un tuteur technique pour effectuer les modifications sur la plateforme.

Par ailleurs, nous avons pu voir que les résistances chez les tuteurs potentiels avaient deux origines principales: d'une part, une représentation faussée de la FOAD qui n'est pas vue comme complémentaire aux formations existantes mais en concurrence avec elles et d'autre part, une grande inquiétude concernant leurs conditions de travail et la pérennité de leur identité de formateur.

Il semble alors que l'institution ait un rôle essentiel à jouer dans la reconnaissance des nouvelles activités du tuteur mais aussi dans l'information/formation à ce métier partiellement nouveau. L'objet d'une nouvelle étude pourrait donc concerner l'impact d'une formation préalable à l'exercice du tutorat et même l'influence d'un accompagnement personnalisé dans ses nouvelles fonctions.

References

Ardouin, T., (2007) Ce qui compte le plus dans les dispositifs à distance, c'est la présence ! Le cas du Master ICF,. *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH

Barbier, J-M., (1996), De l'usage de la notion d'identité en recherche, notamment dans le domaine de la formation. Education Permanente, 128, 11-26

Blandin, B. et Duveau-Patureau, V. (2003), Formations Ouvertes et A Distance : l'opportunité de réinterroger nos pratiques ? *In crefor.asso.fr*
http://www.crefor.asso.fr/ranfor/4/dossiers/foad2003/DossierDocFoad2003Ranfor.pdf (14.09.07)

Crétin, R., Bouzidi, L., Marini, J-L, (2007), Mise en place de l'environnement numérique de travail au sein de l'Université Jean Moulin Lyon 3 : l'enseignant au cœur d'une dynamique de changement. *In Informations, Savoirs, Décisions et Médiations, Revue permanente en ligne des utilisateurs des Technologies de l'Information et de la Communication* http://isdm.univ-tln.fr/PDF/isdm29/CREBOUMAR.pdf (10.03.08)

Daguet, H. (2006), « environnement numérique de travail et d'apprentissage en éducation », colloque Savoirs et acteurs de formation, Rouen, 18-19-20 mai 2006

Fernandez, J. (1990), Réussir une activité de formation, Editions Saint-Martin, Montréal

Gendron, B., (2007), Des compétences au capital émotionnel et bien-être et mal-être des enseignants, Actes du congrès AREF.

Haeuw, F., Coulon, A. (2001), Elaboration d'un référentiel de compétences, In Algora, http://app.algora.org/publications/pdf/refcomp.pdf (20.06.07)

Jacquinot-Delaunay, G., (2003), « Du présentiel à la distance : comment former les enseignants-chercheurs à un changement d'identité professionnelle ? », *Colloque international de l'AFIRSE, Former les enseignants et les formateurs, une priorité pour l'enseignement supérieur ?,* Unesco, CDROM/AFIRSE.

Kim, S-M., Barbier, R. et Verrier, C. (2007), Implication et enseignement en ligne, Actes du congrès AREF.

Lafortune, L., (2007), Dimension affective, travail en équipe de collègues et bien-être des personnels scolaires, Actes du congrès AREF.

Lescouarch, L., (2007) « De l'intérêt de la pédagogie Freinet transposée à un dispositif à distance », *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH

Perrenoud, Ph., (1999) De quelques compétences du formateur expert,
http://www.unige.ch/fapse/SSE/teachers/perrenoud/php_main/php_1999/1999_15.html (5.8.07)

Renoult, C. et Wittorski, R., (2005) De la professionnalisation des formateurs à celle des stagiaires dans un parcours de formation personnalisée. *In* R. Wittorski (dir.*) Formation, travail et professionnalisation,* L'Harmattan,Paris.

Renoult, C., (2007) De la pédagogie personnalisée à la FOADA, il n'y a qu 'un pas…, Actes du congrès AREF.

Renoult, C., Tomeh, T., FOAD ou Formation en présentiel : Que choisir ? Quels effets ? Distance et savoir, 2008 (article soumis)

Thouroude, L., « Etudier en Licence », *In J. Wallet, Le campus numérique FORSE : analyse et témoignage,* Monts, PURH

Wallet, J. (2002), Point de vue des Sciences de l'Education, Symposium Technologies informatiques en éducation. 31 janvier et 1er février 2002
http://www.moddoulearning.com/info/index.php?q=node/28 (1.09.07)

Wittorski, R. (2007), Professionnalisation et développement professionnel, L'Harmattan, Paris.

(B.27)

A Conceptual Framework for Building A Learning Content Management System

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Abstract

In this proposal, we propose a conceptual framework for building a Learning Content Management System (LCMS) that characterize the effective e-learning systems properties from pedagogical and technical perspectives. The proposed framework could be used to provide systematic guidance to the design of LCMS. The framework is drawn from best practices that have been used in the Ministry of Education in Jordan. Namely, the LCMS case study will involve the Management Information Stream (MIS-Online), that is lunched to computerize the MIS curriculum. The project is supported by USAID/ESP program.

1. Introduction:

e-learning is referred to the use of information and communications technology in teaching and learning. e-learning includes concepts a lot more than online learning, such as virtual learning, distributed learning, networked or web-based learning. As the letter "e" in e-learning stands for the word "electronic", e-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices [1,2]. In our rapid changing worlds, the technologies and communications are important reasons in change the learning forms, learning today is no long confined in classrooms with lecture as the only method conveying knowledge. e-Learning, which facilitates education using a network, has made learning possible from anywhere at any time by using the Internet, wide area networks, or local area networks [3], which allow student to retrieve and access distributed resources and information.

Computer Assisted Instruction *CAI* is a result for the technological revolution, and e-learning is referred to a *CAI* which provides interactive learning, by using computer programs and resources such as multimedia (video, audio, animation, flash and images) inside or outside the classroom.

There are a lot of advantages of e-learning, e-learning is flexible and accessible, learners are able to access the e-courses form any where and any time, further, Internet and intranet are widely available, e-Learning can be accessed by Web browsing software on any platform. A training program can be delivered to any machine over the Internet or intranet without having to author a program for each platform, Ease of updating information, Training efficiency is increasing significantly from a qualitative and a quantitative standpoint (using new methods, personalization, learner autonomy, follow-up, learning by opportunity and the speed of the learning updates, creation of knowledge sharing community[1], learning cost may be reduced and learning effectiveness is increasing.

The objectives of the e-learning summarized as the following:

1. Employing the technology in improving the student, teacher and the instruction process.
2. Offering the opportunities to all learners to gain the information with lowest cost and fastest time.
3. Enabling the use of simulated situations as instruction strategies.
4. Enhancing and growing the skills of thinking for the student.
5. Presenting the learning content in attractive method.
6. Considering the individual differentiates between the students.
7. Override the time and the place obstructions.

8. Facilitating the communication between the learners, teacher and the student.
9. Self-learning.

e-Learning systems need a mechanism for managing and delivering e-learning content in a effective form to the Learner who can immediately apply it to perform better, using the learning content management system to help speed learners' time to performance. Before we define the learning content management system, we need to define the concept of the **learning objects**. a learning object is defined as "any entity, digital or non-digital, that may be used for learning, education or training" [4]. IDC[43] defines a learning object as a standing piece (a.k.a. "chunk") of education that contains content and assessment based on specific learning objectives and that has descriptive metadata wrapped around it. The most common formats for e-content are Microsoft PowerPoint, Word, Adobe PDF, SCORM and Macromedia FLASH.

2. LMS & LCMS Definitions

2.1 A Learning Management System (LMS)

LMS is software tools designed to manage user learning interventions, LMS is not only training records management and reporting. It provide several services such as Learner self-service (e.g. self-registration on instructor-led training), training workflow (e.g., user notification, manager approval, waitlist management), the provision of on-line learning (e.g., Computer-Based Training, read & understand), on-line assessment, management of continuous professional education (CPE), collaborative learning (e.g. application sharing, discussion threads), and training resource management (e.g., instructors, facilities, equipment), are some of the additional dimensions to leading Learning Management Systems [5]. LMS is based on variety of platforms such as Java EE based architectures, Microsoft .NET, also there are open source and commercial platforms, Open source and Web-based LMS software solutions are quickly growing in the education and business world.

2.2 A learning content management system or LCMS

LCMS is a multi-user environment which allows the learning developers to create, store, reuse, manage, and deliver digital learning content from a central object repository. From the definitions of LMS and LCMS we can extract the differences between these two concepts, LMS is to manage learners, keeping track of their progress and performance across all types of training activities. It performs heavy-duty administrative tasks, such as reporting to instructors, HR and other ERP systems but isn't generally used to create and manipulate course content it cannot reuse the content of one course when building another. An LCMS manages the process of creating, editing, storing and delivering e-learning content [6].

LCMS applications could include LMS features and functionality [7], therefore the main functionalities of proposed framework for building LCMS are summarized as the following:

- Most or all of the features included in the LMS.
- A learning object repository.
- Creating and storing learning content into central object repository.
- Manipulating the content, the author can add external content, remove or update the existed content.
- Reuse the existed content for another courseware.

[43] IDC is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications, and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. www.idc.com

- Delivering the content that are suitable for the learner's needs (personalized content) based on the learner's profile, proficiency assessment tests and the selections that that learner makes while taking training.
- The learners assessments and evaluation.
- Import existing content in any form, including SCORM, AICC and Adobe PDF, with full enterprise learning content integration.
- Author content once and deliver natively in multiple formats and delivery methods including Microsoft Word, PowerPoint, SCORM, AICC, HTML and PDA.
- Use of XML to tag data for re-use and ease of searching.
- Providing the communication and collaboration, e-learning based on self-study mode, but e-learning is more effective when the learner interacts with the technology, instructor, or other learners.

The proposed framework supports a number of different content types such as Web-based content and File-based content. Each type includes a collection of course formats such as Microsoft Office applications, PDF, Macromedia flash and Multimedia applications.

Is your e-learning system effective?. Effective e-learning systems depend on a set of norms such as usability, interaction, relevance. But e-learning system is not taking a chunk of text materials and putting them on the web, effective e-learning requires understanding learner needs, paying attention to research-based learner-centered design principles, and building an electronic environment that provides timely feedback, rich information, meaningful conversations, and learning-by-doing. To build an effective e-learning system, you should focus and give high attention for managing the content of your e-learning system to achieve the norms and the principles of effective e-learning system. So learning management system(**LMS**) and learning content management system (**LCMS**) are very important terms and should be taken in account. The e-learning systems and products are one of the most rapidly expanding areas of education and training which are used as primary assistance in the learning situations nowadays in the most of pedagogical institutions. Recently, the researcher's attentions trend to study LMS and LCMS, the failure of some e-learning systems was one of important reasons which attracted the researchers to this trend. because they believe these two terms (LMS and LCMS) play very important role in building effective e-learning system and increase the quality of e-learning system on both of the pedagogical and technical levels.

This study proposed A Conceptual Framework For Building A Learning Content Management System which depends on two main dimensions: Technical dimension deals with the manner of employing the technologies tools to support the content of the learning processes such as hardware, software, interface (usability), connectivity, using multimedia to increase the student motivation for the content and attract his attention, e-courses delivery, creating interactive environment in classroom, are the e-learning standards are taken in account in building learning objects and resources?, security of LCMS (e-learning system should provide robust security for the content), Facilities for content migration.

Pedagogical dimension which focuses on the pedagogical concepts and theories that are must be merged in the e-learning system to produce positives outcomes from the learning process, such as the acquired knowledge by the students, the learning Portfolios, student Profile, the individual differentiations between the learners, the self-learning principles, collaborative learning, the up growth properties for the students, offering learning content that are suitable for the student needs and capacities, presenting the learning content by different learning strategies, Individual learner variables, learner motivation, cultural background, Flexibility of the learning process, Assessment and examination…etc.

The Advertency of Ministry of Education is to fulfilling the royal directives, which emphasis on employing the information technology in pedagogy process and achieving e-learning objectives, the ministry started its campaign to adopting the e-learning in its schools by opening communication channels

with JAID[44], AED[45] and ESP[46] to start constructing and establishing MIS-Online project. The memorandum of understanding was signed at 18/4/2006. The project is considered as unique experiment and enhancing the instructional outcomes, the project endeavour is to achieving the following objectives, (Using Information Technologies to):

1. Gaining the learner the employments skills.
2. Busking the learner for market place.
3. Gaining the learner the business management concepts and skills, and information systems applications to find effective solutions for contemporary businesses issues.

The proposed framework was drawn from MIS-Project and the best global practices to help us to extract the dimensions and norms that are necessary for building effective learning content management system.

The MIS-Online Project based on EduWave Platform because EduWave is the main platform available for teachers, students and administrators at schools, in addition, EduWave provides many of tools that assist them in achieving the learning objectives and strategies and daily activities.

Memorandum of understanding is signed in 18\4\2006 between the Ministry of Education of the Hashemite Kingdom of Jordan , JAID Productions ("JAID") and the Academy for Educational Development ("AED"), and the implementation period of the project is two years, the implementation and testing process are still continues.

3. The Problem Statement:

The research problem is "developing a conceptual framework for building a learning content management system that characterize the effective e-learning systems properties from pedagogical and technical perspective., to increase the quality and the efficiency of these systems which resulting in enhancement the role of the technology in the education which leads to scaling up the pedagogical results levels."

The fast spread of information technology had vast impact in all sectors particularly in the education sector, the educational researchers trend to adopt new educational methods that are considered as Technology-based learning and teaching, this adoption bring new learning methodologies and strategies such as e-learning which depends directly on employing the technology tools in education to increase the efficiency and the quality of the learning resulting.

e-learning has great potential to improve access to and quality of education. To gain the benefits of e-learning, we must investigate and analyse the learner requirements and environment requirements. The main objective of LCMS is to manage the learning content that meet the user requirements which help developers to build an effective e-learning system . e-learning is the most recent way to carry out distance education by distributing learning material and processes over the Internet. Its "any time, any place" [3], e-learning, by virtue of its unique distributed, asynchronous nature, shows much promise for fostering significant improvements in accessibility and opportunity to learn. It couples advances in technology and the advent of the information highway to eliminate barriers of time, distance, and socioeconomic status, thereby creating a whole new dimension of learning [3].

Most of e-learning project fails due to some of reasons that must be taken in account, such as focusing on technology and ignoring the pedagogical aspects and theories, the ambiguous interrelation between the components of the e-learning system, lack of the interaction between the software and learner [8], the usability problems of e-learning systems [8], ignoring the different characteristics between

[44] JAID an Integrated Technology Group Subsidiary, www.itgsolutions.com

[45] AED The Academy For Educational Development

[46] ESP ERfKE Support Project

learners(cultural background, technical experience, technological equipment, and physical/cognitive abilities), promoting collaboration and communication, information quality and pedagogical content should support people to learn in various contexts according to selected pedagogical objectives, missing in applying e-learning standardization, "Since the choice of courseware has far-reaching implications for the primary process of an educational institution, its selection requires a careful balancing of the multiple educational, political, and social requirements with the affordances and constraints inherent in the technology" [1].

Because of these problems, the LMS and LCMS gained the attention of the researchers and organizations, they are focusing on LMS and LCMS of the e-learning systems to observing the achievement of technical and pedagogical objectives of these systems, and developers need appropriate guidelines to build an effective LCMS.

Most of recent researches investigating in one or two of these problems, or focusing on the system from technical perspectives without the pedagogical perspectives or contrarily. This research propose a new framework to build learning content management system **LCMS** according the both perspectives. This research will dividing the framework into two main sections, the first is responsible for investeguting pedagogical principles and objectives, the second manipulate the technical perspectives. Both of them will consist of subsections look like as a matrix of standards.

we hope in this research to propose a conceptual framework for building a learning content management system which is fit to the arabian e-learning systems specially for the Jordanian experiments. We believe it is important to present a framework which covers all of e-learning systems components without missing the importance of technical and pedagogical dimensions.

4. Related work:

A summary of some of the literatures related to learning content management system, e-learning standardization and development is given below.

Georganas N et al., (2003) develop e-learning system architecture, Its main objective is to contribute an original paper for a functional architecture and service architecture for building standard-driven distributed and interoperable learning systems. The functional architecture defines components that make up an e-learning system and the objects that must be moved among these components, the model is strongly influenced by the SCORM functional model, and divide the LMS (learning management system) which SCORM defined into LCMS (Learning content management system) and LMS (Learning management system) to make each system's functionality more focused and clear. An LCMS is a multi-user environment where learning developers can create, store, reuse, manage, and deliver digital learning content from a central object repository. Whereas an LMS manages the processes surrounding learning, an LCMS manages the process of creating and delivering learning content, just as the names indicate. The model defined different learning objects exchanged between each components and cross-system workflows which are compatible with current existing standards, also defined how to use Web Services technology to implement the interoperability between LCMSs and LMSs. At the end, they gave multitiered component-oriented system architecture of LCMS to illustrate how to integrate Web Services into a J2EE platform.

Luis, et al. (2004) presents an extension to the SCORM for increasing its ability to support accessibility and interoperability of learning content aggregations. The extension of SCORM in this model started by adding new level category called "Environmental", which is a direct child of the top level node "LOM" (Learning Object Metadata) in which the SCORM is based on, the basic LOM have nine main categories, so this new level category is the tenth level, "Environmental" is also a container which consists of a set of nodes whose type is "Item". The "Item" element is comprised of four child nodes, The "Type" node stipulates the kind of the item being described, and can be used by learning management systems to give semantic meaning to the item and its possible values are restricted, which are Programme,

Bibliography, FAQ, Assessment, Evaluation Rules, and TextElement. The "Value" field holds the identification or content of the item. Example, to modelling a course called FAQ, initially define an "Environmental" node in the course metadata file, The course FAQ is enclosed within one item node, whose type is FAQ; the value field of this item is used to provide a title for LMS presentation. This node's data type is, therefore, Langstring, a LOM data type for describing strings of text. The "Metadata" field, a container node that can cover an entire LOM hierarchy, may be used to specify additional information about the item; this element would contain additional metadata information about the FAQ, referenced by a link to an external metadata file or placed inline with the FAQ item. Finally, the "Item" child node, a container whose structure is the same as its parent node.

Costagliola G., Ferrucci F., Fuccella V, (2006) proposed a Service Oriented Architecture (SOA)-based reference model for offering the SCORM RTE (Run Time Environment) functionalities as a service external to the LMS, the proposed model aims to increase the maturity Of SCORM by increasing the interoperability among LMSs and LO authoring tools, the model focuses on generating manageable and reusable learning objects, cost reduction. The proposed model is validated through a prototype system, in which a popular LMS, developed with PHP language, is enhanced with the support of SCORM RTE functionalities, provided by an external Web service based on Java technology.

The interoperability means "the possibility of running Learning Objects (LOs) produced with any authoring tool on any LMS compliant to the standard specifications. Once full interoperability among LMS and authoring tools is achieved, it will be easier to share LOs, and, consequently, re-use them, with remarkable time and resource saving for the content developers.

The model proposes two levels: the higher level; the separation of concerns between the LMS and the external service is specified, and the lower level; the modules composing each service are identified, the interactions among the services at the lower level specified by a message exchange patterns, the model explains the interactions among the actors on the scene, they are the LMS, the RTE Service, the LO Repository Service and the user-agent.

A layered architecture has been chosen to separate modules of the Web-based Interface, from those of the Business Logic and Data layers. The Web-based Interface layer contains both the Web resources, which can be accessed using a classical HTTP request/response message pattern and the deployed Web services.

Colace, F., Santo M., Pietrosanto A,(2006) show the general evaluation strategy for e-learning platforms, also they mentioned to the importance of evaluating e-learning systems from pedagogical and technical perspectives. evaluating software packages only is not enough. the evaluation process must start from the function and usability of the overall learning system in the context of the human, social and cultural organization within which it is to be used. They discussed the functionality of LMS (Learning Management System) and LCMS (Learning Content Management System). The main function of LMS is managing online teaching activities. it aims to offer management functionality to training platform users such as system administrators, teachers and students. so the functionalities of LMS summarized as follows: Student management, Course management, Student skill assessment, Student activity monitoring and tracking, Activity reporting. LCMS includes all the functions enabling creation, description, importation or exportation of contents as well as their reuse and sharing. Contents are generally organized into independent containers, called learning objects, able to satisfy one or more didactic goals.

Bhatt and Rao (2006) explored several types of learning objects and they classified them into two main sets: first set identifies learning objects in the context of a Web – based Intelligent Tutoring System (WITS). The second set consists of learning objects designed to meet the learning objectives identified in the framework of Bloom and Vincenti, also they demonstrate creation process of metadata for learning object within SCORM. The learning objects to be reusable, stored, retrieved, located and integrated easily it should be tagged by standardized metadata. Learning contexts depending on the learning subjects, goals and on learner's needs and capabilities, SCORM have the ability to take in account these requirements; Bloom's taxonomy is widely used in preparing learning objectives at all education levels. Bloom identified six learning levels within the cognitive domain: recall, comprehension, application, analysis, synthesis, and evaluation. One categorization of engineering knowledge was provided by W.G.Vincenti.

Vincenti categorized engineering knowledge as fundamental design concepts, theoretical tools, quantitative data, criteria and specification, practical consideration, and design instrumentalities. Bhatt and Rao have presented a framework to prepare learning objectives in the context of Bloom's cognitive levels and Vincenti's categories of engineering knowledge.

5. The Proposed Model:

e-learning systems received high attention nowadays. educators need for an effective e-learning systems to help them in achieving their learning tasks, and to help them also in scaling up the educational levels of the students. In figure 1, we present a conceptual framework for building a learning content management system. the framework is divided into two main axises pedagogical and technical (show figure 2 and 3), both of them also divided into sub dimensions, all of these dimensions aim to build the content of the e-learning system in systematic method.

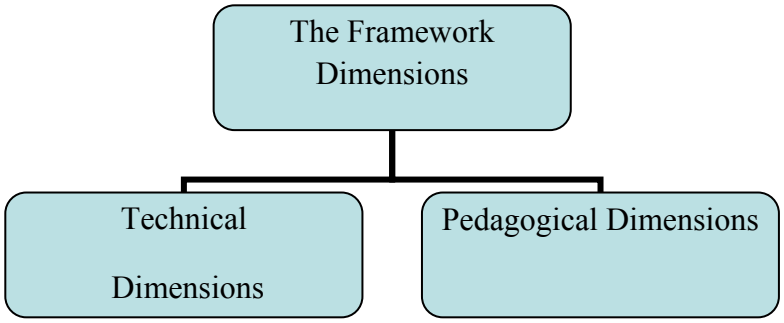
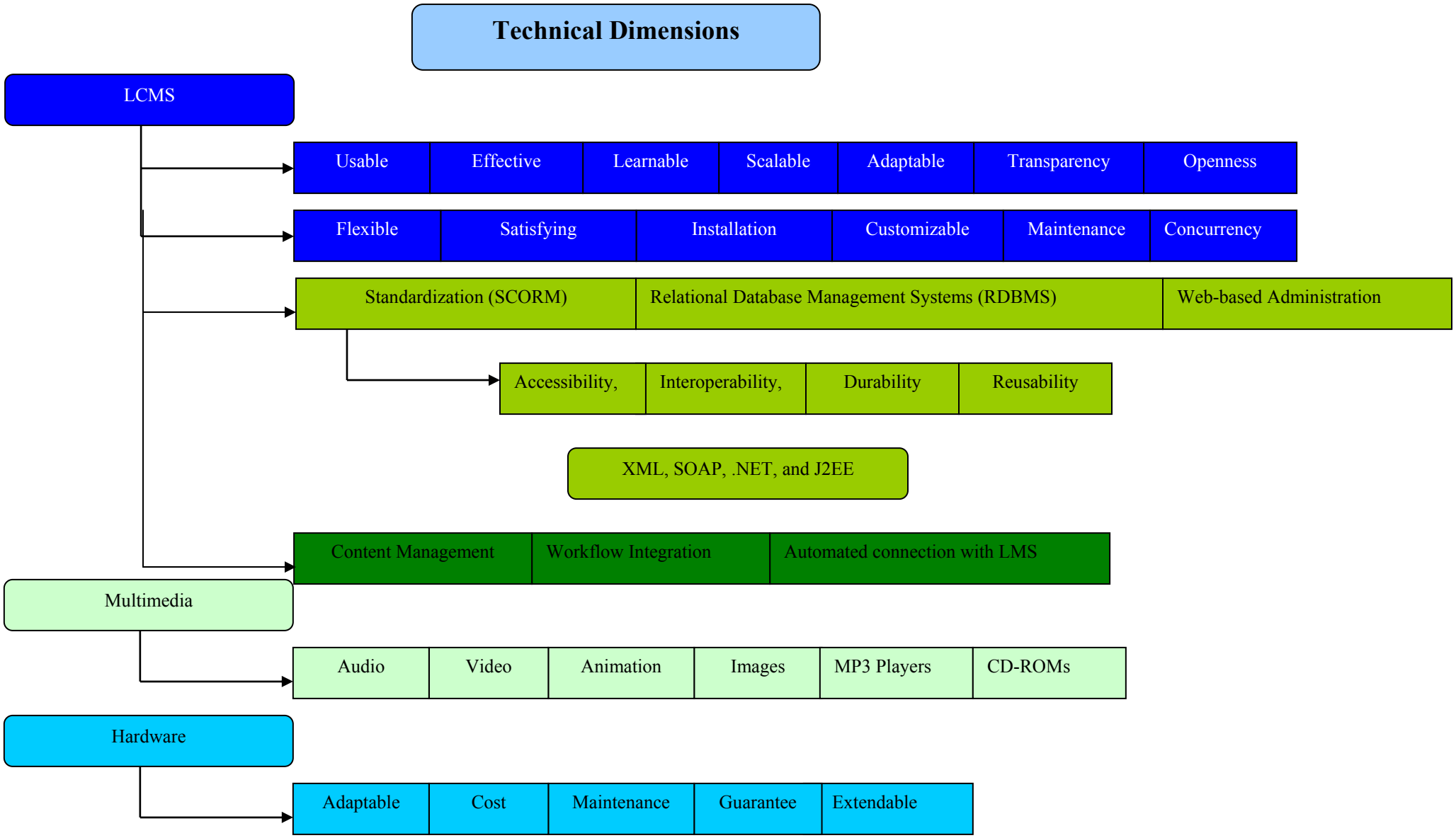
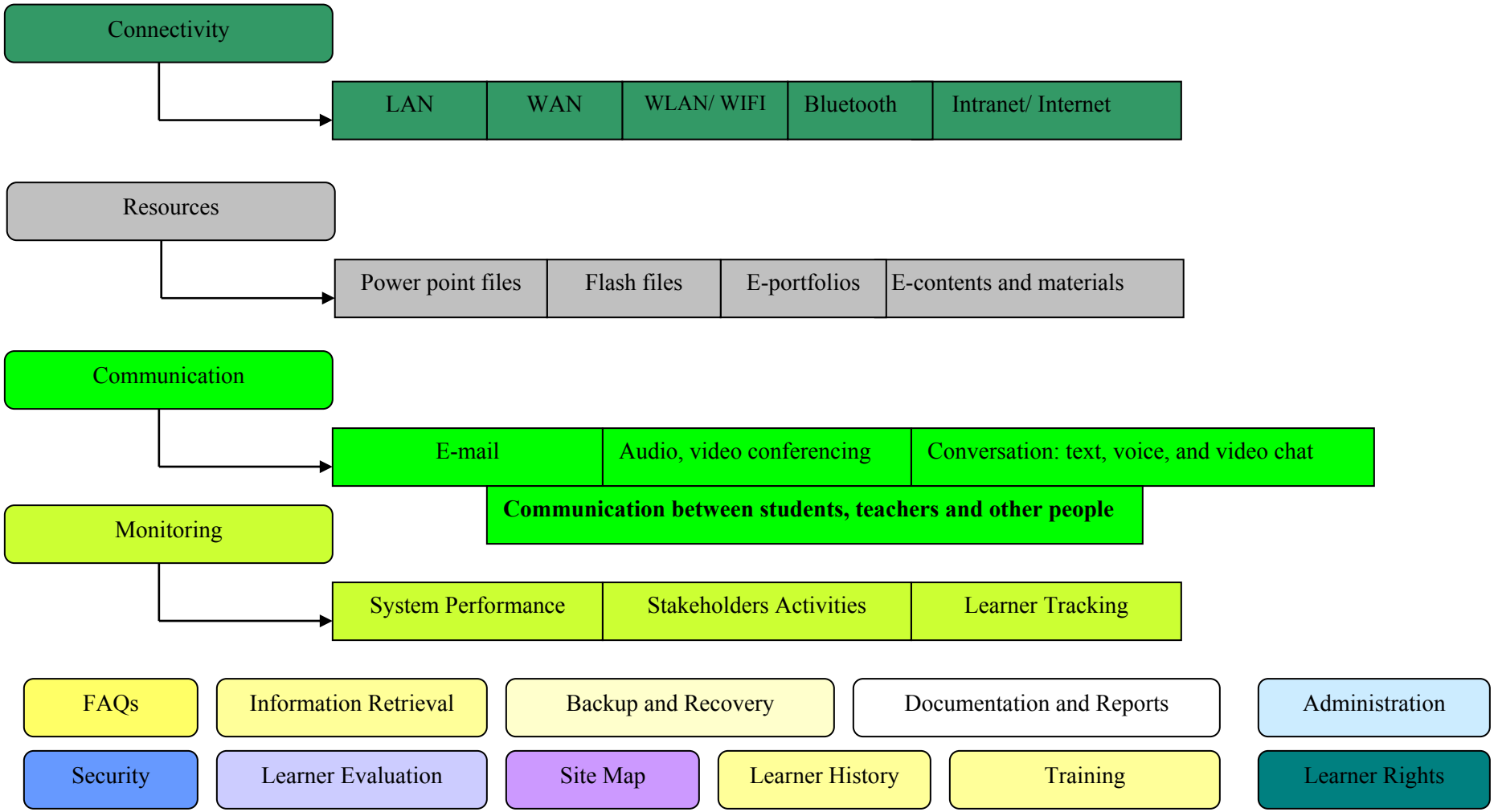


Figure 1: A conceptual framework for building a learning content management system.

Figure 2: The technical dimensions of the proposed conceptual framework for building a learning content management system.





Pedagogical Dimensions

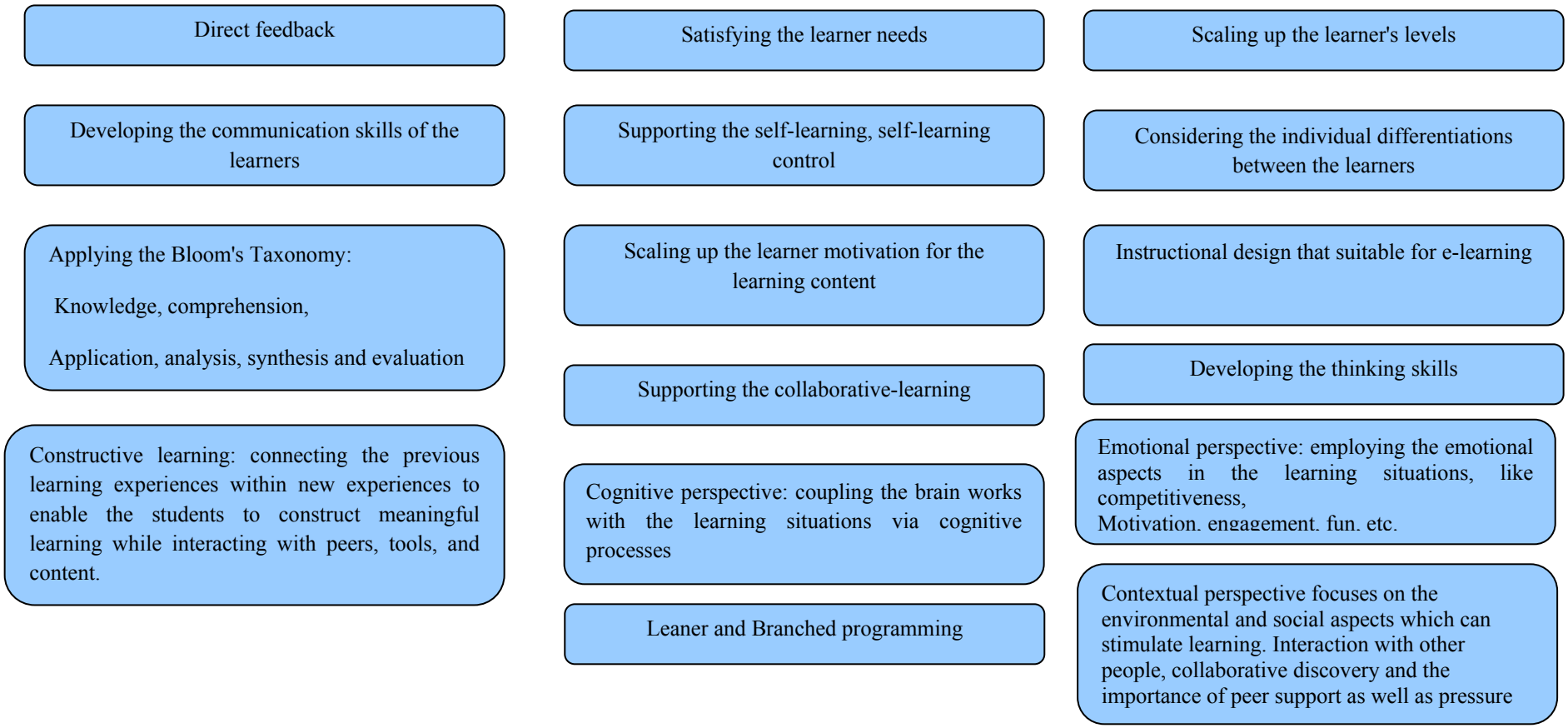


Figure 2: The pedagogical dimensions of the proposed conceptual framework for building a learning content management system.

6. conclusions

We proposed we propose a conceptual framework for building a Learning Content Management System (LCMS) assist in building an effective e-learning systems, the proposed framework focuses on the technical and pedagogical dimensions that must be embedded in any effective e-learning system. The proposed framework characterize the most important features of the technical tools of the e-learning system which guarantee the usability, quality, personality and security of the e-learning platform. Also the proposed framework discusses the pedagogical issues that must be taken in account to scale up the effectiveness of the e-learning system pedagogically.

References:

1. DE Moor A., *A Practical Method for Courseware Evaluation*, ACM International Conference Proceeding Series; Vol. 280 Proceedings of the 2nd international conference on Pragmatic web Tilburg, The Netherlands Pages: 57 – 63, Year of Publication: 2007, ISBN:978-1-59593-859-6
2. Ardito C., Costabile M. F., De Angeli A., Lanzilotti R. *Systematic Evaluation of e-Learning Systems: an Experimental Validation***.** ACM International Conference Proceeding Series; Vol. 189, Year of Publication: 2006 , ISBN:1-59593-325-5
3. Zhang Y., Zhang S, Vuong S., Malik K. *Mobile Learning with Bluetooth-based E-learning System***,** International Conference On Communications And Mobile Computing Proceeding of the 2006 international conference on Communications and mobile computing Vancouver, British Columbia, Canada Pages: 951 – 956, Year of Publication: 2006 ISBN:1-59593-306-9
4. IEEE 1484.12.1-2002, 15 July 2002, Standard for Learning Object Metadata. ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf
5. Hsiu-Ping Y, Shihkuan Hsu , Designing a learning management system to support instruction, Volume 51 , Issue 4 (April 2008) Pages 59-63, Year of Publication: 2008, ISSN:0001-0782, publisher ACM
6. Michael Feldstein, What's important in a learning content management system, eLearn Magazine Volume 2002, Issue 5 (May 2002), Page 4, publisher ACM
7. Leslie E. Amidon, Learning Management Systems, Learning Content Management Systems, IDS Publishing , http://www.ids-publishing.com/Common/Paper/Paper_34/learning%20management1.htm
8. Lanzilotti R., Ardito C., Costabile M. F. eLSE Methodology: a Systematic Approach to the e-Learning Systems Evaluation, retrieval date 10/12/2007 http://www.ifets.info/journals/9_4/5.pdf
9. Georganas N., El Saddik A., Liu X. AN IMPLEMENTABLE ARCHITECTURE OF AN E-LEARNING SYSTEM 2003, retrieval date 15/1/2008 http://www.site.uottawa.ca/~elsaddik/abedweb/publications/architecture.pdf
10. Luís R., Horta N., Simões D. *Enhancing the SCORM Metadata Model*, ACM International Conference Proceedings of the 13th international World Wide Web conference on Alternate track papers & posters WWW Alt. May 2004
11. Costagliola G., Ferrucci F., Fuccella V. *SCORM Run-Time Environment As a Service,* ACM International Conference Proceeding of the 6th international conference on Web engineering ICWE '06, July 2006
12. Colace, F., Santo M., Pietrosanto A. *Evaluation Models for E-Learning Platform: an AHP approach*, 36th ASEE/IEEE Frontiers in Education Conference October 28 – 31, 2006, San Diego, CA http://fie.engrng.pitt.edu/fie2006/papers/1168.pdf, retrieval date 10/12/2007
13. Bhatt C. B., Rao N. J. *SCORM Metadata in the Context of Bloom-Vincenti Taxonomy and Intelligent Tutoring System***,** ACM International Conference Proceedings of the 6th international conference on Web engineering ICWE, July 2006
14. Ardito C., De Marsico M., Lanzilotti R., Levialdi S., Roselli T., Rossano V., Tersigni M. *Usability of E-Learning Tools*, ACM International Conference Proceeding Series Proceedings of the working conference on Advanced visual interfaces Gallipoli, Italy , Pages: 80 - 84 Year of Publication: 2004, ISBN:1-58113-867-9

15. Brusilovsky P., **KnowledgeTree: A Distributed Architecture for Adaptive E-Learning**, ACM International Conference International World Wide Web Conference Proceedings of the 13th international World Wide Web conference on Alternate track papers & posters New York, NY, USA Pages: 104 – 113, Year of Publication: 2004 ISBN:1-58113-912-8
16. Chaffey D., E-Business and E-Commerce, 2/E, Prentice Hall
17. Coulouris G., Dollimore J., Kindberg T. **Distributed Systems Concepts and Design**, Addison Wesley, Third Edition.
18. Masemola S., De villiers M. R. **Towards a Framework for Usability Testing of Interactive e-Learning Applications in Cognitive Domains, Illustrated by a Case Study**, ACM International Conference Proceeding Series; Vol. 204 Proceedings of the 2006 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries Somerset West, South Africa Pages: 187 – 197, Year of Publication: 2006, ISBN:1-59593-567-3

(B.28)

"Dodging the Bullets" or How to Retain Creative Pedagogies Whilst Using Presentation Software in Lectures

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Abstract

Aims to acquaint delegates with the disquieting nature of current research outcomes into the use of presentation software in higher education; and to consider some creative models of using presentation technology which go beyond the default patterns of bulleted lists. The intended impact of the talk is to encourage a reflective and informed use of presentation software that will lead to better pedagogical practice in lectures. Content The session begins with a brief summary of research outcomes into the use of presentation software, with a particular focus on student learning and teaching pedagogies. Examples of lecturing creatively with presentation software are shown. Delegates discuss the relative merits of the examples which they have seen and are invited to reflect on their own use of presentation software. These reflections are shared with the group. A printed hand-out providing references and further reading is given to each delegate. References Adams, C (2006) "PowerPoint, habits of mind, and classroom culture", Journal of Curriculum Studies 38, 4: 389 - 411 Levasseur, D. & Sawyer, J (2006) "Pedagogy Meets PowerPoint: A Research Review of the Effects of Computer-Generated Slides in the Classroom." The Review of Communication, 6:1- 2, 101- 123. Lodge, J (2007) "PowerPoint Lectures – New Opportunity of False Dawn?", ROERCE4, Roehampton University.

Historical perspective

A quarter of a century ago, the overhead projector and the slide-carousel were the lynchpins of presentation technology. Teachers prepared audio visuals on transparent acetates and projected them on a screen for their students. This low-tech approach provided flexibility and in general worked reliably. For a more polished presentation, commercially produced 35mm slides were purchased and displayed on a screen using a slide projector. Whilst teachers generally used coloured pens and acetates to create their their overheads, commercial organisations had their acetates made up professionally – and at some expense. The expense was due to the creation of graphics and photographs. By the early 1980s things were about to change and the reason for this was the arrival of the personal computer.

In 1985 a company called Forethought launched an application, Presenter, to assist with the design and production of presentations using a personal computer. Based on the metaphor of the slideshow, Presenter allowed the user to design, create and print out 'slides' containing text and simple graphics (Gaskins, 2008). It was an instant success. Forethought was bought up shortly afterwards by Microsoft and Presenter was renamed PowerPoint and launched in 1987. Since then the program, in terms of numbers sold, has gone from strength to strength. In 1992 it was estimated that there were 400 million copies in circulation and between 20 to 30 million PowerPoint presentations every day (Craig & Amernic, 2006). Today, the program is used in almost every walk of life: business, industry, education. Even university professors have been persuaded to adopt presentation technology in the delivery of their lectures.

Dissatisfaction with PowerPoint

Yet despite its ubiquity in office, factory and classroom, concerns have been raised about its suitability for purpose. A quick trawl of internet humour pages, for example, soon reveals a raft of cartoons that satirise PowerPoint's 'ability' to bore audiences (see Adams, 2000). Perhaps the most devastating critique of its use comes from Edward Tufte (2003). In a highly critical essay he claimed that there was evidence that, compared to other common presentation tools, PowerPoint significantly reduces the analytical quality of serious presentations of evidence; that it corrupts statistical reasoning and that it often weakens verbal and spatial thinking. He lambasted it for its 'Stalinist' control of slide design which, often as not, results in a hierarchical bulleted list of phrases. The bulleted list is an

impoverished way of communicating, he argued, and he illustrated his results with some examples (e.g. Norvig, 1999) where the inappropriate use of a slideshow led to poor communication.

Others, for example John Sweller (2007), argued that PowerPoint presentations made learning more difficult. Sweller maintained that displaying text on a screen, whilst a teacher was lecturing, made excessive cognitive demands on students. "The use of the PowerPoint presentation has been a disaster . . . It should be ditched," he announced.

Tufte and Sweller's arguments have generated a vigorous debate and a number of contrasting claims and counter-claims have been made about the use of presentation software.

What the research says

In their comprehensive review of PowerPoint research studies, Levasseur & Sawyer (2006) noted that most students had favourable attitudes towards the use of PowerPoint in lectures; they found them more interesting and entertaining; they helped with the organisation of the lecture and assisted with the taking of notes. But despite this positive attitude on the part of the students, the authors could not find any convincing evidence from any of the studies they examined that using PowerPoint improved learning outcomes47. Why might this be so? Levasseur & Sawyer note that the case for PowerPoint enriching learning can be argued both for and against using cognitive load theory and Paivio's dual coding theory. But perhaps a more persuasive analysis of PowerPoint's failure to promote learning more effectively is made by Adams (2006).

She argues that PowerPoint is a tool and as such it favours specific kinds of communication. Like every other tool PowerPoint is an 'evocative object' and invites its users to employ it in particular ways. So what are these particular ways and what are the outcomes? The outcomes are bulleted lists and the reason why is that PowerPoint 'exerts invisible lines of force on the choices teachers make'. Why is this so? Well, much of it is down to the software designers who wanted to make PowerPoint easy to learn and use. To support beginners the designers added several features which make it simple to create a slideshow, e.g. the auto-content wizard which allows a presentation to be created by filling in blanks; the pervasive prompts such as, 'Click to Add Title' which automate the slideshow structure and slide design; the provision of colourful templates which automate slide design. The upshot of these 'pushy' support devices is a slideshow which consists largely or entirely of bulleted lists.

So what's wrong with bulleted lists? Plenty, according to Adams. Every subject domain has developed its own ways of representing the information it needs to convey understanding. The bulleted list is an impoverished substitute for native knowledge forms and PowerPoint's hegemony is 'rendering obsolete valuable, perhaps critical knowledge forms'. Teachers need to act vigorously against PowerPoint's 'soft determinism' and design their own slides that go beyond the bulleted list.

Models of usage

Put your head around any university lecture room or attend any academic conference and the chances are that you will see PowerPoint in action. So how is it being used? Selliass (2008) describes three common and depressing scenarios: the *budget teleprompter*, the *data dump* and the *handout generator*. In the *teleprompter* scenario the teacher creates slides filled with screens of bulleted points. In extreme case cases, the screen acts as a script which the teacher reads out verbatim what is written on the screen; in less rigid situations, the screen acts as an *aide-memoire* or notes for the teacher. In both of these cases the slideshow is designed primarily for the needs of the teacher, not the students. Not good.

Then there's the *data dump* slideshow. In this scenario large amounts of data are displayed on the screen. These are impractical for students to read during the presentation but they have the advantage of being easy to display and they save on photocopying costs.

Finally, there's the *handout generator*. In this situation PowerPoint is used to print out notes for students. If the slideshow is poorly designed then of course the quality of the handouts will be equally poor. Far better to write an informative handout written up in full sentences and containing a list of references for follow-up reading.

[47] The one exception to this was in cases where students were issued with the slideshow notes in advance. In this particular case some small gains in learning were detected.

But not all slide shows are as poor as these. Indeed some teachers make excellent use of PowerPoint. What are the features of a good slideshow? An effective slideshow will:

- have a simple clear design;
- use a limited amount of text on each slide;
- complement what the speaker is saying, e.g. using images;
- take into account learners limited concentration span;
- respect learners' preferred learning styles; and
- promote active engagement in the lecture rather than passive listening.

Slideshows exhibiting some of these characteristics can be found in the literature (Alley, 2003; Atkinson, 2005; Kosslyn, 2007; Reynolds, 2008) and on the world wide web (Slideshare). In the interests of effective pedagogy, teachers are recommended to discard the bulleted list and investigate superior alternatives.

References

Adams, C (2006) "PowerPoint, habits of mind, and classroom culture", *Journal of Curriculum Studies* 38, 4: 389 - 411

Adams, S (2000) *PowerPoint Poisoning*, URL: http://www.cs.vu.nl/~frankh/dilbert.html <Accessed 15.7.08>

Alley, M (2003) *The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid*, NY: Springer-Verlag

Atkinson, C (2005) *Beyond Bullet Points: Using Microsoft PowerPoint to Create Presentations That Inform, Motivate, and Inspire*, Microsoft Press

Craig, R & Amernic, J (2006) "PowerPoint Presentation Technology and the Dynamics of Teaching", *Innovation in Higher Education* 31:147 – 160

Gaskins, R (2008) *Home Page for Robert Gaskins*, URL: http://www.robertgaskins.com/ <Accessed 15.7.08>

Kosslyn, S (2007) *Clear and to the Point: 8 Psychological Principles for Compelling PowerPoint Presentations*, NY: OUP

Levasseur, D. & Sawyer, J (2006) "Pedagogy Meets PowerPoint: A Research Review of the Effects of Computer-Generated Slides in the Classroom." *The Review of Communication*, 6:1- 2, 101- 123.

Norvig, P (1999) *The Gettysburg PowerPoint Presentation*, URL: http://norvig.com/Gettysburg/ <Accessed 10.12.07>

Reynolds, G (2008) *Presentation Zen: Simple Ideas on Presentation Design and Delivery*, New Riders Press

Selliass (2008) *Take Your Slide Deck to the Next Level*, URL: http://www.slideshare.net/selias22/taking-your-slide-deck-to-the-next-level/ <Accessed 15.7.08>

Sweller, J (2007) *PowerPoint Should be Ditched*, URL: http://www.presentationzen.com/presentationzen/2007/04/is_it_finally_t.html

Tufte, E (2003) The *Cognitive Style of PowerPoint. Pitching Out Corrupts Within*. Cheshire, Con: Graphics Press LLC

Teaching with PowerPoint blog

This is currently being developed. It should be available in September 2008.
http://teachingwithpowerpoint.blogspot.com/

About the Author

John Lodge is a lecturer (ICT in education) at Roehampton University, London, teaching general ICT modules as well as multimedia and web-based learning. A teacher since the mid-1980s, Lodge has worked with the visually impaired and provided ICT consultancy for schools and local education authorities.

(B.29)

Martin Drlik Jozef, Enhancing E-learning Quality: Often, quality of e-learning is measured by the involvement of multimedia elements into the courses. Despite the fact that e-learning courses can hardly be successful without a proper application of hyperlinks, electronic communication and tests, our understanding of their quality is based on different concepts. We see it as a contemporary method of increasing learner's knowledge by offering a high flexibility in applied content-related communication between instructors and students in terms of time, location and contact means. For that reason, the presence of the tools should be valued much lower compared to the effectiveness of their application and the ability of the designer and instructor to exploit them properly in the right moment. E-learning requires much higher levels of cooperation from the learner than the traditional methods do. There is the key representative of all reasons: to be actively present at his/her virtual class, the student must switch his/ her computer on and intensively follow his/her classroom goings-on. Without his/ her cooperation, the outcomes of the process are questionable. It gives two principle directions to our reasoning: "The e-learning content must have a personal value for the learner" and "Education is communication". If we take the above presumptions and compare them with measures of excellence of teaching in traditional classes, we see that quality of e-learning is supported by many other factors, mainly selection of teachers, their pre-service and in-service training, the follow-up activities by school administration, modification of teaching an learning materials to the format appropriate for on-line education, sufficient amount and quality of information resources, continuing testing of students' knowledge and intensive and quick feedback. In our lecture we will demonstrate good practices in all above components using examples from the authors' personal experience with 100% on-line as well as combined on-line and on-site education. Some of the principles are applicable worldwide, some are very local. We will try to explain which are which and why.

(B.30)

Muntasser Khater; Narimane Hadj Hamou, Distance Learning: Quality and Accreditation: Education (DE) plays a significant and expanding role in education provided by accredited institutions of higher education. This is especially true in degree-granting, international accredited institutions where the majority of distance learning programs and courses are being offered. The development of Information and Communication Technology has caused fundamental changes in many industries and the same is true for education and training services. Widely adopted Internet-based networks are making Distance Education and Training possible anywhere for anyone, even working members of society who have limited time. In addition, future developments promise even greater improvement of interactive information exchange, making the participants feel directly involved in live and sympathetic interchange. This paper presents the main principles of Licensure and accreditation. In order to assure members of the public that the licensed institutions and the accredited programs offered by institutions indeed meet high standards, two interrelated standards-based quality assurance processes-institutional licensure and program accreditation to assess educational quality are employed. Universities should build quality into the educational processes so that each process adds value to learning delivery. To do this, the first task is to define quality criteria for each process. The university should also define methods for checking whether the quality criteria of each process have been met. These methods can then be applied to continuously improve the processes. The paper briefly guides institutions on requirements for DE systems and how to switch to virtual academic business through offering all academic services online. In addition, the paper briefly directs faculty members and instructors on technical features for DE system, where to find the tools and how to gain skills needed to develop their courseware and on-line courses. A framework for e-learning system was presented which can help in all aspects of e-learning environment. This framework will provide guidance in creating virtual education or e-learning plan. There are numerous factors help to create a meaningful learning environment. And finally, establishing a Distance Learning Center for any higher education institution is a vital and a challenging issue.

(B.31)

Trevor J. Tebbs, A Story to Share: A Hyperopic Child: This presentation recounts the story of a five year old in the USA ordinarily destined for special education as an disabled autistic child. Observation of the child in the classroom setting, along with parental input and the insights offered by the child's preschool teacher, suggested that a diagnosis of ASD might not be appropriate. Clinical work and psychological testing led the author to investigate the possibility of extreme farsightedness (hyperopia) in early childhood being antecedent to the patterns of behavior presented by the child in school. After pursuing various avenues of research the child was identified as a gifted and not autistic. Based on the identification, educational personnel reframed their view of the child's educational and social emotional needs, deciding instead to embrace a "working from strengths" as opposed to a "remediation of weakness" model.

About the Author

Trevor J. Tebbs is an educator, cognitive behavioral psychotherapist, educational consultant with 40 years of experience working with individuals across the life span, and author. As a watercolor artist he had a major one –man exhibition at the International Monetary Fund Headquarters in Washington D.C.. His initial training was as a regular and special education teacher in England. Over the years he has experienced teaching in a wide array of settings in the UK and USA. For example, he has been a vice-principal in a school for children with severe cognitive and physical disabilities, Assistant Director of the University of Connecticut (UConn) Honors Program, art educator, and education professor. Trevor's graduate work was in Educational Psychology based at the National Research Center on the Gifted and Talented (NRCG/T) at UConn with Joseph Renzulli (Director of the NRCG/T) and Sally Reis (Chair of the Educational Psychology Department at UConn). In the past he has taught courses in Art Education, Critical Thinking, The Skillful Teacher, Curriculum Development, Research Methods, Drawing, and Sculpture. As an adjunct professor he teaches Educational Psychology, Human Growth and Development and a Seminar in Psychology focused on the educational and social emotional needs of gifted and talented children. In his private practice he works with pre-school aged children through to adults in a clinical setting. His consulting and counseling interests are focused on the educational and social emotional concerns often associated with high ability. Much of his work is based on the notion that personal transformation and psychological healing may be facilitated through raising an individual awareness of self. In addition to the major impact of his studies at the NRCG/T, he is highly influenced by the work of such leaders in the world of psychology and psychoeducation as Jung, Glasser, Rogers, Sternberg, Gardner, and Csikszentmihalyi. He is particularly interested in work of Dabrowski, and often works with gifted individuals in the context of OverExcitability and the Theory of Positive Disintegration (TPD).

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(B.32)

Helen Petrie; Christopher Power; David Swallow; Sharon Bostick, Supporting students with disabilities in further and higher education through virtual learning environments: Students with disabilities face many barriers in achieving their full potential in further and higher education and staff in their institutions often struggle to provide appropriate support for them. The EU4All Project, part-funded by the European Commission, is exploring ways in which the capabilities of virtual learning environments (VLEs) can be used to support students with disabilities and the staff who work with them more effectively. Such support might range from automating the production of teaching materials in alternative formats for students with particular requirements (Braille books for blind students, subtitled video for deaf students etc) through online advice for teachers on good teaching and support methods for students with disabilities to online discussion groups for students with disabilities to share experiences and issues. The project has started with an intensive requirements gathering phase that has included online surveys of students and staff, in-depth interviews and focus groups with students and staff and an analysis of the topics raised in online discussion groups for support staff of students with disabilities. Over 1000 students and 130 staff have completed the surveys, 80 people have participated in interviews and focus groups and 150 topics have been analysed from the online discussion groups. This paper will present an overview of the results of these requirements gathering exercises, highlighting the issues currently facing students with disabilities and the staff who support them and will outline the ways we believe that VLEs can help provide more effective support for students with disabilities and the staff who support them.

(B.33)

Maria del Carmen Domínguez Torres, Gifted With Associate Disorders: Gifted children form a heterogenous group, presenting a CI from 130 to 200, high creativity, commitment with homework. They have in common, high performance in intelligence tests, high capacity to learn. As the other children present disorders that prevent a suitable academic, social and emotional development. The disabled ones form a group of infralayings, infrastimulated. In order to reach his development it is necessary to recognize their potential and educate it, to take care of their incapacities. Dyssynchrony between chronological age and mental age, frustrating school experiences, their social surroundings lead to their symptoms. The psychometric evaluation will use diverse methods. The diagnosis will provide the advisable intervention, orienting teachers and parents. The treatment includes several aspects: educative, pharmacological, and psychological. In order to reach its potential it is necessary to recognize and develop their intellectual capacities and incapacities to be treated (Willard- Holt 1994). Knowing the characteristics of the gifted, the professionals, will have tools to evaluate them and treat them. Profesionals and parents must consider individually the education. Starting from the knowledge, attending him individually. It is difficult to give general rules, because under the gifted term exist sociocultural personalities, capacities and different atmospheres.

Orientation et réussite

José de Valverde
Conseiller d'Orientation-Psychologue
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Résumé

La moitié des débats sur l'avenir de l'école qui ont eu lieu en France au printemps 2004 ont porté sur la question de la réussite scolaire. Or, la notion de réussite est au cœur de la problématique de l'orientation dans la mesure où pour les jeunes et leur famille, les enjeux de la scolarité sont bien de trouver un emploi et monter dans l'échelle sociale. Ce sont d'abord les aspects scolaires de l'orientation qui occupent une place centrale dans l'esprit public car l'insertion professionnelle est en grande partie dépendante des itinéraires suivis.

Les élèves attendent en priorité de l'école qu'elle les prépare à un métier et les aide à réussir leur projet d'orientation. De fait, l'organisation du système scolaire français transforme les questions d'orientation en questions d'orientation scolaire.

On constate la persistance d'un déterminisme social sur la performance des élèves et l'orientation, vu le poids des facteurs scolaires, apparaît bien comme une sélection. L'orientation sanctionne l'adéquation des performances de l'élève aux exigences du système scolaire. Différentes études soulignent le poids de certains facteurs sur le processus d'orientation (l'âge, l'origine sociale des élèves, le niveau d'éducation des parents et la nationalité de l'élève, le sexe).

Les questions liées à la scolarité (réussite, échec..) sont intiment liées aux questions d'avenir et à la construction identitaire. Diverses recherches ont porté sur les effets des dimensions conatives en éducation (personnalité, estime de soi, compétences sociales). Parmi celles-ci, il en est une qui joue un rôle important à la fois dans la réussite scolaire et dans celle du projet d'orientation : la motivation à la réussite. La construction de ce projet est un processus complexe qui peut être guidée par l'éducation à l'orientation. Eduquer en orientation, c'est ainsi permettre à tous les acteurs de s'interroger sur les moyens nécessaires pour que l'école soit garante de l'égalité d'accès à la culture et à la réussite de chacun. La mise en œuvre d'une politique locale reposant sur le projet personnel de l'élève, le développement de la culture de l'orientation et la créativité ne peuvent qu'y contribuer.

Introduction.

L'analyse que je vais développer ici est basée sur mon expérience de Conseiller d'Orientation-Psychologue, ainsi que sur mon activité de formateur intervenant dans les domaines du traitement de l'information, de l'éducation à l'orientation et du décrochage scolaire.

A l'école, certains enfants réussissent mieux que d'autres et de grandes enquêtes ont été consacrées aux déterminants sociologiques des trajectoires scolaires. Des liens ont été établis entre milieu social et réussite scolaire. Outre l'appartenance sociale, d'autres facteurs liés à la réussite ont été mis en évidence comme l'âge ou le sexe. Lorsqu'on parle de réussite, on doit se poser la question des enjeux de la scolarité et de l'orientation. Un constat s'impose : le sens de l'école a évolué chez les jeunes dans la mesure où elle représente un espace où ils intègrent les connaissances qu'ils jugent utiles pour leur futur métier. Ainsi, quel que soit le milieu dont ils sont issus et leur niveau de motivation, les collégiens et les lycéens placent leur avenir professionnel au cœur de leurs préoccupations. Comme le rappelle la sociologue Marie Duru-Bella, les enjeux de la scolarité sont bien de trouver un emploi pour monter dans l'échelle sociale (*Sociologie de l'école*, Armand Colin, 2007, p.55): «*les inégalités sociales de carrières scolaires s'expliquent notamment par le fait que, pour les élèves et leur famille, l'obtention d'un diplôme apparaît nécessaire pour s'insérer et accéder aux places les plus enviées de la société*».

La question qui se pose est alors de savoir quel est le lien entre réussite et orientation? Elle amène d'autres questions:
- quel est le poids de certaines variables conatives dans la réussite des élèves?
- comment aider les jeunes à réussir leur orientation?

I) La question de la réussite est au cœur de la problématique de l'orientation.

La moitié des débats sur l'avenir de l'école qui ont eu lieu en France au printemps 2004 ont porté sur la question de la réussite scolaire. Or, la notion de réussite est au cœur de la problématique de l'orientation.

Qu'entend-t-on par orientation ?

1) Pour une personne, l'orientation c'est sa capacité à se projeter dans l'avenir, à identifier le type d'activité socio-économique qui lui plairait d'exercer et l'itinéraire de formation qu'il faut suivre pour y accéder. C'est aussi sa capacité à mettre les moyens pour y parvenir.
   Cette démarche est celle qui correspond à la construction d'un projet personnel. Elle dépend d'un certain nombre de facteurs qui sont autant de sources d'influences sur l'orientation d'un individu :
   - facteurs économiques;
   - facteurs sociologiques;
   - facteurs pédagogiques;
   - facteurs psychologiques;

   C'est un phénomène complexe, susceptible d'évoluer dans le temps.

2) Mais ce n'est pas le seul sens que l'on peut donner au mot « orientation ». Il désigne aussi la répartition des élèves dans les filières du système scolaire.

3) Enfin, l'orientation peut désigner l'ensemble des activités pédagogiques et psychologiques pour aider un consultant (jeune ou adulte) à réfléchir aux voies qui lui conviennent le mieux.

La deuxième définition de l'orientation (répartition des élèves) recouvre, selon le Professeur Jean Guichard, « *un ensemble de règles du jeu et de procédures destinées à répartir les élèves dans les diverses filières scolaires ou à les en exclure*. », (Francine Grobras (dir.*), L'éducation à l'orientation au collège*, CNDP, Hachette,1998, p.33).

Force est de constater que ce sont d'abord les aspects scolaires de l'orientation qui occupent une place centrale dans l'esprit public, dans la mesure où l'insertion professionnelle est en grande partie dépendante des itinéraires suivis.

Le système scolaire français

Ainsi, comme le soulignent les Professeurs Jean Guichard et Michel Huteau dans leur ouvrage *Psychologie de l'orientation,* Dunod 2006 p.16 –18, le système scolaire français est unifié, il propose d'offrir à tous la « *même école moyenne* » et intègre les formations professionnelles, techniques et générales au sein d'un même système.

Vers 15 ou 16 ans, le jeune doit faire son choix entre plusieurs itinéraires : la voie conduisant à un diplôme général ou bien une formation technologique générale ou encore une formation professionnelle. Pour répondre à cette question, le système scolaire fonctionne avec un ensemble de procédures d'orientation et d'affectation qui reposent sur un « dialogue » entre les familles et les enseignants. Or les évaluations de ces derniers occupent une place capitale, plus importante encore lorsque le jeune est de milieu modeste. Jean Guichard et Michel Huteau rappellent que la règle sur laquelle repose les prises de décision d'orientation s'appuie sur les performances scolaires : moins les résultats sont bons et plus l'éventail des possibilités d'orientation est restreint.

Les élèves obtenant les meilleurs résultats dans les disciplines scolaires les plus abstraites peuvent continuer des études dans les filières conduisant aux insertions sociales et professionnelles les plus recherchées ; ceux dont les résultats sont les moins bons voient leurs possibilités d'orientation réduites à des filières courtes. C'est ainsi que toutes les formations se situent le long d'une même hiérarchie correspondant au mérite tel que l'école le définit (la réussite dans les disciplines abstraites) et aux positions sociales qu'elle prédisposent à occuper. Cette organisation pèse lourdement sur les pratiques d'orientation et il est indéniable qu'il existe un lien entre ces pratiques et la gestion des flux d'élèves comme le soulignent Jean Guichard et Michel Huteau : « *Une telle organisation transforme les questions d'orientation en questions d'orientation scolaire. La question primordiale n'est plus de déterminer quelles professions ou quels secteurs professionnels conviendraient le mieux au jeune,*

mais de savoir si son « niveau scolaire » lui permettra de suivre des études dans telle ou telle formation située à tel point de la hiérarchie des formations (selon leur degré supposé de difficultés scolaires). »

Et les auteurs d'en tirer les conséquences : « *Dans un tel dispositif, les personnels d'orientation ne peuvent que jouer un rôle marginal : celui d'informer et de conseiller les élèves (notamment quant aux « stratégies » d'orientation scolaire les plus adaptées à leur situation) et celui d'apporter un « éclairage utile » aux enseignants. Ils peuvent aussi se voir confier des tâches de psychologie scolaire et du développement. »*

La faible pertinence de la notion de projet personnel mis en exergue dans les textes

Pour Marie Duru-Bellat, dans ce contexte, il faut souligner la faible pertinence de la notion de projet personnel mis en exergue dans les textes : « *L'orientation, vu le poids des facteurs scolaires, apparaît bien comme une sélection, même si celle-ci est en grande partie « gérée » par les jeunes eux-mêmes*. » (*Sociologie de l'école,* Armand Colin, 2007, p. 48).

En d'autres termes, la mise en avant du projet dans les textes s'avère contradictoire avec le fonctionnement effectif de l'orientation, comme le montre par exemple l'analyse du choix de baccalauréat : selon les intentions officielles, les élèves se répartissent entre les différentes séries de bac en fonction de leurs goûts, projets et de la diversité de leurs talents et non pas en fonction de la place présumée de cette série dans une quelconque hiérarchie des formations.

Or, dans la réalité, l'orientation revient à se situer le long d'une hiérarchie unidimensionnelle de valeur scolaire et de prestige. C'est ainsi que « *les lycéens, avec des atouts inégaux, tentent d'accéder à la filière qui apparaît à la fois la plus conforme à leur niveau et la mieux placée dans la hiérarchie unidimensionnelle allant de la filière S aux séries technologiques ; à cet égard, la meilleure filière est celle qui permet d'accéder aux études perçues comme les plus « porteuses » de débouchés, même si son contenu est perçu comme peu attractif. Cette logique engendre de nombreux choix par défaut* » (Ibid p. 48).

Des facteurs qui influencent les décisions d'orientation

Il existe des écarts flagrants entre les objectifs de la politique d'orientation et les résultats concrets de l'action d'orientation. Je reprends ici les données exposées dans la revue internationale d'éducation d'avril 2005 (p.110 à 112). Plusieurs facteurs occupent une place importante au sein des critères pris, consciemment ou inconsciemment, par les conseils de classe:

- l'âge,
- l'origine sociale des élèves, le niveau d'éducation des parents et la nationalité de l'élève,
- le sexe.

L'âge:

Il est, au moins en apparence, le facteur le plus déterminant : 96,5 % des élèves ayant un an d'avance sont orientés vers la seconde générale et technologique des lycées, contre 2,2 % seulement vers la seconde professionnelle. Pour les élèves ayant un an de retard, ces chiffres sont respectivement égaux à 45,7 % et 46,7 %. Les bacheliers généraux sont en majorité « à l'heure » et, parmi eux, l'âge le plus bas se retrouve dans la série scientifique, laquelle est la plus valorisée dans le système scolaire français. Par contre, les bacheliers technologiques ont en moyenne un à deux ans de retard et les bacheliers professionnels deux ans de retard ou plus.

L'origine sociale des élèves, le niveau d'éducation des parents et la nationalité de l'élève:

Même si les conseils de classe ne prennent pas ouvertement en compte l'origine sociale des élèves, le niveau d'éducation des parents ou la nationalité de l'élève, toutes les études convergent sur un même constat : ces facteurs jouent un rôle décisif dans l'élaboration des stratégies familiales et ils sont ceux qui ont les effets les plus évidents sur la formulation de leur choix au début du processus d'orientation. Ainsi, 97 % des enseignants et 95 % des cadres supérieurs, 97 % des familles dont le père à un niveau d'études supérieures demandent pour leurs enfants une orientation en seconde

générale et technologique. Ce pourcentage ne représente plus que 67 % chez les ouvriers qualifiés et 59 % pour les inactifs (1).

On ne peut que constater le faible poids des conseils de classe pour corriger les écarts entre valeur scolaire et excès ou défaut d'ambition des demandes. L'influence du capital culturel des parents continue de jouer un rôle important dans le processus d'orientation. On peut observer qu'au-delà du collège, l'orientation fait apparaître des écarts significatifs selon la catégorie socioprofessionnelle du chef de famille. C'est ainsi que les chances d'accéder au lycée varient environ de 1 à 2 entre les 10 % d'élèves issus des catégories les plus favorisées et les 10 % de ceux qui sont parmi les plus modestes.

L'influence du sexe:

L'orientation vers l'enseignement général et technologique est plus fréquente chez les filles que chez les garçons et ceci, en raison du choix des familles qui veulent éviter d'envoyer leur fille en seconde professionnelle mais aussi du fait que les filles ont, de manière générale, un meilleur niveau que les garçons. Cela étant, à valeur scolaire égale, le choix des filles est davantage sous l'influence des représentations sociales de la répartition des compétences et des professions. Des mécanismes d'auto-sélection agissent de manière significative dans l'orientation des filles : celles-ci ont une moindre confiance dans leur capacités.

La contribution du dispositif d'information et d'orientation à la réussite des élèves

Pour autant, malgré les contraintes objectives qui pèsent sur le processus d'orientation, le travail pédagogique sur le projet avec les jeunes est absolument nécessaire.

Comme je l'ai souligné en introduction, les élèves ont beaucoup «changé» ces trente dernières années. Le sens de l'école a évolué à leurs yeux : l'école est non plus un lieu de savoir, gratuit et atemporel et ils attendent en priorité de celle-ci, qu'elle les prépare à un métier et les aide à réussir leur projet d'orientation. Dés lors, la question qui se pose est celle du lien entre la réussite et le projet. Il est clair que lorsque l'école n'est pas en phase avec les enjeux de la scolarité et de l'orientation, elle perd sa signification pour les jeunes et risque de générer du décrochage.

Le sentiment d'une école « vide de sens » chez les décrocheurs est renforcé par une pédagogie qui se révèle bien souvent inadaptée, sachant qu'on aura d'autant plus de chances de s'investir dans ses études qu'on y prendra plaisir et qu'on se sentira capable de réussir. Mais ce que représente ces études, ce qu'elles permettront de réaliser, le rôle qu'elles jouent dans la réussite du projet est tout aussi important. Ceci peut expliquer pourquoi le projet personnel est au cœur du dispositif de re-scolarisation d'établissements qui accueillent des décrocheurs, tel le lycée Jean Lurçat à Paris.

Au sein de l'institution éducative, le service public d'information et d'orientation doit contribuer à la réussite des élèves grâce à l'intervention de professionnels hautement qualifiés : les Conseillers d'Orientation-Psychologues appelés généralement C.O.P. Ils exercent leurs activités sous l'autorité du directeur du Centre d'Information et d'Orientation (C.I.O) dont ils relèvent. La fonction d'aide à l'adaptation, de soutien et d'aide à la réussite ainsi que la fonction d'aide à l'orientation et à la construction de projets personnels occupent une place centrale dans le travail des C.O.P... Comme le rappelle Catherine Remermier, Conseillère d'Orientation-Psychologue et formatrice en I.U.F.M., pour travailler sur le projet, « *nous sommes obligés d'affronter la question de la réussite et de l'échec des élèves (...). Ce n'est pas par hasard si, dans les missions du C.O.P., il y a la contribution à la réussite scolaire* » (Académie de Créteil – Séminaire académique *« Culture de l'orientation »* - 16 octobre 1997). Il y a donc un lien entre la réussite scolaire et l'orientation dans la mesure où la première conditionne la seconde et ceci, en raison de la conception du système scolaire français.

II) La motivation source d'influence pour l'orientation des élèves et pour leur réussite scolaire.

Diverses recherches ont porté sur les effets des dimensions conatives en éducation (personnalité, motivation, estime de soi, compétence sociale) et la place qu'elles occupent dans la réussite à l'école. Parmi celles-ci, il en est une qui joue un rôle important à la fois dans la réussite scolaire et dans celle du projet d'orientation : la motivation à la réussite.

La motivation à la réussite est une attitude générale incitant la personne à la construction puis à la réalisation de projets. Chez les adolescents et les jeunes adultes en situation de formation, cette motivation à la réussite peut porter sur divers domaines : scolarité, anticipation de la vie professionnelle, relations humaines, etc. Voyons à présent, de manière plus approfondie, cette notion de motivation à la réussite.

Le besoin d'accomplissement, motivation sociale de premier plan pour l'étude des conduites d'orientation.

Le psychologue américain Henry A. Murray a mis en évidence expérimentalement vingt besoins qui sont à la base de nos conduites : ainsi, à côté des besoins comme la faim, la sexualité, on trouve des besoins comme l'agression, la recherche de domination, etc.

Murray a repéré un besoin parmi les diverses motivations de l'être humain qui présente un intérêt important pour les conduites d'orientation, le besoin d'accomplissement. Par la suite, d'autres psychologues ont travaillé sur ce besoin spécifique, John W. Atkinson et David Mac Clelland notamment.

Le besoin de réussite ou besoin d'accomplissement est une motivation sociale qui peut se définir comme le désir d'atteindre, dans des situations de compétition, des buts correspondants à des normes d'excellence. Pour le sujet, il s'agit de réussir le mieux possible dans un domaine qui peut être scolaire, sportif, professionnel, etc.

La motivation à la réussite.

La relation entre motivation et réussite aux examens de l'enseignement secondaire a été l'objet d'importants travaux. Yann Forner, chercheur en psychologie, a constaté que la fréquence de réussite au baccalauréat augmente avec l'attitude motivée ; il a mis en évidence une motivation à la réussite qui est la combinaison de trois facteurs:

- Le **besoin de réussite** : la personne se donne des buts qui présentent pour elle une certaine difficulté. Elle met en place des conduites lui permettant d'atteindre ses buts et elle persiste suffisamment dans son activité motivée.
- Le **contrôle interne-contrôle externe** (locus of control) : introduit par le psychologue Julian B. Rotter en 1966, il désigne la façon dont les sujets localisent la causalité des événements qui les concernent. Il y a les individus qui pensent qu'ils sont à l'origine de ce qui leur arrive (contrôle interne) et ceux qui jugent que ce qui leur arrive dépend du hasard ou bien des autres (contrôle externe).
- La **perspective temporelle** : ce dernier facteur correspond à l'ensemble des attitudes à l'égard du temps. Un sujet peut élaborer un projet situé plus ou moins loin dans le temps ou au contraire, vivre « au jour le jour » et se montrer incapable d'anticiper sur l'avenir.

L'école doit prendre en charge la gestion des motivations pour conduire les élèves à la réussite

De nombreux travaux expérimentaux ont étudié les relations entre motivation et réussite scolaire et ont donné lieu à des ouvrages de vulgarisation destinés à un large public étudiants, enseignants et parents (comme par exemple le livre d'Alain Lieury et Fabien Fenouillet, *Motivation et réussite scolaire*, Dunod, 1997).

Si l'école ne se contente pas d'accueillir de nouveaux collégiens et lycéens mais a pour objectif de les conduire à la réussite, elle doit prendre en charge *la gestion des motivations,* comme le souligne Daniel Pemartin Conseiller d'Orientation-Psychologue (Les démarches de projets personnels, Editions EAP p 134) : « *elle ne pourra faire l'économie d'une interrogation sur ses structures, son fonctionnement, la nécessité de nouvelles pratiques. Il n'y a pas d'action sans motivation, cette dernière pouvant être générée par l'identification d'un objet-but valorisé à atteindre, ou par le sens que la personne attribue à ce qu'elle fait. Si les approches éducatives relatives aux démarches de projets incluent ces deux dimensions, alors elles peuvent participer à la démocratisation de l'école*».

Rappelons que le rapport de la Commission du débat national sur l'avenir de l'école pour la réussite de tous les élèves (2) préconise d'aider les élèves à construire un projet éclairé et le respecter le mieux possible. Le rapport insiste sur l'importance de la motivation liée à l'orientation dans la réussite des élèves « *L'affectation dans une filière de formation que l'on n'a pas choisie (c'est le cas d'un jeune sur trois parmi ceux qui ont suivi une formation dans la voie professionnelle – proportion considérable) est aussi un facteur de démotivation important. Faire disparaître cette situation et, plus généralement, améliorer l'orientation est donc de nature à répondre à la question la plus souvent retenue dans le grand débat national, celle qui porte sur la motivation des élèves, élément moteur de leur réussite* ».

III) Réussir son projet d'orientation

La construction du projet : un processus complexe.

Les projets ne peuvent se réduirent à de simples intentions ou encore à de simples choix d'études. Ils peuvent être définis comme des buts que les élèves essaient d'atteindrent.

La construction du projet individuel est un processus particulièrement complexe qui est susceptible d'évolution et d'adaptation permanente, dans lequel interviennent:

- l'élève qui devient peu a peu l'acteur principal de son orientation;
- l'environnement familial;
- l'environnement scolaire: action éducative des enseignants, personnels d'éducation et de documentation;
- l'environnement socio-économique : action des partenaires du monde socio-économique;
- l'action spécifique du Conseiller d'Orientation-Psychologue.

L'éducation à l'orientation: une construction guidée.

L'éducation à l'orientation permet de rendre l'élève acteur de son orientation. Il a besoin d'être guidé dans sa démarche d'élaboration de projet. Or précisément, l'éducation à l'orientation à pour objectif de lui permettre de développer des compétences au moyen de méthodes et de contenus qui s'inscrivent dans cette démarche de projet.

Le début du développement de l'éducation à l'orientation se situe dans les années 1970. Les méthodes d'éducation à l'orientation vont plus loin qu'une information sur les études et les professions, elles ont une composante psychologique. Elles ont pour objectif de permettre à l'individu de mieux se connaître. Elles doivent aussi développer un ensemble de compétences et d'attitudes utilisées pour élaborer les intentions d'avenir.

L'éducation à l'orientation est donc une mission à part entière pour les établissements scolaires ; elle correspond à une nouvelle démarche pour l'orientation scolaire et professionnelle : il s'agit d'amener les jeunes à travailler sur trois systèmes de représentations:

- la représentation de soi;
- la représentation de l'univers professionnel;
- la représentation des systèmes de formation.

La mise en relation de ces trois systèmes de représentations dans le cadre de l'éducation à l'orientation permet une projection de soi qui fait du jeune, un acteur de son propre devenir. Dans cette démarche, le rôle de l'école est multiple :

- donner à l'élève les méthodes et les connaissances pour lui permettre d'enrichir ses représentations pour qu'elles soient le plus proches de la réalité;
- permettre à l'élève de développer la capacité d'autonomie et de responsabilité qu'il exercera tout au long de sa vie.

A l'heure actuelle, en France, l'éducation à l'orientation est largement répandue au niveau du collège et en cours d'institutionnalisation au niveau du lycée. Cependant, si on dit que l'élève devient « l'acteur principal de son orientation », il faut se poser la question de l'autonomie du sujet dans les pratiques d'aide à l'orientation. Comme le rappellent Jean Guichard et Michel Huteau (*Psychologie de l'orientation*, Dunod, 2006, p.119), lorsque le sujet pense que son orientation dépend de lui-même, la notion de projet a un sens et il est motivé pour réfléchir sur son avenir. Selon eux, pratiquement toutes

les interventions dans le domaine de l'orientation sont soucieuses de respecter l'autonomie du sujet et aussi de la développer.

Toutefois, ils posent la question des éventuels effets contraires au but recherché (*Ibid* p.349): « *culpabilisation du sujet et camouflage des déterminismes sociaux… frein au développement personnel, manipulation des aspirations* » ; selon eux, l'affirmation du respect de l'autonomie du sujet peut parfois masquer des phénomènes d'influence, voire même des manipulations. Ainsi, les travaux qui portent sur l'évaluation des pratiques d'orientation montrent que même si ces phénomènes d'influence ne sont pas systématiques, ils sont bien réels : les séances d'éducation à l'orientation, qu'elles soient intégrées ou non à des bilans, sont propices à la mise en œuvre de ces phénomènes.

Le dispositif de l'Académie de Créteil.

La démarche d'orientation étant un processus continu, global, concernant tous les personnels, il est devenu nécessaire d'aider ces derniers à développer cette pratique éducative de l'orientation. C'est ce qui a motivé la mise en place en 1995-1996, d'un dispositif académique pour le développement de la culture de l'orientation sur l'académie de Créteil. Il a fonctionné pendant plusieurs années mais n'a malheureusement pas été maintenu, malgré un bilan positif. Dans chaque district de cette académie, des équipes de trois personnes - les « trinômes » - participaient à la conception, à l'organisation et à l'animation d'un plan de formation pour favoriser le partage de la culture de l'orientation par l'ensemble des personnels, chefs d'établissement, professeurs, conseillers d'éducation, documentalistes, conseillers d'orientation-psychologues.

L'action entreprise dans l'académie pour accompagner les équipes éducatives dans leur mission d'aide à l'orientation des élèves reposait sur des séminaires académiques, un bulletin « *Correspondances »* qui se faisait l'écho des réflexions sur l'orientation et l'activité du dispositif, des formations de formateurs, ainsi que des actions de formation mises en place par les trinômes.

Il ne peut y avoir d'éducation à l'orientation sans qu'un certain nombre de conditions soient réunies, avec, en premier lieu, les moyens nécessaires. Au collège Saint-Exupéry de Rosny-sous-Bois (Seine Saint-Denis), la mobilisation des ressources internes et externes a rendu possible la mise en place de l'éducation à l'orientation:

- nécessité de dégager un temps scolaire pour l'orientation (T.S.O.) correspondant à une heure quinzaine, qui complète ce qui se fait dans le cadre de l'enseignement des disciplines ou au cours d'entretiens individuels;
- nécessité d'un accompagnement et d'un suivi individualisés des élèves.

Il a fallu organiser l'éducation à l'orientation en tenant compte du fait que d'une part, ce n'est pas une nouvelle discipline (l'orientation est un domaine transversal qui exige le concours de toutes les disciplines) et que, d'autre part, ce n'est pas l'affaire d'un spécialiste, c'est une œuvre collective où chacun (conseiller d'orientation-psychologue, professeur ou autre adulte) intervient à sa manière, en fonction des compétences qu'il maîtrise.

Il a fallu des éléments facilitateurs, en premier lieu une équipe comprenant le C.O.P., les professeurs principaux des classes concernées et autres enseignants intervenant dans ce domaine, le C.P.E., le documentaliste…

L'équipe a pu développer l'éducation à l'orientation à travers les enseignements disciplinaires, par exemple en arts plastiques, avec l'atelier « *Auteur de ma vie* » dans lequel les élèves travaillent sur l'image de soi, leurs intérêts, leurs représentations du « métier rêvé ». L'objectif est de leur permettre d'utiliser la créativité développée en arts plastiques pour leur projet. Je présenterai cet atelier dans la partie consacrée à la créativité un peu plus loin.

Des ressources télématiques documentaires (au C.D.I. ou au C.I.O.) sont nécessaires. Parmi celles achetées par le collège figurent des ordinateurs et l'accès à internet (treize postes informatiques neufs avec accès à internet haut débit ont été installés dans la nouvelle salle multimédia du collège) ainsi que des logiciels d'aide à l'orientation.

Eduquer en orientation, c'est ainsi permettre à tous les acteurs de s'interroger sur les moyens nécessaires pour que l'école soit garante de l'égalité d'accès à la culture et à la réussite de chacun. La mise en œuvre d'une politique locale reposant sur le projet personnel de l'élève, le développement de la culture de l'orientation et la créativité ne peuvent qu'y contribuer.

IV) La créativité : une ressource précieuse pour l'éducation à l'orientation.

Le travail sur le projet mobilise la créativité

Ces dernières années, le projet s'est imposé comme un impératif pour les établissements scolaires comme pour les jeunes.

Comme le souligne le Professeur Jean-Pierre Boutinet, la construction d'un projet fait appel à la créativité:

> « *tout projet, et c'est là son caractère attractif, est une machine à fabriquer de l'idéal ; il déplace l'attention vers un ailleurs qu'il est possible de faire advenir en stimulant l'imaginaire susceptible de mettre l'individu ou le groupe en situation d'innovation » (Projets d'avenir et adolescence, les enjeux personnels et sociaux,* Editions ADAPT, 1993, p. 46).

Si le projet s'impose à tous, telle une injonction, les jeunes ne sont pas tous identiques en matière de réussite scolaire et de construction de projet. Ainsi, Jean-Pierre Boutinet identifie, de façon très schématique, trois types d'élèves (Ibid p. 46-47):

- les « sans projets » : en situation de réussite, remettent à plus tard la mise en place d'un véritable projet et préfèrent valoriser une formation générale dans les filières prévues à cet effet;
- les « en-projets » réussissent moyennement à l'école et on même pu connaître l'échec scolaire. Ils s'interrogent sur leur avenir, doutent d'eux même et ressentent l'obligation d'élaborer des projets pour donner un sens à leurs études actuelles;
- les « hors-projets » sont dans une situation de précarité scolaire nourrie d'échecs répétés et d'exclusion interdisant d'anticiper un futur possible.

Pour Jean-Pierre Boutinet, ce qui unit ces trois populations d'élèves, c'est le fait d'être menacées par une même injonction paradoxale : « quel que soit le désir des élèves de se mettre ou non dans une situation de créativité, chacun d'eux est désormais confronté à l'obligation administrative de se doter d'un projet ».

Selon lui, en érigeant la créativité à travers le projet en loi et règlement, l'institution à travers les textes de références, les enseignants, les conseillers d'orientation ou d'éducation semble émettre une double injonction paradoxale:

- je vous enjoins, dans votre propre intérêt, d'user librement de votre créativité pour penser votre propre avenir
- mettez-vous en projet pour conjurer ces temps difficiles et imprévisibles, même si je pense finalement que cela ne vous servira pas à grand-chose.

Si l'on veut éviter, voire atténuer cette double injonction, il est nécessaire de respecter cinq conditions selon Jean-Pierre Boutinet (Ibid p.52):

1) considérer d'abord le projet au niveau de l'exemplarité et non du banal et du quotidien, ce qui implique de porter l'attention de l'élève sur ce qui, dans son cadre de vie, n'est pas concerné par le projet pour lui permettre de mieux déterminer a contrario ce qu'il désire;
2) considérer le projet comme une lente et périlleuse gestation à travers un continuel travail d'explicitation de ses intentions, selon une temporalité en spirale marquée par l'imprévisible;
3) considérer le projet toujours en relation avec un objet, un but, des personnes significatives, un environnement social, une échéance, une situation à vivre;
4) considérer le projet comme l'outil aujourd'hui approprié pour penser l'incertitude et la complexité et nous aider à définir non pas la meilleure solution mais une solution parmi d'autres;
5) considérer le projet au sein d'un tissu social dans la mouvance d'autres projets en interaction avec eux.

Jean-Pierre Boutinet conclut sur le fait que les conduites à projet donnent lieu à diverses dérives lorsqu'on cherche à abuser d'elles, c'est-à-dire dans le cas d'élèves que l'on met arbitrairement en projet. Il souligne que le recours au projet permet de penser un ailleurs possible, alternative à la situation présente, susceptible de développer les capacités d'innovation et de créativité de l'élève acteur (Ibid p. 52-53).

L'importance de la créativité pour libérer le sujet en situation d'orientation

Un constat s'impose : les élèves ont du mal à sortir de l'emprise des contraintes immédiates et a admettre qu'autre chose est possible et à l'envisager. Qu'on songe au poids des notes, aux contraintes liées à l'offre de formation et au marché de l'emploi. Bien souvent, l'élève procède a un appariement entre ses résultats scolaires et des filières d'études. Cette attitude en apparence réaliste, bloque les processus qui sont nécessaires pour construire un projet et y croire, notamment l'utilisation d'une image de soi positive et projetée dans l'avenir. D'où l'idée d'utiliser le ludique et l'imaginaire pour débloquer les choses comme l'ont mis en évidence des consultants en ressources humaines dans le monde de l'entreprise. Je citerai Sandra Michel et Marie-Christine Mallen qui soulignent l'importance de la créativité pour libérer le sujet en situation d'orientation : lui permettre de se rendre libre de ce qu'il est, pour imaginer ce qu'il pourrait être (*Le bilan personnel, outil de votre réussite* Les Editions d'Organisation, 1992, p.64 -68).

L'utilisation de la créativité pour l'éducation à l'orientation

Toutes ces raisons m'ont conduit à travailler sur l'utilisation de la créativité dans le cadre de l'éducation à l'orientation. Dans le cadre des recherches que j'effectue avec le professeur Todd Lubart sur la créativité chez des personnalités exceptionnelles (telles que Vincent Van Gogh), l'idée m'est venue de proposer à Mme Legouy-Desaulle, professeure d'arts plastiques, de mettre en place un enseignement, sous forme d'atelier, pouvant permettre aux élèves de 3ème du collège du collège Saint-Exupéry de Rosny-sous-bois de travailler sur leur projet d'orientation.

On peut définir la créativité comme étant la *« capacité à réaliser une production qui soit à la fois nouvelle et adaptée au contexte dans lequel elle se manifeste* » (Todd Lubart, *Psychologie de la créativité* , Armand Colin, 2003, p.10).

La relation entre l'éducation à l'orientation et les arts plastiques

Les arts plastiques rentrent en résonance avec l'éducation à l'orientation dans les deux domaines suivants (*99 questions sur l'éducation à l'orientation,* CNDP du Languedoc-Roussillon 2001, question 42) :

a) Construction d'une image positive de soi
b) Compétences transversales:
   - savoir construire et utiliser des démarches d'observation;
   - savoir utiliser les sources d'information et de conseil, savoir sélectionner des informations, savoir s'auto-évaluer, évaluer une situation en termes d'avantages et d'inconvénients;
   - savoir travailler en équipe.

L'atelier « Auteur de ma vie »

Nous avons mis en place cet atelier au collège en 2004. Nous l'avons appelé : « *Auteur de ma vie* ». L'idée est que la créativité, telle qu'elle est développée dans les arts plastiques, peut être utilisée pour aider à l'élaboration d'un projet d'orientation mais aussi, pour s'adapter aux situations nouvelles de la vie sociale et professionnelle.

Cet enseignement d'arts plastiques se déroule en parallèle du programme d'éducation à l'orientation inscrit dans le cadre du Temps Scolaire pour l'Orientation (T.S.O.) en 3ème.

L'atelier se compose de 6 séquences ; leur déroulement vise à développer chez l'élève :
1 – 3 - 4: la connaissance de soi;
5 - : l'entraînement à la projection dans l'avenir;
2- 6 - : le sens du partage.

Pour l'ensemble des séquences, les élèves sont incités à interroger eux-mêmes les moyens qu'ils ont mis en œuvre pour réussir leur réalisation. Par « moyens », nous entendons les moyens matériels aussi bien que les ressources personnelles (savoirs faire, implication personnelle, respect du travail...). Un barème d'auto notation est proposé au début de chaque séquence.

Le travail de liaison entre le programme développé dans le cadre du Temps Scolaire pour l'Orientation (T.S.O.) et l'atelier « Auteur de ma vie ».

Dès le début de l'atelier, le C.O.P. propose aux élèves d'analyser les liens qui existent entre les arts plastiques et l'orientation. Il s'agit là d'un travail difficile car pour beaucoup d'entre eux, il n'y a pas de rapports entre les deux domaines. Les élèves sont invités à réfléchir sur le terme « créativité » et à en donner une définition.

Progressivement, grâce aux activités développées tout au long de l'atelier, ils découvrent que la créativité utilisée en arts plastiques est une ressource précieuse pour bâtir leur projet d'orientation et au-delà, pour leur projet de vie.

Le travail de liaison est facilité par le C.O.P. qui joue le rôle d'un « catalyseur » : il fait travailler chaque élève sur le lien entre le travail réalisé dans l'atelier et celui mené dans le cadre du Temps Scolaire pour l'Orientation (T.S.O.) correspondant à une heure tous les quinze jours avec le professeur principal. Ce travail de comparaison porte sur la représentation que l'élève a de lui-même et celles qu'il a des métiers, à partir du travail qu'il a mené dans le cadre du T.S.O. et dans l'atelier «Auteur de ma vie ». Cette comparaison, va permettre à l'élève de définir une stratégie adaptée à son projet.

Afin de faciliter la mise en perspective des différentes informations, le C.O.P. propose aux élèves de compléter un tableau avec différentes rubriques comme ci-dessous :

<table>
<tr>
<td>MOI
➢ mes vœux, mes désirs
➢ mes goûts
➢ mes intérêts
➢ mes aptitudes
➢ mes résultats scolaires
➢ etc</td>
<td rowspan="2">MON PROJET

Définir une stratégie :

➢ collecter les informations nécessaires
➢ ajuster mon projet aux réalités
➢ agir sur les paramètres qui dépendent de moi
➢ mettre en œuvre tous les moyens utiles
➢ etc</td>
</tr>
<tr>
<td>LES METIERS
➢ les tâches
➢ les conditions de travail
➢ les salaires
➢ les carrières
➢ etc</td>
</tr>
</table>

Effets positifs

L'atelier «Auteur de ma vie » aide les élèves à accéder à la maturité et à l'autonomie pour leur choix d'orientation et au-delà, pour leur projet de vie. Comme le souligne Marie-Agnès Hoffmans-Gosset *« dans l'entrelacs que forment les choix, les responsabilités, les initiatives et les décisions, voici qu'apparaît maintenant le faire créateur. L'être autonome crée sa vie, il ne la subit pas. »* (*Apprendre l'autonomie, apprendre la socialisation*, Editions Chroniques Sociales, 2000, p. 78).

Cet atelier présente d'autres points positifs:

- il permet aussi de développer un travail sur l'image de soi, pour aider les jeunes à avoir une image positive d'eux-mêmes afin de leur permettre de bâtir un projet d'orientation dans de bonnes conditions. Ce travail est particulièrement important avec les élèves en situation de décrochage chez lesquels il existe un déficit d'image positive de soi, le but étant de restaurer le sentiment de confiance en soi chez eux afin de retourner un sentiment d'échec en projet possible;
- il apporte également une aide à la socialisation des adolescents en réhabilitant l'altérité, en d'autres termes, la reconnaissance et le respect de l'autre.

Développer la créativité pour l'éducation à l'orientation à travers les enseignements disciplinaires

Ce bilan positif m'a conduit à proposer à d'autres collègues, la mise en place d'un travail basé sur la créativité. Ainsi, par exemple, une enseignante de lettres, Mme Maud Varbédian-Lapoussière, a

invité ses élèves de 6ème à faire un travail de recherche documentaire à partir de leur « métier de rêve ». Les premiers résultats sont encourageants et permettent de penser qu'il est pertinent de développer la créativité pour l'éducation à l'orientation à travers les enseignements disciplinaires, à la condition expresse que cela soit fait dans le cadre d'un programme défini avec le (la) C.O.P.

En conclusion : Développer la culture de l'orientation et l'utilisation de la créativité pour contribuer à la réussite des élèves à l'école

Notre système éducatif continue de juger l'adaptation d'un élève sur la base de ses performances scolaires. Sa motivation, le fait qu'il se sente bien dans l'établissement, le jugement qu'il porte sur lui (son estime de soi) passe au second plan. Pourtant, il est de moins en moins possible de ne pas prendre en compte ces données et, en particulier, la motivation, si on veut pouvoir transmettre des connaissances dans de bonnes conditions. La motivation est, en effet, une condition essentielle de réussite. Il n'est pas illusoire de penser qu'à l'avenir, les enseignants devront être non seulement des experts de leur matière, mais aussi des spécialistes de motivation. Le rapport de la Commission du débat national sur l'avenir de l'école pour la réussite de tous les élèves préconise d'aider les élèves à construire un projet éclairé et le respecter le mieux possible.

Pour que la notion de projet ait un sens aux yeux d'un sujet, pour qu'il soit motivé pour réfléchir à son avenir, il faut qu'il pense que son orientation dépend de lui-même, de sa capacité à acquérir des connaissances et des compétences, et il est souhaitable qu'il puisse avoir une image de soi positive. Le développement de la culture de l'orientation et l'utilisation de la créativité comme ressource pour construire un projet peuvent y apporter une contribution essentielle.

(1) Sébastien Roux et Aline Davaillon, *Le processus d'orientation en fin de troisième. Observation du comportement des acteurs et analyse des causalités* , Education et formations, MEN, n°60, juil-sept.2001, p. 45.

(2) Rapport de la Commission du débat national sur l'avenir de l'école présidée par Claude Thélot, La documentation Française, 2004, p. 75 -76.

About the Author

Université de Paris X–Nanterre:

1986: DEUG de lettres – Mention espagnol
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1988: Maîtrise de psychologie clinique
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1990: Diplôme d'Etudes Approfondies de psychologie dans la spécialité : « Sciences des comportements et des pratiques sociales » - Mention bien

Conservatoire National des Arts et Métiers (C.N.A.M.):

- Cours B1: La communication, besoins des hommes ; théories et styles de management, sociométrie, gestion psychosociologique des organisations
- Travaux pratiques B1: exercices sur les communications ; travail en groupe, conduite des entretiens et des réunions, négociation, brainstorming, exercices d'études de problèmes en groupe, enquêtes et analyses de contenus
- Cours B22 : Instruire ou former, la formation professionnelle et la formation psychosociale
- Travaux pratiques B22:

Le psychologue et la formation-animation :

e. Rôle du psychologue-animateur, agent de changement
f. Les différentes orientations pédagogiques et le choix d'une méthode
g. La création du matériel pédagogique

techniques de l'animateur :

- La méthode des cas : présentation de la méthode et de ses objectifs ; types de cas, choix d'un cas, rédaction d'un cas, animation
- Les jeux pédagogiques :L'implication dans une situation de jeu, la conception et l'utilisation des jeux pédagogiques
- Les jeux de rôles : objectifs et spécificité des jeux de rôles, déroulement et conduite de jeux, exploitation du jeu.

L'intervention psychosociale:

- L'analyse de la demande;
- Le diagnostic et la mise en place d'une action de formation.

Université de Paris VIII-Vincennes :

1989 : Obtention des unités de valeurs suivantes :

- « L'introduction à la psychanalyse » de Freud
- La sexualité féminine, entre idéal et fantasme
- Conférences cliniques : efficacité et limites de la psychanalyse

Institut National d'Etude du Travail et d'orientation Professionnelle (I.N.E.T.O.P.) :

1996 : Diplôme d'Etat de conseiller d'orientation-psychologue

Formation de Formateur

2005/2006: « Approfondir et diversifier les pratiques de formation sur les processus de déscolarisation et de rescolarisation » (responsable Martine Kherroubi).

2006/2007: « Comment aider les élèves au collège et favoriser une réflexion sur l'orientation ? » (responsable Catherine Remermier)

Expérience professionnelle :

1983-1988: Surveillant d'externat sur l'académie de Paris

1989-1992: Télé-marketing

1992-1994: Conseiller d'orientation-psychologue intérimaire sur les académies de Créteil et Paris

1994-1996: Conseiller d'orientation-psychologue stagiaire I.N.E.T.O.P. à Paris

1996-1997: Conseiller d'orientation-psychologue titulaire au Centre d'Information et d'Orientation de Tremblay-en-France

Depuis septembre 1997 : Conseiller d'orientation-psychologue titulaire au Centre d'Information et d'Orientation de Noisy-le-sec

Activités dans le domaine de la formation

Tutorats exercés:

Depuis 1999/2000: Tuteur de conseiller d'orientation-psychologues stagiaires 1ère et 2ème année

Activités de Formation:

Formation des enseignants:

Depuis 2001/2002 : Formateur dans le cadre de la formation des professeurs nouvellement nommés sur l'académie de Créteil.

Formation des conseillers d'orientation-psychologues:

Depuis 2005/2006 : Formateur des conseillers d'orientation-psychologues sur le décrochage scolaire dans le cadre du Plan Académique de Formation.

2002/2003 : Enquête sur les besoins et attentes des professeurs principaux en matière de formation à l'orientation sur les communes de Bagnolet, Montreuil-sous-bois, Noisy-le-Sec, Romainville, Rosny-sous-bois (communes du District 6 comprenant un total de 27 établissements).

Publications

« Avons-nous changé l'orientation ? » CRAP - Cahiers Pédagogiques Janvier 2007-N°449

Adaptation scolaire

« Le conseiller d'orientation-psychologue et le décrochage scolaire », Adaptation scolaire, un enjeu pour les psychologues - Masson 2007

« La créativité en arts plastiques : une ressource pour l'éducation à l'orientation » - « Repères pour agir Second degré » SCÉRÉN [CNDP- CRDP] – tome 2- 2007
Le cimetière du Père-Lachaise, promenades au fil du temps – Editions Ouest -France mai 2007.

Connaissances informatiques

- Maîtrise du montage numérique sur Macintosh « I Mac » (i-movie)
- Pratique du logiciel « Powerpoint »
- Pratique du logiciel « Ethnos » dans la réalisation d'enquêtes par questionnaire

Divers

- Depuis janvier 2003, membre du réseau d'échange et d'entraide du district 6 sur les comportements de rupture dans la classe ou dans l'établissement : démotivation, agressivité, absentéisme.
  Site internet : http://www.rezo-decrochage.org
- Publication dans le ***bulletin de liaison du réseau d'échange et d'entraide des personnels*** numéro du mois d'avril 2004 : La contribution d'un COPSY à la lutte contre le décrochage.
- Publication d'un article dans le magazine ***Connaissance du Val de Marne*** (tirage : 572.000 exemplaires), dont le numéro du mois de mars 2002 comporte un dossier sur l'orientation scolaire avec mon interview.
- Reportage de **France 5,** pour l'émission **"Cas d'école"** du mercredi 13 février 2002 consacrée à l'orientation au collège. Reportage destiné à montrer comment travaille un conseiller d'orientation-psychologue avec les élèves en entretien particulier. Tournage le lundi 11 février 2002 durant une demi-journée au collège Saint-Exupéry de Rosny-sous-bois.

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(B.35)

Supporting Problem-Solving Performance in the Gifted Classroom through the Construction of Concept Maps

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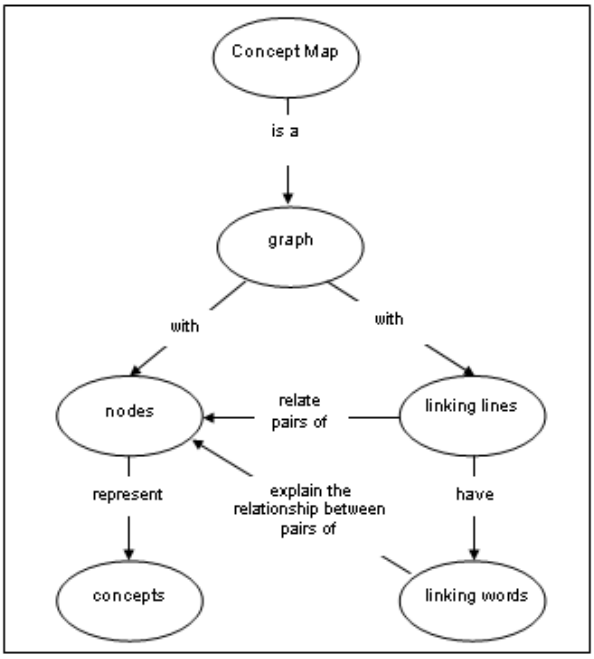
Abstract

Developing effective curriculum for the gifted entails incorporating some features that have emerged from cognitive research, such as metacognition and scaffolding through concept mapping. Concept maps, which are externalized graphical representations of knowledge, enable students to recognize useful information in a problem by helping them externalize their mental processes. When students use them, they can more easily retrieve prior knowledge and link it with new knowledge that is related to the problem. Research has shown that concept maps facilitate complex cognitive processing during problem solving and help the learner to elaborate the problem statement, to generate alternative solutions, and to solve the problem more effectively and efficiently. In this session, we will analyze several ways of using concept-maps to assist students in solving complex, real-life problems. Because problem-solving performance is affected by both conceptual and procedural knowledge, concept maps that support the combination of concepts and processes will be discussed. Particular emphasis will be placed on the use of concept maps that foster communication during small-group problem solving.

A successful one-size-fits-all mode of instruction does not exist (Tomlinson, 1995). Given the fact that students differ with regard to readiness, interest, and learning profiles, a clear need exists for differentiated instruction (Tomlinson, 1994, 1995a, 1995b, & 2001). However, this type of approach for advanced learners is absent in most educational practices. An important component of the high-level curriculum that has been suggested for advanced learners is problem solving (Johnson, 2000), which has been shown to be greatly enhanced through the use of external representations (Jonassen, Beissner, & Yacci, 1993; Malone & Dekkers, 1984).

Various researchers have stressed the importance of helping students externalize their knowledge to better understand the problem space and to find solutions in a more efficient manner (Larkin, 1989; Stoyaov, 1997; Vekiri, 2002; Zhang, 1997). In particular, the use of concept maps has been suggested (Jonassen et al., 1993). Through the use of concept maps, students can represent their understanding of the subject, identify knowledge gaps and misconceptions, as well as refine concepts and the relationships among concepts, thus fostering meaningful learning that is likely to be transferred (Garcia-Gil & Villegas, 2003; Novak, 1990a, 1990b; Novak & Gowin, 1983, 1995; Novak & Musonda, 1991; Wandersee, 1990). This graphical approach to knowledge representation is based on Ausubel's assimilation theory (Ausubel, 1968), which emphasizes that the single most important factor influencing learning is what the learner already knows. Concept maps help to make evident the key concepts or propositions to be learned, and also suggest linkages between the new knowledge and the already existing internal cognitive structures. Clearly, to use this approach, teachers need to move away from traditional authoritarian roles and to take on the role of guide. At the same time, they need to require that students cease being passive recipients of learning and become doers and thinkers instead.

Concept mapping is a useful tool for helping students to learn about the structure of knowledge and the process of knowledge production, or metaknowledge. It is a technique for externalizing hierarchically arranged concepts and propositions that express relationships between concepts as indicated by connecting lines and linking words. The following figure shows an example provided by Ruiz Primo (2000) that illustrates the ideas underlying concept mapping using concept map content.



As students make and remake their concept maps and share them with others, they engage in a true process of knowledge construction in which new ideas are pondered and meaningfully connected to previous schemata (Boxtel, Linden, Roelofs, & Erkens, 2002). This process encourages negotiation of meaning through dialogue and exchange of ideas, and distances itself from the assumption that the teacher or the textbook has the only right answer. This approach also fosters cooperation between learners and teachers. The explicit nature of a concept map allows all those involved in the learning process to exchange views on why a particular propositional linkage is valid, missing, or misplaced. This exchange of perspectives provides teachers with an excellent opportunity to help their students identify misconceptions, which are usually signaled by a missing or an invalid linkage between concepts.

Usually, there are several equally valid ways to link concepts, but each will have a slightly different connotation. By allowing the expression of nuances of meaning, concept maps reveal the learner's cognitive organization, which may include some creative elements as students find novel ways to represent concept relationships and hierarchies. In fact, many students classified as underachievers are bright individuals who find traditional instruction unmotivating but who are enthusiastic about showing a creative, meaningful representation of their knowledge when given the opportunity.

When it comes to solving problems, concept maps represent an invaluable tool because they help students to externalize their internal problem-solving processes, to recognize available information that is useful to solve the problem, to retrieve relevant prior knowledge, and to identify barriers to the process (Cataloglu, 2006; Hayes, 1989; Lee, Baylor, & Nelson, 2005; Sherman & Grueneberg, 2000; Stoyanov, 1997). However, conventional concept maps have several limitations (Lee et al., 2005). They convey conceptual knowledge, but tend to forget an essential component that impacts all process-oriented activities, namely, procedural knowledge. Also, they traditionally represent knowledge exclusively through the modalities of text and graphics. And, due to the restrictions of space that characterize paper and computer screens, they tend to allow the representation of only a limited number of concepts, to ignore mentioning the strength of association between concepts, and to lack contextuality, that is, the learner's prior knowledge and experience that gives meaning to the situation in which the problem is embedded.

Concept maps that are more helpful during the problem-solving process emphasize the shaping of conceptual knowledge based on related procedural knowledge (Hegarty, 1991). They facilitate the transition from declarative (i.e., awareness of objects, events or ideas) to structural (i.e., an intermediate knowledge that makes reference to the relations among concepts and which mediates the translation of declarative into procedural knowledge) and, finally, to procedural knowledge. Also, because the successful solution of complex problems entails a sound understanding of the context

(Jonassen, 2001), concept maps should provide the spatial flexibility that the learner needs to include commentaries about how the concepts are interrelated in different situations and about what these situations mean to the selection of certain processes. These maps can be constructed using tools—mostly computer-based—that facilitate the attachment of annotations to concepts and links, thus clarifying the type and strength of association between concepts, and between concepts and processes. In this manner, the learner can more readily access the information that is relevant for solving a particular problem. These tools may also allow the learner to represent knowledge employing a combination of text, graphics, sound and animation (Lee et al., 2005; Morphew, 2000). The possibility to incorporate more than two dimensions into a concept map can be extremely useful because multiple representations of knowledge have been shown to improve problem-solving performance (Paivio, 1990).

Finally, given the fact that concept mapping aids knowledge construction, a comment regarding the types of knowledge that it encourages within Bloom's taxonomy of educational objectives is in order. Bloom (1965) outlined six "levels" of objectives in education that have been used in the field of gifted education to make decisions regarding differentiated instruction. It is easy to write objective questions that test whether or not what Bloom called Level I objectives—rote recall of specific information—have been met. But it is considerably more challenging to design a test to determine whether new knowledge has been analyzed, synthesized, and evaluated by students. Because concept mapping requires students to perform at all six levels, not only can educators help students acquire the types of knowledge that support problem-solving performance, but they can also more readily assess the depth and complexity of the knowledge acquired by their students.

References

Ausubel, D. P. (1968). *Educational psychology: A cognitive view*. New York: Holt Rinehrt and Winston.

Bloom, B. S., Krathwohl, D. R., & Masia, B. B. (1965). *Taxonomy of educational objectives*. Longman: London.

Boxtel, C., Linden, J., Roelofs, E., & Erkens, G. (2002). Collaborative concept mapping: Provoking and supporting meaningful discourse. *Theory Into Practice, 41*(1), 40-46.

Cataloglu, E. (2006). Open source software in teaching physics: A case study on vector algebra and visual representations. *The Turkish Online Journal of Educational Technology, 5*(1), article 8. Retrieved from TOJET database.

Gil-Garcia, A., & Villegas, J. (2003, July). *Engaging minds, enhancing comprehension and constructing knowledge through visual representations*. Paper presented at a Conference on Word Association for Case Method Research and Application, Bordeaux, France. (ERIC Document Reproduction Service No. ED480131).

Hegarty, M. (1991). Knowledge and processes in mechanical problem solving. In R. J. Sternberg & P. A. Frensch (Eds.), *Complex problem solving: Principles and mechanisms* (pp. 253-285). Hillsdale, NJ: Lawrence Erlbaum.

Johnson, D. T. (2000). *Mathematics to gifted students in a mixed-ability classroom*. Reston, VA: ERIC Clearinghouse on Disabilities and Gifted Education, Council for Exceptional Children. (ERIC Document Reproduction Service No. ED441302).

Jonassen, D. H. (2001). Can you train your employees to solve problems: If so, what kind? *Performance Improvement, 40*(9), 16-22.

Jonassen, D. H., Beissner, K., & Yacci, M. (1993). Structural knowledge: Techniques for representing, conveying and assessment tools. *Journal of Interactive Learning Research, 8*(3/4), 289-308.

Larkin, J. H. (1989). Display based problem solving. In D. Klahr & K. Kotovsky (Eds.), *Complex information processing: The impact of Herbert A. Simon* (pp. 319-341). Hillsdale, NJ: Lawrence Erlbaum.

Malone, J. & Dekkers, J. (1984). The concept map as an aid in instruction in science and mathematics. *School Science and Mathematics, 84*(3), 220-232.

Morphew, V. N. (2000). Web-based learning and instruction: A constructivist approach. In L. Lau (Ed.), *Distance learning technologies: Issues, trends and opportunities* (pp. 1-15). Idea Group Publishing: Canada.

Novak, J. D., Gowin, D. B., & Johansen, G. T. (1983). The use of concept mapping and knowledge Vee mapping with junior high school students. *Science Education, 67(*5), 625-645.
Novak, J. & Gowin, B., (1995). *Learning how to learn*. Cambridge: University Press.
Novak, J. D. (1990a). Concept maps and Vee diagrams: Two metacognitive tools to facilitate meaningful learning. *Instructional Science*, 19, 29-52.
Novak, J. D. (1990b). Concept mapping: A useful tool in science education. *Journal of Research in Science Teaching, 27*(10), 1012-1028.
Novak, J. D., & Musonda, D. (1991). A twelve-year longitudinal study of science concept learning. *American Educational Research Journal, 28*(1), 117-153.
Paivio, A. (1990). *Mental representations: A dual coding approach*. Oxford, UK: Oxford University Press.
Ruiz Primo, M. A. (2000). On the use of concept maps as an assessment tool in science: What we have learned so far. *Revista Electrónica de Investigación Educativa, 2*(1). Retrieved May 20, 2008, from http://redie.uabc.mx/vol2no1/contents-ruizpri.html
Sherman, R. A., & Grueneberg, K. (2000). Concept mapping with multimedia on the Web. *Journal of Educational Multimedia and Hypermedia, 9*(4), 313-331.
Stoyanov, S. (1997). Cognitive mapping as learning method in hypermedia design. *Journal of Interactive Learning Research, 8*(3/4), 309-323.
Tomlinson, C. (1994, April). *Preservice teachers' perceptions of and responses to the diferential needs of gifted students in their classroom*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.
Tomlinson, C. (1995a). *Differentiating instruction for advanced learners in the mixed-ability middle school classroom*. Reston, VA: ERIC Clearinghouse on Disabilities and Gifted Education, Council for Exceptional Children. (ERIC Document Reproduction Service No. ED389141).
Tomlinson, C. (1995b). *Gifted learners and the middle school: Problem or promise?* Reston, VA: ERIC Clearinghouse on Disabilities and Gifted Education, Council for Exceptional Children. (ERIC Document Reproduction Service No. ED386832).
Tomlinson, C. (2001). Differentiated instruction in the regular classroom: What does it mean? How does it look? *Understanding Our Gifted, 14*(1), 3-6.
Vekri, I. (2002). What is the value of graphical displays in learning. *Educational Psychology Review, 14*(3), 261-312.
Wandersee, J. H. (1990). Concept mapping and the cartography of cognition. *Journal of Research in Science Teaching, 27*(10), 887-895.
Jonassen, D. H., Beissner, K., & Yacci, M. (1993). *Structural knowledge: Techniques for representing, conveying, and acquiring structural knowledge*. Hillside, NJ: Lawrence Erlbaum.
Lee, Y., Baylor, A. L., & Nelson, D. W. (2005). Supporting problem-solving performance through the construction of knowledge maps. *Journal of Interactive Learning Research, 16*(2), 117-131.
Zhang, J. (1997). The nature of external representations in problem solving. *Cognitive Science, 21*(2), 179-217.

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(B.36)

Yeliz Kiralp; Cigdem Karagulmez; Sibel Dincyurek; Sulen Sahin, Effects of Different Family Attitudes on their Child's Academic Achievement: The most important factor that distinguishes humans from each other is child development and family attitude. This means that family plays a particularly important role in the academic success. The influence of family in the formation of self-development and achievement is observed from pre-birth stage until one's death. Inter-familial relationships and particularly that of the mother and the father, is one of the most important factors affecting a child's psycho-social development, and also affecting their academic achievement. It is commonly stated in literature that the most appropriate environment for a healthy psycho-social development is an environment in which the mother and the father display a democratic attitude towards the child. It is stated that children brought-up in such an environment are more successful in school life , have stronger self-confidence, self-esteem and self-concept, whereas children brought up in an authoritarian environment, even though successful in academic matters, have weaker self-confidence in social matters, are more inclined towards crime, depression and addictive substances and they have a conformist attitude towards environment. The concept of "success" has become one of the most important factors in the Turkish society (Baltaş,1993).The extensive efforts and sacrifices made by parents, so their children are successful academically and have the opportunity to enter university, is unlimited; parents go to the extent of becoming indebted so their children can attend private schools. However, many parents are unaware that they are one of the influential factors of their child's academic success. For this reason it is assumed that parents' attitudes are a strong source in raising their children's academic achievement. There is an absence of studies indicating family attitude and the effect of these on their children's academic achievement in North Cyprus. The absence of such studies creates an urgent necessity for such research in North Cyprus which has a very small population. The research to be done needs to reflect the family structures and their effect on child's academic achievement. Based on the necessity of such research, the study aims at determining the relationship between different family structures and their effects of children's academic success, with respect to several variables. It is hoped that, the results of the study will contribute particularly family attitude and the children's academic achievement in North Cyprus. Baring in mind the differences in family attitudes, the study will also lead to the development of various educational programs for the families to bring-up their children in a better family environment, therefore to create a psycho-socially heal their society and increase their child's academic success. The Scope and Sampling of the Study The scope of the study is limited to the Psychological Counselling and Guidance students studying at Near East University during the 2007-2008 academic year.

(B.37)

Simon Peter Taylor, Gifted & talented students in secondary science classes in New Zealand: enhancing creativity and spirit in our students-what can we do? This presentation will explore the latest work being done in New Zealand secondary schools engaging students who are gifted and talented in science. You will see video interviews of students discussing their interests and stories about their learning. Simon will also discuss some highlights and challenges in the diverse range of remote rural to urban schools in New Zealand. There will be a focus on how we can "light the fire and keep the fire burning" within our senior science students and the practical strategies to enhance creativity in the workings of a classroom. Yes, the 21st Century has arrived but have our science lessons changed? The challenge of meeting the needs of the learner and meeting the needs of the science discipline! Simon will talk briefly about the aspirations of the project, the need to catch the spirit of the teenager and the direction to support the gifted learner for the future.

About the Author

Simon Peter Taylor is a secondary science adviser for the University of Waikato for the regions of the Bay of Plenty and central North island of New Zealand. His passion has been teaching physics and science for 21 years in secondary schools in New Zealand with large proportions of Maori students. His most recent work has been researching and working with teachers with gifted students in science. The workshops on “lighting the fire” for science students have been popular with teachers and Simon discusses how might the learning be differentiated for gifted children? His work takes him to remote and isolated areas of New Zealand supporting schools and teachers. His central focus has been directed at student learning, incorporating collaborative strategies and practical creative investigation. Much of his work centers on the student learning environment with the themes of student voice and student negotiation at the heart of the practice. The project “Think tall and talk more” in schools has made a large impact on teacher professional learning and raising student achievement in science. Simon continues working with teachers, writing for the Ministry of Education, researching in the areas of Gifted and talented Science learning and in-depth projects with Maori students.

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Education for Migrant Children in Beijing

Alicia Qi

Abstract

Since early 1990s, China has witnessed several waves of migrant workers swarming into big cities ceaselessly searching for better paying jobs and better living. They formed large migrant communities on the outskirts of cities. Since mid 1990s, they started reuniting with their families and children. With more migrant children coming into cities, education for them becomes a pressing social problem in many parts of China, especially in metropolitan cities like Beijing. Recently, more than 400,000 migrant children are in the city proper or the urban fringe, living in poor conditions and without proper education, some are even being excluded from their legal right to education. About 400 schools for migrant children, vary greatly in scale and largely illegal, are providing education for migrants. Some migrants are too poor to afford education; some are misinformed and too ignorant to the centrality of education for a fair starts for their children. Some migrant children are just excluded from the education system because of social discrimination and the indifference of the local communities. The government is also facing dilemmas and lack of effective policy measures to deal with the problem that is expanding both in scope and complexities. The study proposes that it is now high time for the government to adopt appropriate measures to handle the problem before it is too late. More resources for education are needed, more flexibility in policy and administrative arrangements has to be called for, and a more proactive attitude to the issue should be developed.

Introduction

Education for migrant children has becoming a more and more pressing issue for the developing China. And the issue is also becoming a more and more "hot topic" better term) topic for the academic circle. The total number of academic papers is increasing in a way similar to the ceaselessly expanding volume of migrant workers, which together with news reports have helped to bring this issue into public attention. As it is believed, when public attention is aroused and proposals for problem solving coming up, it is possible that solution will come in the corner. Today, when mentioning this issue, many people will jump to the conclusion that government should be criticized for being reluctant to provide migrant children with education. Actually, the status quo is that around 250,000 of 400,000 migrant children in Beijing are studying in public schools (official document 2007). Though this official figure is questionable, it still reflects the fact that compared with a few years ago, the overall situation is improving. Since 2004, migrant children admitted to public schools only need to pay 200 *yuan* per semester. And even fewer people know that the notorious event of September 1st in 2006 (37 migrant schools in *Haidian* District were shut down) took place under a backdrop that was actually in favor of migrant children (reason will be explained later). I believe that beneath the surface of the issue, something with more profound nature is under going. Rather than stop at descriptive level or merely concentrates on seeking for compulsory education right for them, researches on education for migrant children should echo this profound change. And this is where the theme of this paper lies in.

Limitation of Existing Research

Education for migrant children must be an issue of great uniqueness and importance otherwise it would not have attracted such enormous attention from both home and abroad. This is something I never doubt, given the fact that about 120 million (according to the Fifth Population Census) to 150 million people (other's estimation) are on the move, carrying with them a vast number of children. Again according to the Fifth Census, the number of migrant children was above 14 million, and this was seven years ago. Updated estimation is more than 20 million. In Beijing alone, the number of migrant children has reached 400, 000. I still remember what an official said to me in June, he said that it is in this year that Beijing municipal government officially adopted this figure. What was between the lines is that they had known the number before it was officially announced, but due to whatever reason they kept it undiscovered to the public.

Statistics let us know more about the general situations of migrant children and their schooling. However as far as I am concern, it is necessary to question the validity of a few very important figures before we believing in them, such as the number of public schools receiving migrant children, number of migrant schools, and numbers of migrant children studying in either of these two kinds of schools, and etc. There are basically three reasons why I think questioning is necessary. First of all, research

programs of considerable size are usually organized or sponsored by government. Therefore the statistics they provided could be very 'political' and thus less trustworthy. Secondly, researches were seldom done on a basis of random sampling, which leads to questioning of the overall legitimacy of applying the figures to the whole migrant population under study. Lastly, reading through related journals leaves me with an impression that apart from many papers of high academic value, there are also quite a number of them quoted data from each other in a way not serious enough. Besides, most papers stop at descriptive level. My guts feeling tells me there is still much space to improve in researches on migrant workers and their children.

Inconsistent and sometimes questionable statistics are only one of those aspects needs to be improved. Bradley and Schaefer stated in their book that data may alter other's lives, and therefore as researchers we have to be very cautious and responsible:

Data about humans have the potential to alter the persons about whom the data have been collected and their relationships with other persons…and such data are likely being used to make major decisions regarding people's education, employment, and place of residence, and they exercise a major influence on business and governmental policies…Because such decisions are so important, researchers and practitioners have a significant responsibility to see that such data are accurate, meaningful, and are presented in such a way that they (could) contribute to good decision making (1998).

Their attitude towards data actually could be applied to the whole research procedures, especially to social researches about human beings. Unlike earlier practitioners who went into the filed and collected first-hand information, nowadays some papers were written up in a very simplified manner, which reflects a not-so-responsible attitude towards doing researches.

I have a personal experience at an international conference. A renounced scholar whose Master thesis is on migrant children in Beijing failed to answer questions about a few basic numbers regarding migrant children, with the excuse that they are to mobilized to be counted. In contrast, a migrant school's principle clearly answered those questions with confidence. The sharp contradiction reminded me with alarms that as a researcher I must respect the ethic of doing social research, be responsible to those children I study and try to serve their benefits.

Education for Migrant Children in General

It is common knowledge that every child in China ought to be guaranteed the access to nine year compulsory education, which composes an important part of children's lawful right. As the term suggests, compulsory education should be compulsory and free. However, in reality children of migrant workers have difficulties to study in public schools in cities. Education for migrant children has long been a problem, until 1996 migrant children were mostly refused permission to enroll in urban schools. New regulations passed that year allowed for the enrollment of migrant children in public schools in some certain cities on an experimental basis. Before the Provisional Measures for the Schooling of Migrant Children and Young People was issued in 1998, education for migrant children was not guaranteed by the Compulsory Education Laws, since it stated that it was the governments at their origins that shoulder the responsibilities of providing education to migrant children. Governmental subsidies for education were subscribed according to the number of registered students. Therefore, when moved to cities, migrant children's education was no longer supported by the governments at their origins, nor it was in charged of by the governments of their present existence. To put it another way, when leaving their origins, they were simultaneously excluded from the basic social security form entitled to them by Chinese laws (Cai 2004). So their education became a grey zone of management, their hometown's government in rural area could no longer help, nor do the local governments in cities want to help (Xie 1999).

Education for Migrant Children in Beijing

a. Large Number of Migrant Children in Beijing

There are just too many different versions of the estimated number of migrant children in Beijing and it is thus hard to tell which one is more convincible. The most recent offical statistic available

shows that in the past 6 years, the number of school-aged migrant children is increasing rapidly from 98,000 in 2000 to 400,000 in 2006. By the end of 2006, the number of migrant children at an age for receiving compulsory education in Beijing reached 400,372.

b. How Many Migrant Children Are in Schools?

Various reports, academic papers and articles have provided us with inconsistent statistical figures on this issue, and reports on the percentage of migrant children in school fluctuated widely. Updated statistics by the end of 2006 shows that among the 400,372 migrant children, 250,118 of them attended public schools, making up 62% of the total. Those studying in civil-run schools numbered 46,667, accounting for 12%. And the rest 26%, namely 103,587 migrant children attended unauthorized migrant schools.

c. Concerns from Various Groups

Prior to the late 1990s, little or no attention had been paid to the problem of schooling for migrant children. Since then, the issue has attracted significant attention in some cities, as evidenced by reporting in local newspapers, particularly in Beijing and Shanghai. Some such articles expressed concern that a "new generation of illiterate" was being created. The images of migrants and their children could be vividly reflected by the ways they were addressed by the mass media. In the early stage, migrant children were referred to as "black kids", who wandered on the streets all day long, smoked, drunk, gambled and stole. Over the last a few years, attitudes towards migrants and their children have changed gradually. Unlike years ago when migrants were described as those who came from the rural world, now people have started challenging the legitimacy of the *hukou* system; unlike before when migrants seemed to born into the bottom of the society, nowadays people have started talking about integrating them into a more harmonious society which demonstrates more equality and fairness; as to migrant children, they are no longer being deemed as "little illiterate on the move", but as "little flowers on the move" who deserve as much as care and nutrition as their urban peers.

The issue of education for migrant children also attracts enormous attention from foreign NGOs, mass media and local academic circle. The positive impact they have exerted on the development of the issue can not be denied.

d. Official Attitude at the Early Stage

Both in Beijing and Shanghai, local people's congress and consultative bodies have discussed the problem of children of migrants who are not receiving education in those cities. To a certain extent, limiting educational opportunities for migrant children is a conscious strategy that the city authority may use to increase the costs of migration, so as to deter migrants from setting in the cities. As to reason why there were many migrant children who did not attend schools, the local government placed a large proportion of the blame for the situation on the migrants themselves.

e. Official Provision

1996 Trial Measures for the Schooling of Children and Youth among the Floating Population in Cities and Towns (below, 1996 Trial Measures) passed that year allowed for the enrollment of children of migrants in state schools in some areas of certain cities on an experimental basis. It provided that those who do not have the condition to enter the full-time, state-run schools can receive "informal" education through attending supplementary classes run by state schools. Another solution to migrant children's schooling has been for urban authorities to set up schools and classes for migrants. However, as detailed below, fees for such schools remain prohibitively high for most migrant.

f. Private Solutions

As city schools have often either refused to accept migrant students or have set their fees at a level that is not affordable to migrant parents, since the early to mid-1990s, large numbers of private schools have been set up in cities with large migrant populations. Simplified schools set up by migrants usually operate on a small scale and mainly offer primary education. Many of them are located in the

peri-urban areas. The physical environments of these schools are often poor and facilities insufficient. By the end of 2006, there are 268 migrant schools in Beijing, among which 63 have obtained legal status, the rest 205 have not.

Re-examining the Policies on Education for Migrant Children

In this section, a four steps model is to be adopted to examine education policy for migrant children in Beijing. The model starts with analyzing policies on education for migrant children, including analyzing both the content and the effect of them. The second step is to describe and examine the social context from where these policies were generated and developed. The third step is to address the relationship and dynamics between policies on education for migrant children and other parts of the social system. And lastly the fourth step is to jump out of current social structure and seek for aspiring alternatives. By adopting this four step model, not only policies and social context under current social structure are to be discussed, ideological issue can be addresses as well.

a. Policies on Education for Migrant Children

Like most modern governments, the Chinese government lays great store in education (in fact, the % of government spending on education had been relatively low previously, but has been rising rapidly in these few years. But comparative analysis still says that the Government of the PRC is not investing in education enough). It is explicitly listed in the Compulsory Education Law of the People's Republic of China which was put into effect on July 1, 1986 that: All children who have reached the age of six shall enroll in school and receive compulsory education for the prescribed number of years, regardless of sex, nationality or race (China Education and Research Network 2005). However, due to the insufficient policy protection, huge difficult was met by migrant children pursuing schoolings. Many of them were out off school in their moves. A series of laws and regulations were formulated and implemented to address this issue and they are listed as below. I will mainly analyze two of them: *Procedures* of 1998 and *Opinions* of 2003.

Laws and Regulations

Year	Department	Action	Laws and Regulation
In 1995	Ministry of Education	Listed the issue concerning the education of migrant children among that year's discussion agenda.	
	Basic Education Department Beijing Municipal Education and Science Research Institute	Jointly did research on the issue.	
Apr1996	Former state Educational Committee	Piloted it in Beijing, Shanghai and some other cities.	1996 Trial Measures for the Schooling of Children and Youth among the Floating Population in Cities and Towns
Mar1998	Ministry of Security Former State Educational Committee	First departmental rules concerning education for the children of migrant workers in China.	Provisional Procedures on Schooling for Migrant Children and adolescent Hereafter referred to as '*Procedures'*.
In 2001	State Council		Decisions on the Reform and Development of Basic Education

Jan 15th, 2003	General Office of the State Council	Stipulates that governments of their present existence should adopt various measures to enroll migrant students into local public schools. Migrant children should be regarded equally in terms of entrance requirements. Support should be strengthened and rendered to migrant schools and efforts made to integrate them into the development plans of the local education system to realize an uniformed management	Article 6 in the Notice on a Better Management and Service for Migrant Workers
Sept 19th, 2003	Premier Wen	Delivered a speech on a meeting, emphasizing the government's resolution of providing schoolings to migrant children.	
Sept 30th, 2003	General Office of the State Council Ministry of Education Ministry of Security National Development and Reform Commission Another three departments	Designs an overall plan for tackling this problem and forms a educational system with "two main roles" as its principle and with "establishing a protection mechanism guaranteeing migrant children to be covered by a comprehensive compulsory education" as its core essence	**Opinions on Further Improving the Work of Providing Education to the Children of Farmer-workers in Cities Hereafter referred to as '*Opinions*'.**

(Ming 2006; Wu 2001; Wang 2004)

Comments and Concluding Remarks

Procedures (1998): It states that governments of present existences should provide migrant children with opportunities to receive compulsory education, and meanwhile set up strict management mechanism. Governments of their origins should set strict restrictions to control the movement of registered students. As long as the children can be offered supervision, they must attend schools at where their *hokou* are. It clearly states that the governments of their present existence should shoulder the major responsibility to provide compulsory education to these children. And the migrant children can also choose to study in civil-run schools, affiliated schools run by state own primary and secondary schools for migrant children and migrant schools as well. It also requires that none of these schools should seek for profits, and they can only charge a reasonable amount of fees allowed by relevant rules and regulations. High fees are prohibited.

Opinions (2003): It designs an overall plan for tackling this problem and forms a educational system with "two main roles" as its principle and with "establishing a protection mechanism guaranteeing migrant children to be covered by a comprehensive compulsory education" as its core essence. It stipulates that governments of present existences should actively play its role in providing migrant children with compulsory education. A well-developed mechanism guaranteeing education for migrant children should be established. Schools for migrant children should be included into the overall plan of urban infrastructure development. Financial department should allocate necessary financial support for this arrangement. It also demands that migrant children should de treated equally in terms of school fees, they should not be charged more than their urban peers.

By examining the detailed content of these two regulations, an obvious improvement can be identified. *Procedures* to a certain extent better accept the mobility of migrant children and come up with a more concrete plan to tackle the problem. It requires public schools to provide migrant children with opportunities for education and reduce extra fees. But it still calls for strict restrictions to control the movement of registered students. In practice, the rule has been pigeonholed. Since the general principle made by the state may be differently put into action at local levels. Besides, "differential

treatment" can still be traced in it (Yang 2006). Since it also allows schools to charge extra fees from migrant families, migrant workers have to pay high prices to send their children to public schools, which sometimes could be far too high for most migrants to enroll nonresidents in public schools (Christian Science Monitor 2006).

From Procedure to Opinions, the progress as described is promising. From then on, public schools have adopted a more pro-active stance to serve migrant children, which stimulates a fast increase of the figure of migrant children attending public schools. According to a report based on a survey in Beijing in 2000 by the Ministry of Agriculture's Rural Economics Research center, only about 14 percent of migrant workers have managed to send their children to public schools in Beijing. About 11 percent attend the shabby unregistered schools run by migrant workers themselves in Beijing and about 2 percent are not attending school at all (People's Daily Online 2003). By the end of 2004, there were about 345,000 school-age children in Beijing, among which, 217,000 studied in public schools, 29,000 in civil-run primary and middle schools, and about 98,000 in migrant schools (Li 2005).

It should be pointed out that it was under this backdrop that a few districts in Beijing adopted a rigid manner shutting down migrant schools. Not like what was reported by the mass media, in fact, local governments simply want to include more migrant children into urban public school system. Rather than their intention, their unwise and inconsiderate approaches should have been condemned for the September 1st event.

b. Social Context of the Issue

Un-reversible historical trend

The planned economy meant a steady population structure for China. However, the unleashing of market forces on rural China has led to more stress on the urban education system as a way to integrate rural children into the urban mainstream. The increased flow of people is actually an education system in itself in that it creates a system of communication that not only transmits increased knowledge about employment, market, and related opportunities bout also communicates knowledge about cultural and social transformations (Postiglione 2006).

Reflected by the two regulations mentioned above, it can be sensed that something much more humane is undergoing. The overall social environment is not that one of a few years before. To a certain extent this change demonstrates that Chinese governments at all levels have already realized that their governing is no longer based on a planed economy as well as a rigid *hukou* system. China nowadays is undergoing an un-reversible historical transformation. In this process, millions of people who used to be ascribed as farmers will turn into urban citizens. The *hukou* system rooted from the planed economy is bound to collapse sooner or later. And the boundary between rural and urban is bound to disappear. It is only a matter of time. According to statistic, during the recent ten or more years, the number of migrant workers in China doubled, increased from 70 millions in 1993 to 140 million in 2003, making up more than 10% of China's total population and accounting for around 30% of China's rural labor force. Young people aged 15 to 35 accounts for more than 70% of the total migrant population (Wang and Shen 2006). Agricultural economics scholar Wen Tiejun believed that 350 million rural population are surplus labors. Currently, 120 million of them are working in the cities, about 70 million are working in smaller enterprises in the countryside and in small towns, and there are still more than 150 million Chinese farmers "unemployed." (China Daily 07/30/2004) The direction of future development is quite clear. It is predictable that rural migration to urban China will continue into the middle of the twenty-first century and will inevitably lead to a radical increase in the cultural diversity of the urban landscape (Postiglione 2006).

Demand for Redistribution of Social Resources

The relaxed enforcement of the *hukou* system has provided rural workers with opportunities to start new lives in cities, but the continued influence of it still segregates migrant workers from urban residents and deprived them of the basic entitlements and amenities available to the latter. By coming to cities for development opportunity, they are not only seeking for better paid jobs, they are also looking for opportunities to change their fate, or at least the fate of their children.

No matter what approach is adopted or how many categories are classified, rural residents in China are with 100% certainty ascribed to the lowest level of the social stratum. From the perspective

of social stratification, they are being deprived with both resources and access to resources. To move up from the bottom, migrants come to cities to earn their living. But in cities they are looked down upon by urban residents for their attire, mannerisms, living habits, and accents in speaking Putonghua, as well as for their low educational level, low status employment, and poverty (Kwong 2006). Because they lack urban residence registration, local legislation and lack proper education, local legislation has excluded them from taking government employment or other high-status jobs. In Beijing, they are restricted to 200 job categories that include the lowest and dirtiest blue-color jobs; similar measures have been taken in Shanghai. As a result of these personal and artificial limitations, about 57 percent of the Anhui migrants in Beijing are construction workers doing carpentry, bricklaying, cement work, painting, electrical installation, and cleaning; the rest work in restaurants or as domestic helpers (Liu, in Kwong 2006). They are underpaid, and they need to work around the clock. As a result of such discrimination and their lack of education, the average income in the Beijing migrant community by 2000 was 900 yuan a month when the city average was 2,000 yuan; in Shanghai, their average monthly income was 680 yuan, about two-thirds that of the average in the city (Li, in Kwong 2006).

The social system of today makes migrant workers "cheap labor force", but not members of urban society. Therefore, their various social needs generated in cities have been neglected without being ware, or sometimes even for particular purpose (Yang 2005). With 800 million population makes up the lowest stratum of the society, such kind of social stratum for sure will not keep unchanged. May they aware or not, rural migrants are not only on the move themselves, they are also creating a history with their move. In the new historical epoch, the current social stratum will be restructured and resources of various kinds will be redistributed, which is both in the interests of them and in the interests of us all.

c. More Resource for the Poor

In the national context, the integration of urban and rural would be hastened by the ever deepening economic reform and the ever changing society in the foreseeable future. More rural residents will head to cities, towns or other better developed places to look for better employment opportunities and to earn more money. However, Lack of social security coverage has long been an issue for people from the countryside and those living in the countryside of China. This is particularly acute as they move away from their natural support and staying in a risk laden urban areas, exposing themselves to new form of social risks in urban employment.

According to Chung (2004) these people would be detached from the informal, natural and indigenous networks they used to depend on and they will also be exposed to new potential hazards on top of the common human life crisis they have to face in living. Without taking the life risks they are exposed to, social protection measures are only offered to their local counterparts, which is the disappointing and unfair situation those migrant works have to accept without bargaining. For migrant children, when leaving their origins, they were simultaneously excluded from the basic social security form entitled to them by Chinese laws (Cai 2004). So their education became a grey zone of management, their hometown's government in rural area could no longer help, nor do the local governments in cities want to help (Xie 1999).

In recent years, situation has been improving. Many cities, including Beijing, have announced its policy to allow migrant workers to settle down in cities if migrant workers satisfy some residency requirements, and they would then be granted equal rights and access to social security, social services as well as other social protection entitled to their urban counterparts. Migrant children are also guaranteed by newly-implemented laws and regulations to their access of compulsory education. However, this is still far from the reality for many in the practical level. For example, impoverished migrant families still cannot afford to enroll their children in public schools; discrimination in public schools might deter parents and children away; some public schools are reluctant to admit migrant children for lacking of financial support. This is probably why there are still 269 migrant schools in Beijing, with about one third of migrant children studying there.

As shown by the above chart, governmental departments involved in policy making increased both in terms of the number and their level. At the early stage, only educational department did research in this field. By the year 2003, the *Opinions* was jointly formulated by Ministry of Education, Ministry of Security, National Development and Reform Commission, and three other departments, and it was announced by the General Office of State Council. This actually indicates the complexity of this issue.

As an ever-increasing population, migrants and their children account for a crucial part of social network. Consequently the issue of education for migrant children cannot be solved by education system along, but by co-operation of all of those relating bureaucracies. Since one of them change, others will have to follow. And this adds to the complexity of addressing this issue.

As it is believed, compulsory education is part of public service, which is an important component of social welfare. Some people tend to argue that private market players could be involved, what the government should do is to set up the policy environment and to develop sensible policies. However, education is a non alienable social right that the government has to guarantee not only by legal stipulations, but also by concrete state involvement in provision. So to cover migrant children into urban school system requires the state government to pay for the bill. How much money to use, where does the money come from, who or what is to be scarified for this financial redistribution and etc, are all need to be weighed with cautious.

As we know, after the reform and opening up, Chinese government has concentrated on economic development with overwhelming determination and efforts. Speculating economic growth has been achieved while the side product, that is the expending gap between the rich and poor, also comes along. Now, if education is expected to be rendered to migrant children, other benefits enjoyed by urban kids may follow sooner or later. And a consistent social security network might be demanded to be expended to cover urban residents, rural residents and migrant population. As a result, the amount of financial budget will sore up and exert pressure to the government. To keep on gearing up economic growth at the cost of impeding the livelihood of part of the population, or allocate more resources to enhance the livelihood of part of the population at the cost of slowing down the economic growth, is a hard choice to make.

d. Both Policy and Ideology Matter

Ideology matter most

Ideology matter most, since how we make the choice and how we formulate new policies depends on what we believe. Ideology, in the sense of national understanding of the meaning of "fairness," altruism, and basic human rights – may play a crucial independent role in defining the acceptable domains of inequality. With a desired ideology, policies can be made up accordingly to reach these "fairness" objectives. The key point is that now we need to rethink the relationship between economic growth and people's well being and the issue of equality as well.

Popular but Biased Perspectives

Numerous studies have been conducted on the issue. However, their perspectives are usually narrow and stereotyped. In this section, some popular but biased perspectives are listed and criticized at first, and then understandings and suggestions of the author are presented.

Social Integration and Education

Those who tend to see education as the basic policy tool to development the "commonness" of society argues that education is perhaps the most salient factor affecting the integration of migrant people with the mainstream society. They argue that those migrants with higher levels of education adapt more easily to urban lives. This type of understanding pointed directly to the risk of ignoring the education needs of migrant children. Without education to build this common ground and consensus among all social members of the society, the ongoing stability of the society would also be in doubt.

Cultural transmission through education

By some people, Education is understood as the most basic formal social process for effective cultural transmission in a well planned and structured way. It appears more important for those migrant children who are going to stay behind and would eventually become a non alienable member of the city, since they are moving in from outside, and lack of local cultural endowments. Their detachment from their cultural origins is also a reason for the cultural heritage of the receiving cities to be built to fill the cultural vacuum of new comers.

Consolidation of Social norms and values

Quite a number of scholars see education as formal and structured processes for migrant children to acquire, to get accustomed to, to practice out, and to unquestionably conform to those social norms governing some common expectations on their personal and social behaviors. They believe for the society at large, it is essential and socially desirable to make those values central to the society explicitly conceivable to all new comers and to foster their internalization of such values in a group as well as in collective situations.

Political and Social Control and Education

Some other scholars tend to stress the role of education in conducing conformity and the subordination of individual to the collective. Learning with peers around the same age in a group situation serves to exercise social pressure to conform. This makes the governance of the society easier with a group of more or less homogeneous population. For migrant children, education can unify them with the mass and to obey the social expectations have on them. Otherwise, their behavior would be less predictable, and the stability as well as the social order of the society would be more possibly with problems.

Human Capital Investment and Education

Finally, there are also quite a number of scholars who adopt the perspective of human capital in examining the issue. They believe that education is the most basic structured process for the society to develop its human capital for economic growth and social development. For them, migrant children are by no mean less important than all other members in the society. If they are not to be developed into productive labors necessary for the society, they would likely become dependent members instead. Moreover, with potential resources of migrants being left idle is also a waste of resource, which hampers the possible maximal development potential of the society. Some of them have also related the issue to globalization and argue that education is a decisive factor for a country to win initiative in the highly competitive global market. And it is therefore unacceptable for a vast group of children be left beyond reach to proper education.

Critiques on the above Perspectives

All of these perspectives treat migrants and their children as negative receivers of policies. Migrants and their children are either deemed as outsiders subordinated to the mainstream or merely as potential resources worth better usage. They fail to see the existence of inequalities, let along the born right of people from rural origins in pursuing self-development. In some sense, they come from our extremely stratified and unfair society and in turn make it even more unfair. As remarked by Kahn, 2006 Pulitzer Prize winner: Over the past quarter century…China has made one of the most astounding economic transitions in the world history…But the general rise in wealth has obscured the creation of a society of haves and have-nots…where great riches coexist with persistent poverty. The comfort and luxury of the well educated, the powerful and the well connected only magnify the everyday plight of those displaced and left behind (2006). The reason why current situation is like this is because we have long believing in the market since the reform and opening up in 1978, but tolerating its incapability in bringing the benefits to all, especially to those who apparently deserve it.

Desired Perspective: Education for Migrant Children as Part of Social Protection

Then, how should we view the issue of education for migrant children under the bigger backdrop? In fact, inequality itself, especially the gap between the rich and the poor is closely related to the levels and patterns of redistribution system. Higher economic inequality produces lower levels of those publicly shared goods that foster greater equality of opportunity and greater upward mobility. For children, education is undoubtedly the most important factor influencing their future lives. In nowadays China, it seems that we do not possess the social and institutions or political movements that might bring about greater levels of redistribution, even for those who are more clearly deserving because of their efforts and the fact that they have long being scarifying for the economy growth. Now it is the time for us to give back to them.

Then what kind of mechanism should we establish to guarantee them a brighter future? According to a study for the World Bank (Nyberg & Rozelle 1999, in Chung 2004), several recommendations

made were more directly related to income protection and social security arrangement. One of which is to enhance the promotion of education to contribute to poverty alleviation. With this framework, Chung re-conceptualized social security in a broad sense to incorporated objectives in protection, support and development. Apart form social insurance programs to cushion the risks associated poverty, unemployment, health problems, disability, work injury, and old age, social assistance and welfare service programs to provide for those with no other means of adequate support, social security framed within the social protection framework also includes policies and programs designed to facilitate labor adjustments and promote the smooth operation of labor markets, such as education and training.

Conclusion

The planned economy meant a steady population structure for China. However, the unleashing of market forces on rural China has led to more stress on the urban education system as a way to integrate rural children into the urban mainstream. In recent years, *hokou* is becoming less a restriction at least in principle. Many cities, including Beijing, have announced its policy to allow migrant workers to settle down in cities if migrant workers satisfy some residency requirements, and they would then be granted equal rights and access to social security, social services as well as other social protection entitled to their urban counterparts. However, this is still not the reality for many in the practical level. For children of migrant workers in particular, funding problems and other reasons still block their way to schools. More often than not, they do not have the same development opportunity as their urban counterparts, even if they finally succeed in getting a school place, there still are many difficulties in front. Lack of social security coverage has long been an issue for people from the countryside and those living in the countryside of China. This is particularly acute as they move away from their natural support and staying in a risk laden urban areas, exposing themselves to new form of social risks in urban employment. For migrant children, education could be perceived as the most basic form of social security, not only to secure their fair chance to be educated and to acquire the basic knowledge and skills in living. Education is also essential for them to secure their equal right to development. Education fairness therefore serves as the foundation of social fairness, it serves as the basic of all social security measures for children also. Without impartiality in education, the country's efforts to narrow and eliminate the gap between the rich and poor will remain unbridgeable. With more and more farmers flocking into the cities, the education of their children is a problem that looms ever larger. It is generally hoped that all cities across the country will take more measures with regard to migrant children so that they can enjoy equal educational opportunities along with city children.

References

Bradley, W. James and Kurt C. Schaefer. (1998c). *The Uses and Misuses of Data and Models*. Thousand Oaks, Calif.: Sage Publications.

China Daily. 2004. The Migrant Workers Exodus, Jul 30.

Cai, Xia. 2004. Literature Review of the Researches on the Issue of the Education of Migrant Workers in Cities. *Shanghai Education Study* (12): 9-11.

Christian Science Monitor. 2006. "Beijing Shuttering Schools for Migrant Kids." http://www.csmonitor.com/2006/1006/p06s01-woap.html (accessed Oct. 25, 2006).

China Education and Research Network. "Compulsory Education Law of the People's Republic of China." http://www.edu.cn/20050114/3126820.shtml (accessed Oct. 25, 2006).

Chung, Kim Wah. 2004. Social Security in Rural China. *The University of Hong Kong - Ph.D Thesis Collection*: pp.281-292.

Joseph Kahn. (2007). Preview, in Du Bin *The Petitioner Living Fossil of Chinese Rule by Law*. Hong Kong: MingPao Publication Ltd.

Kwong, Julia. The Integration of Migrant Children in Beijing Schools, in Postiglione, Gerard A. (ed.). 2006. *Education and Social Change in* China. New York: M.E.

Ming, Qinghua. 2006. A Realistic Reflection of the Compulsory Education Status and Goals of the Migrant Workers' Children in Modern China. *Journal of Hubei University* 33 (2): 234-237.

Official Document of Beijing Municipal Education Commission, Feb 09, 2007.

People's Daily Online. 2003. "Ensure Schooling for All Children." http://english.people.com.cn/200312/09/eng20031209_129961.shtml (accessed Oct. 23, 2006).
Postiglione, Gerard A. (ed.). 2006. *Education and Social Change in China*. New York: M.E Sharpe, Inc.
Wu, Xiaoping. 2001. Issues on the Education of the Migrant Children in Beijing. *Beijing Social Science* (3): 146-149.
Xie, Jinyu. 1999. Problems and Measures for the Education of Rural Children Moved into Big Cities. *North West Population* (4): 32-36.
Wang, Lei and Shen Yan. 2006. 'Migrant Flowers' Also Have Springs: A Research on the Education for Children of Migrant Works. *China Rural Education* (1): 33-38.
Wang, Ying. 2004. Provide Real Equality to the Children of Migrant Workers. *Basic Education Review* (1): 74-75.
Yang, Yuhua. 2005. Take Care of the 'Second Generation' of migrant population. *Continental Bridge* (3): 65-66.

About the Author

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(B.39)

Christer Johannesson, Of course, Science is Fun: a course for teachers: As courses for children at The Royal Institute of Technology (KTH) have worked well for a long time there was a suggestion to implement the pedagogy and experiments used to primary schools. The solution was to construct and deliver continuing education to primary school teachers. The new course for teachers became after a pilot test a university course. The advantage to make it a university course was that the teachers got university credits and that the courses was paid by the university system. The course consists of two parts - one experimental and one pedagogical part. For the pedagogical part external expertise joined the project both at the construction of the course as well as at the delivery. The course is based on the ideas of Maria Montessori, Jean Piaget (in some parts), Loris Malaguzzi (the Reggio Emilia model), books about children activities and experiences from children's Saturday courses at KTH. The examination consists of two parts one is an evaluation of different teaching methods and pedagogical models. The other is performing in class with invited children and display how to make creative and interesting experiments.

About the Author

Eric Christer Johannesson has got his Ph.D. in Physics in 1984. He is a Senior Lecturer and the Director of Basic Science Education at the Department of Physics, Royal Institute of Technology, since 2002. In his different activities, there have been more than 20 000 participating young people during the last 30 years. More than 100 schools have been visiting his laboratories, most of them several times. Other activities have been directed to children, girls, young women and young women. He has been granted more than €2.5 million to cover the expenses of his scientific initiatives.

(B.40)

Methods of adaptive learning & cognition effects --- Based on Visualizing navigation of Concept map with Semantic structure

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Abstract

When facing the "chunk" of information, the visualize navigation of Concept Map (CM) and Semantic Structure (SS) in Digital Library (Museum) with a hierarchical classification and structure, enable the user to construct personal collections of information and allows self learning. This research is based on the HCI (Human Computer Interface): Information architecture design & Visual hierarchy Navigation; to explore the utility and usability of Concept Map and Semantic content Structure in Digital Library (Museum).

Based on questionnaires and correlation data, the researcher carries out the analysis and discussions. The findings showed that the "Have Concept Map with Semantic Structure navigation" is better than "Have no structure navigation" for the user's cognition and learning. And different users (like the expert and novice) have different use preferences in their usage process. Findings from this research may be used to help the Digital library designer and future researchers.

Keyword: Visual Navigation, Concept Map (CM), Semantic Structure (SS), adaptive learning.

1. Literature research:

Most mapping tools provide functions for annotating nodes, interactive tuning and restructuring the visualized knowledge structures. CM+SS with the contextualization idea, can induce and foster the user's cognitive processes, with the basis of the external representation of knowledge.

From the adaptive tutoring of Knowledge Space Theory, Dietrich Albert (1997) points out that the knowledge space theory provides a formal model for representing students' knowledge and describing the structure of a domain of knowledge. In the researcher's opinion, the concept map and semantic structure in digital library (museum) or synthesizing the spatial representations of contents can provide interconnected ideas from different subjects and different topic. These also serve to enhance the information communication process, and to comprehend the knowledge structural or information memory better.

The following expound upon the factor of "Visual navigation & Cognitive" and **"**Personal knowledge management"**.**

1.1. Visual navigation & Cognitive

John G Hedberg (2003): The advantage of visualized navigation, is that the users can browse or search, based on the facet closest to their way of mental-categorizing content.

As Sweller in 1998 expressed: The structure of human cognitive architecture, the contents of long term memory are "sophisticated structures that permit us to perceive, think, and solve problems," These structures, known as schemas, are what permit us to treat multiple elements as a single element.

The idea of "single element", just as the researcher points out the visualized navigation with two elements of "Concept map" and "Semantic structure". Each of the "single elements" seems like a single concept map and one layer of semantic structure; those two elements have their own functions which are to facilitate the changes the short-term memory into long-term memory and allow the user to acquire information.

1.2. Concept map & Semantic Structure in Personal knowledge management

Concept maps use graphic displays of knowledge topics in a node-link structure.

The knowledge generation and mapping function have been used effectively in instructional settings to foster processes of knowledge generation.

Toulmin (1958) and Thadgard, (1992) also cite the concept map as a visual representation of knowledge structures which provide the visual languages as a complementary alternatives to natural languages, as a means of communicating knowledge.

On the other hand, Fisher in 1990 state that the Semantic Networks is like a Mind-tool. The constructing of semantic nets can engage the learners in explicit descriptions of concepts and their interrelationships.

Mizue Kayama and Toshio Okamoto (2001) also say that the semantic structure of the whole system, with visual representation in the concept map, would be recognizable and transferable to learners. Moreover, to give the users an overview of the whole before letting them explore the vast information space in details.

However, in the researcher's opinion, the retrieval operation in CM+SS may include several web page sub-links (use of the interface button such as 'Back' and 'Forward'). This retrieval exercise can have positive and negative aspects. The user can retrieve their information on the web easily but too many sub-link web pages will add to overload. Moreover, different users have different special characteristics and control questions, so if they only acquire the original author's structure and maps, their own existing structures, that are questionable.

2. Research design and methodology

The testing/examination object in this research are not only restricted in certain/unique group, the researcher uses random sampling and cluster random to choose the participants from the general population user, the ages level are from 18 to 65 years old. After they finished the questionnaires and the researcher chose some of them for in-depth interview.

On the other hand, for the conjunction of research issue in CM & SS service, the researcher selected the Taiwan National Digital Archive Program: "The Digital Museum of Nature & Culture" web site (http://digimuse.nmns.edu.tw/index.jsp) as the empirical test sample, to combine the related CM and SS knowledge in each topic (about the digital natural & cultural metadata) and also to provide a basis for developing new on-line exhibition concepts and knowledge map.

Figure 2.1: The front page of "The Digital Museum of Nature & Culture" web site

2.1 Research design

Nadav Zin and Mark Levene (1999) state that the non-sequential reading of the material can become quite frustrating when directed by a particular goal or interest. In order to relate to this, the researcher uses two questionnaires and in-depth interviews. These serve to confirm the utility and feasibility of CM+SS in Digital Library (Museum) and web site.

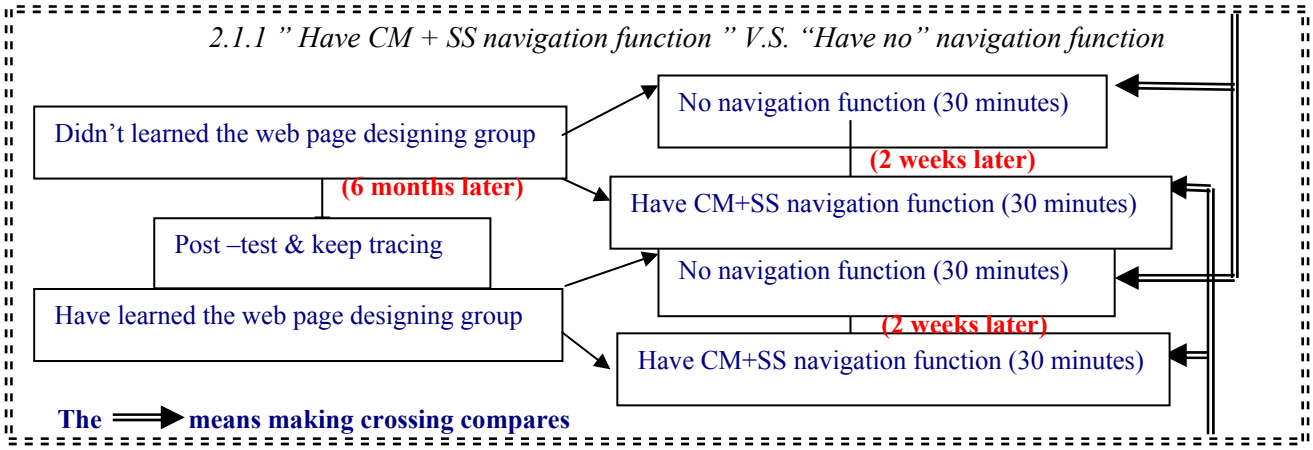

Figure 2.2: The research design process of " Have CM + SS navigation "V.S. "Have No" These navigation function

Using the **"** Have CM + SS navigation function " versus the "Have no": these navigation functions, make a cross-comparison to the "Didn't learn the web page design group" & "Have learned the web page design group" respectively. These are done to explore which kinds of the digital library design can motivate the user's cognitive comprehension; recall ability and learning retention.

Figure 2.3: Have No navigation function edition in Digital library museum (Chinese Edition).

Figure 2.4: Have CM+SS navigation function edition in Digital library museum (Chinese Edition).

The reliability of questionnaire through the pre-test and post-test separately is assessed. With the software, SPSS, the Paired-Samples of T Test was used. The correlation coefficient of "Have no

navigation-edition" is: 0.906 with a p-value of 0.591 and the correlation of "Have CM+SS" navigation edition" is 0 .875 with a p-value of 0.59. The p-values in both cases are large or exceed 0.05. While the Cronbach's Alpha is: 0.890 for the question number from 11 to 15 which were about the users' experience in "Have CM+SS navigation" edition questionnaire.

2.1.2 "CM+ SS in Hypermedia Digital Museum (Library) Navigation" questionnaire

A part of the qualitative questionnaire of "CM+ SS in Hypermedia Digital Museum (Library) Navigation" is an adaptation from Beasley & Waugh's (1995): NON-LINEAR MEDIA DISORIENTATION ASSESSMENT questionnaire and the DOVILES (Distance & Open Virtual Learning Environment Scale) of Hong Kong Education and Manpower Bureau. This part of the questionnaire inquired about 6 issues: "User experience of computer "; "User cognition in CM & SS"; "User reactions & cognitive to the Web Site navigation (focus on digital library and museum);" User interface design";" CM and SS navigation" and " Hypermedia service". The Cronbach's Alpha reported for this part is: 0.7074.

2.2. Research methodology

The researcher used the rating standard provided by Novak & Gowin (1984) to analyze the tester's comprehension toward the CM & SS in questionnaire, after dividing the testers into three groups of: "Have no idea";" Have some idea "; "Like the expert". According to test results, some of them, with a representative feedback were chosen and further in- depth interviews were carried out.

Figure 2.5: The complete diagram of CM.

Figure 2.6: The sample question of SS.

Table 2.1: The statistics of the tester & interviewee number.

1. No navigation function edition test to the two-groups of user	100
2. Have CM+SS navigation function edition test to the two-groups of user	100
3. Post-Test and keep tracing to the original –Didn't learn experience group	24
4. CM+ SS in Hypermedia Web Site Navigation questionnaire test	118
5. The In-depth interviews (With the test members after the questionnaire text)	18

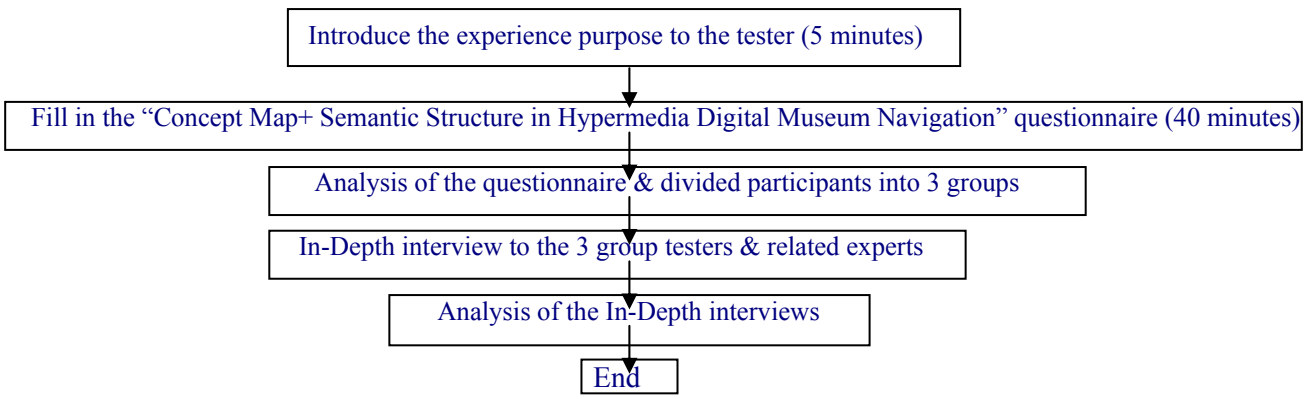

Figure 2.7: The research design process of "CM+ SS in Hypermedia Digital Museum (Library) Navigation" questionnaire test & in-depth interview.

3. Analysis & discussion

3.1. From the cross-compare of two-navigation editions

Table 3.1: The correct & wrong answer rate from the original "Have learnt web design Group" & the pre-test with post-test to the original didn't learned web design group

Pre-Test: Didn't learn web design Group			Post-Test: After having learnt the web site design curriculum and operation skill			The original "Have learnt web design Group" in pre-test		
	Average correct answer rate	Average wrong answer rate		Average correct answer rate	Average wrong answer rate		Average correct answer rate	Average wrong answer rate
Have CM+SS navigation	69%	31%	Have CM+SS navigation	79%	21%	Have CM+SS navigation	81%	19%
No navigation structure	66%	34%	No navigation structure	70%	30%	No navigation structure	68%	32%

From the pre-test results: irrespective of whether the users fall in the category of "Have CM+SS navigation function" or the "No navigation structure" or the "Didn't Learn Web Site Design Group", they do not have an obvious or difference effect in their cognitive learning, and the test results are also inferior to the "Have learnt web design Group".

After that, the correct answer rate from the two- test editions in post-test was presented as an obvious progression. Moreover, from the question numbers11 to 15 which were about the user's experience in CM+SS, the average answer rate of " Agree Very Much" and "Agrees" in pre-test of "Didn't learn web site design group" is 60%; in the post-test is up to 77%. This result are similar to the original "Have learnt Web Site design group" of 75%.

These result prove the previous hypothesis: which state that in order to enhance learning and cognition results of the "Didn't Learn Web Site Design Group", professional computer knowledge and operation technical skill training are very essential and has a practical effect.

3.2. From the questionnaire of "Concept Map+ Semantic Structure in adaptive Hypermedia Digital Museum (Library) Navigation"[48]

1. The testers do not agree with the CM & SS standpoint completely and they do not follow the CM & SS navigation blindly, but this also depends on the conditions & questions set during their usage time.
2. 66% of the testers claimed that they "Strongly agree" & "Agree" that the CM & SS can motivate them to solve more problems and/or with fewer errors.
3. 79% of all the testers also choose "Agree" & "Strongly Agree" to state that the CM & SS navigation based on hypermedia service, will enhance their Web usability & cognitive learning.
4. 56% of all the testers are "Agree" & "Strongly Agree" the excess Navigation search tool, will lead to "Over link" and "Cognitive Overload".--- These test results revealed: No matter the amount of information & the convenience of semantic navigation searching tool, should be kept under control with the right amount.
5. The obvious & significant comparison results from the related variable of using SPSS:
   - 81% of all the testers, also "Strongly agree"& "Agree" with the two variables: The CM & SS navigation based on hypermedia service is the good way for interface interaction and informatics interaction & will enhance user's cognitive learning. (The analysis result from SPSS of Pearson Correlation is: 0.437***; P＜0.01.)
   - 86 % of all the testers, also "Strongly agree"& "Agree" with the two variables: The CM & SS Navigation is assistance & Navigation with hypermedia concepts & semantic function is useful.(The analysis result from SPSS of Pearson Correlation is: 0.348**; P＜0.05.)
   - 81 % of all the tester, also "Strongly agree"& "Agree" with the two variables:

[48] Please note that throughout this section *** refers to 1% level of significance and ** refers to 5% level of significance

They need the CM & SS Navigation to assist them & they think that CM & SS navigation based on hypermedia service enhance Web usability in users'cognitive learning. (The analysis result from SPSS of Pearson Correlation is: 0.346***; P＜0.001.)

 78 % of all the tester, also "Strongly agree"& "Agree" with the two variables:
They need the CM & SS Navigation to assist them & they think that CM & SS navigation based on hypermedia service can help people search information more accurately. (The analysis result from SPSS of Pearson Correlation is: 0.417***; P＜0.01.)

3.3. Synthesize the pilot & final interviewee opinion from 3 groups

	Have no idea groups:	Have some idea groups	Like expert groups
Viewpoint with CM+SS	Like the Mental Model and Knowledge Structures. But anxiety about: will the amount of information become overload?	Like the guidance for "knowledge sharing" and "knowledge creation". Can accelerate the comprehension with the correlation knowledge	Not adopt the CM+SS blindly, but depend on the topic or target.
Prefer how many semantics sub- link	The average of sub-links is 6 to 10	The average of sub-links is 5 to 10.	The average of sub-links is 6 to 10

4. Conclusion and suggestion

Based on the UI (User Interface) design including the Information design, Sensorial design and Interactive design, CM+SS with a hypermedia metadata characteristics and simulating the self-navigating format, the digital library and museum contents can exchange with sharing and interoperability. In this research test web site, the XML & Java were used to present the structure & web pages, with the reserve and preserve function and this research test looked at promoting the "digital content resource management" and the processes of information communication.

4.1. Research conclusion

In researchers' conclusion, The CM+SS model have these characteristic and ascendancy in Digital Library (Museum): (1). Provides quality of service, adaptive of demand; (2). Extends the characteristic of hypertext; (3). Overviews the "shape" of whole structure; (4).Allows cognitive structure navigation with a meaningful learning; (5). Contributes to the cognition memory (based on the UI interactive design and sensorial design); (6). Allows for non- linearity, flexibilities and interactive construction in visual communication; (7).Retrieve & reusable services.

4.2. Research suggestion

(1) Avoid "amplitude"; "scattered" and "aimless" information design;
(2). Avoid more than 10 semantic sub-links to the extended topic. (56% of all the testers "Strongly Agree" &" Agree" that too much navigation of search tool will lead to "Over link" and "Cognitive Overload";
(3). Visualizing navigation --- Integrated with multimedia metadata;
(4). Integrated the adaptive & personalized in CM+SS navigation with ICT service;
(5). Organized Interactive & Feedback system;
(6). User Interface design classification: Based on the theory of: User-centered design & HCI, to provide an adaptive & customization service:

Table 4.1: Three- groups of testers' different use preferences in UI and information navigation design.

Expert:	Emphases the "Utility" and "Usability" function. Provide the direct guidance and clear way with the feature of "system integrity" and "intuition observes" pattern.
Have some idea:	Prefers the simple explicit /organized / direct link and scaffolding (information structure); the adaptive presentation and adaptive navigation; adaptive scaffolding and the adopt path.
Have no idea:	Divides the web contents into different unit page, provide the simply and visualized navigate design. The moderate amount of information is important. Classify the information; provide the catalogue and page code, or key-word index.

References:

Beasley &Waugh's, (1995). Cognitive mapping architectures and hypermedia disorientation: An empirical study. Journal of Educational Multimedia and Hypermedia, 4(2/3), pp. 239-255.

Dietrich Albert, Theo Held, and Cord Hockemeyer. (1997). A relational model for describing hypertext structures.

La grille d'évaluation de Novak et Gowin (1984), pp. 36-37, http://www.uqtr.uquebec.ca/~lamyd/ideateur/evaluation_des_reseaux_de_concepts.htm

John G Hedberg, Barry Harper and Christine Brown, (1993). Reducing cognitive load in multimedia navigation, Australian Journal of Educational Technology, 9(2), 157-181.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning, Cognitive Science, 12, pp. 257-285.

Toulmin, S. (1958). The Uses of Argument. Cambridge, UK, Cambridge University Press.

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(C.1)

Abbas Madandar Arani, e-Learning, State and Educational System in Middle East: e-Learning has provided men with new opportunities in teaching-learning procedures. A historical review of educational systems literature reveals that e-learning has spread out among people much faster than any other learning methods. E-learning as a state-of-the-art technology, has caused great innovations in materials development in those societies in which new methods and procedures could hardly ever been accepted. Technological innovations and the development of tele-communications such as Television Stations and Channels, Satellites, Mobile, and Internet have made it possible for the children and teenagers in the Middle East to access to the latest news and information. Of course, these developments have endangered both political and educational systems in some aspects. The present paper while pointing to some of the recent development in the field of e-learning in the Middle East, tries to examine the political and educational systems reactions to this phenomenon.

(C.2)

Abdurrahman Ghaleb Almekhlafi, Preservice Teachers' Perception of the Utility of Elearning at the United Arab Emirates: Elearning (EL) is the latest wave of development of distance education, which has become an extremely important part of instructional technology. Recent EL research has indicated the utility of this instructional method for both students and teachers. However, teachers' perceptions of EL utility has not been extensively researched, particularly in the United Arab Emirates. The purpose of this study is to explore preservice teachers' perception of the utility of EL at the College of Education, United Arab Emirates University. A questionnaire was administered to 44 preservice teachers during in the Spring of 2005-2006 academic year. These participants were taking a capstone course either 50% or 100% via EL. Study results showed high self-perception of the utility of EL for both groups. Implications for United Arab Emirates context are discussed.

(C.3)

Catherine Renoult, How to become an e-learning tutor when you are a teacher? (analysis of the modalities of the transformations: The aim of this article is to analyse the conditions of the setting up of e-learning in preparation for the entrance examination for the profession of medical secretary under the hospices of a partnership between the "Education Nationale" (Ministry of Education) and the "Association Nationale de la Formation Hospitalire" for adults. The research is based on the study of interviews with teachers, questionnaires completed by students and the minutes taken during meetings about the setting up of e-learning. This article focuses mainly on the identity transformations undergone by teachers when they become e-tutors and also on the difficulties they encounter in the process, our goal being to highlight the channels of professionalization that are available to them and the conditions which encourage the recognition of their new status.

(C.4)

Chun-Hsiung Liao; Wei-Lung Huang, Explaining Instructor Acceptance of Blended e-Learning System: Education plays an important role in Taiwan's economic development. Of all 5.3 million students in a population of 22.9 million, 1.3 million were having a higher education. Education expenditure was around $20 billion, accounting for 6.07% of GDP and 20% of total governmental expenditure. The expenditure on higher education was 18% of total education expenditure. The well developed information technologies (IT) infrastructure in Taiwan provides a suitable background for the E-learning in educational schools. E-learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance. Blended E-learning is a mixture of classroom teaching and asynchronous learning which integrates E-learning techniques with traditional teaching methods including lectures, face to face discussions and seminars. It combines the characteristics of asynchronous teaching and traditional classroom teaching method and helps instructor s how to efficiently use extra tools in teaching. Instructor is a central role in the effectiveness and success of E-learning based courses and instructional implementation of the IT determines the effectiveness of E-learning. This study is to analyze the influential factors of instructor acceptance of the blended E-learning system in higher education schools in Taiwan. The technology acceptance model (TAM) essentially hypothesized that a user's behavioral intention to use a technology was determined by their attitude towards the technology. Based on TAM, we incorporate the constructs of information system quality, and computer and Internet self-efficacy to predict user acceptance of blended E-learning in Taiwan. This research was accomplished by conducting a face-to-face questionnaire survey. The data instrument for this research was collected from February 20 to March 19 by interviewing around 200 faculties in an integrated university in Taiwan. Structural equation modeling is used to empirically test factors influencing instructor usage of blended E-learning in Taiwan. The findings of this study will provide schools and instructors a better understanding of blended E-learning development strategy. Keywords: Blended E-learning, Instructors, TAM, Structural Equation Modeling.

(C.5)

Educating Teachers for Social Skills Curriculum

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Abstract

The presentation focuses on questions of development of teachers social competencies for curriculum, in which the social and relation dimensions are accented. Under the view of competency concept of educating pupils we can see two main "together interconnected - problem groups concerning the teachers: 1. The teacher's own level of social competencies, 2. The acquired teacher's education in methodology of teaching social competencies. The presentation presents the outcomes of few enquiries from both mentioned areas in a phase of curriculum transformation, in which the social skills are being increasingly accented. On the basis of analysis of the accomplished educational programs for teachers we will refer to approaches, that stimulate the teacher's social development, but also we will point out the barriers in his educational path concerning the social competencies. Conclusions are led towards two types of institutions. For institutions of undergraduate education of teachers it means to change in a way, that the universities will stop considering teacher, his social competencies and his readiness to develop social competencies of his pupils, as a part of rather hidden curriculum and will begin working with these themes as if they were elements of the formal curriculum. For institutions, in which the teachers are already working, it means to accept entirely a school concept of learning institution. It is possible then to nurture the educational environment of the teacher, who learns to be an innovative teacher oriented towards his pupils excellence using their social skills training, on the basis of cooperative social skills and relations.

Introduction

We consider the social relationship dimension of the teaching profession to be essential for education and its quality in the following decades. Schools have made several changes overall – they have opened to the widest social stratum and require a complete change in the conception of teaching. They require more and more advisory and psychological-pedagogical abilities from teachers, a deeper orientation into social problems as schools have changed to resemble more an after-school club where teachers are the monitors? And the intellectual quality has stayed in second place because they are not essential to the smooth functioning of the school system (Nemo in: Boudon, 2001, 111)? From this we see that **social competence is not an entity that is side by side with the intellectual quality of the teacher, but rather in its taking shape we can count on support of one area towards the other.** In any case the focus in on preparation for social behavior of the teacher and stress on the current transformation of schools is on the competence based conception of education – including the personal and social competencies. And if the curriculum is based on this, how should the teacher be equipped to work with this?

Social competence among teachers is very often taken for granted (in the norms, postulates, professional standards), but at the present time less attention is paid to its development or creating the conditions for its fulfillment. The basic research question which has tied together our research over the last several years (1999 – 2008), which will continue into the following years, is as follows:

How do you create the educational conditions for the development of social competencies among teachers for a curriculum in which the social relationship dimension is emphasized?

From the point-of-view of a competence based conception of education of students, we see among teachers in practice two basic – mutually interconnected – groups of problems:

1. The personal level of the social competence of the teacher

2. The teacher's education in the didactics of social competence.

1. The personal level of the social competence of the teacher

In order for us to not stay at too general a level, we will specify the first group of problems through the **thematic cooperation.** Cooperation, in the current teaching environment, is a key concept and also a basic structure for the social development of teachers. Cooperation – between teachers and

students – is established as a basic requirement and means of the transformation of schools. However, the reality does not yet meet these requirements. In curriculum documents for primary and secondary education, cooperation has an unshakeable position in the framework of personal and social competencies of the student. Cooperative teaching is therefore considered as an effective model focusing on the development of cognitive abilities and on the forms of social competencies of the student. However, based on our observation the implementation of cooperation based on this approach breaks down in the area where the teacher is to cooperate in the development of these competencies.

Where and how to create such an area?

A. In the pre-service education of the teacher:

We consider the conception of preparation to be the key for the conditions to be optimal for teaching with social competencies. On the basis of analysis of teacher preparation in the Czech Republic we have concluded that it is in the environment where courses are added focusing on social competencies (courses of personal and social development, courses of communication, and so on), that these courses however are carried out for the most part in the context of the transmissive paradigm of schools. The transmission of knowledge pushes out cooperation between the outside phenomenon (Tonucci, 1991): often the practical cooperative activities become only a fraction of the study program for future teachers (according to our research it is approximately 5-10% of the entire teaching time). The effect of returning to teaching strategies used in the difficult first few years of teaching is well-known: if we therefore want for the teachers in a curriculum which is saturated with social competencies to be able to handle cooperative skills that there is no other option than to form a curriculum for their previous preparation to a large extent on cooperation, in the true sense of the word to lead to overlearning. Future teachers should not only understand the dimension of social interdependence, the essence of cooperation as positive interdependence and the essence of cooperative teaching, but also **intensively learn in a cooperative environment with cooperative means.**

How to do this specifically? Through cooperative strategies – from the simplest type of "think and share" which can be used in large lecture auditoriums to the more difficult structures - for example, the use of academic controversy. Often work in cooperative teaching groups including groups formed in a stable manner where the members cooperate for example in the completion or control of several assigned tasks, during preparation for exams, for the first supervision of teaching etc. The assigning of cooperative projects which maintain the principles of cooperative teaching and include the individual accountability and processing.

From our research oriented on the supervision of teaching it emerges:

- Students of teaching value these strategies as optimal in the preparation for their profession;
- They are willing to incorporate it into their teaching materials in practice because they believe in its effectiveness;
- They believe that they will be able to follow this strategy; and
- They have formed the basis of social competence for cooperation.

B. In the further inservice education of the teacher

If the teacher himself did not undergo the school curriculum which was explicitly and in a hidden manner saturated with social competencies for cooperation, he will always be somewhat in a position of someone who teaches a language yet is only one lesson ahead of his students. The fear of failure on the part of the teachers during the implementation of the curriculum of a social relationship dimension is natural, at the same time it is however one of the greatest obstacles for its realization. This is why it is so important to rely on support for a more complex form of education than simply graduating from a course which trains social competence.

.A more complex form of teacher education is founded on the following factors: **knowledge, workculture and environment, educational activities and personal/social competencies.** Because our research was focused primarily on cooperation, we will again use examples from this area. Teachers need **knowledge** of the meaning of the curriculum based on social competencies and the place of their personal social competencies during its realization. It is however necessary to provide this knowledge in the framework of schools which is defined as the **teaching organization** (Senge

1990, Mortimer 1995). Cooperation can then be considered as the main principle of this conception. According to R Mucchielli (1996) the greatest psychological barrier to the cooperation of individuals is the so-call defense of one's ego, which is explained as an unconscious fear of changes in the perception of oneself. In the conception of school as a teaching organization there can be found a number of mechanisms (for example the acceptance of risk in a secure environment), which supports the cooperation of teachers. However, according to our findings, the Czech schools are only beginning to move towards this: for example when describing social relationship in the schools it was very rare for higher forms of cooperativeness (the sharing and exchange of professional opinions and joint work).

A part of the conception of schools as a teaching organization is **the specific conception of educational activities.** If we would like for teachers to educate themselves for a social skills curriculum, then we must consider team work of the teacher to be a basic means of this. Work in the so-called mutual assistance teams is based on the principles of cooperative learning. On the basis of active research of these teams from various schools we examined their effectiveness. In addition to discoveries about the link in the overall conception of schools (especially support for the management of the schools) we compiled information concerning the social competencies of the teachers. Among other things it provided interesting information about the fact that teachers do the same thing that they often criticize in their students – for example they do not cooperate with those they do not like and find – often against the meaning of the matter – agreement a majority of the time. This and other information directed our current research: from the entire complex of competencies for cooperation I selected as critical the ability to not agree, to go into a conflict of ideas (controversy). Teachers avoid conflict and expressions of disagreement or they do not know how to solve it. To educate and train teachers in this area again does not mean to undertake a one-time step (to introduce a course on problem solving): it is about working with the complexity of the entire problem, that is minimally in the four aforementioned approaches knowledge, workculture and environment, educational activities and personal/social competencies.

Now we will discuss the second of the aforementioned themes:

2. The teacher's education in the didactics of social competence

We are therefore interested in the teacher's education in the methodology of teaching social competencies (or the so-called – "didactics of personal and social competencies"). Our investigation in the conditions of pre-service education of teachers, but also especially later the in-service training of teachers in the Czech Republic showed a problem:

- Our teachers are not adequately prepared for the development of the social competencies of students despite the fact that among pedagogues there is held the general feeling that teachers are prepared for this. ≺

(An especially difficult situation later occurs when the teacher is not adequately prepared in the field of the didactics of social competencies and moreover they themselves do not have adequate social competence.)

We were led to this conclusion through work with teachers in the framework of continuing education. This education was focused on the methodology of the so-called personal and social education. It took place between 1999-2005 in the framework of a project for continuing education. First outside the context of the Czech school reform and later in connection with this reform. In these courses I worked over time with approximately 500 teachers, I saw approximately 200 sample teaching hours, I read approximately 150 lesson plans. I also supervised approximately 100 hours of lectures from individual who taught the teachers. The systematization of the information for this work became obvious on its own, as several phenomena in the courses appeared repeatedly. In its way it was active research, as we attempted to evaluate the information that was gained in our own courses in the framework of this project.

First then to several pieces of information from this investigation. First the basic information:

1. The teachers are not adequately educated in the theory of social competencies – in defining social competence and in working with it they often use "folk-concepts".

2. The teachers do not have "pedagogical content knowledge", meaning they do not have an adequately clear perception of the practical functioning of social competence and regarding their basic mechanisms do not have.

- **the understood knowledge** of phenomenon from the area of social competence
- they do not have the skills of **practical differentiation** of these phenomenon

and this is related to

3. The teachers have problems connecting to certain themes from the area of social competence with specific methods (games, exercises etc., despite the fact that they know many games and exercises).

The following explanation will include examples of these three areas whether they are separate or connected.

- **They do not know phenomenon from the area of social competence, they do not have the theoretical foundation.**
- The teachers do not have adequate knowledge of phenomena associated with social competence. For example, they do not completely know what is empathy, active listening, or group dynamics. The following problems emerge out of this to a large extent:
- **Phenomena are labeled with incorrect terms.**
- For example several aggressive displays are labeled as assertive.
- **They don't differentiate (do not see) phenomenon in practice.**
- When using the methods of role play the teachers repeatedly said that the students "live"/empathize in these roles, however from the students in the games it was evident that this was not the case. Or: They do not differentiate that in a game developing body language it changes the mutual relationships among the students. Therefore this is not just the competence of non-verbal communication. If they do not see this, evidently an important theme which the students bring to the games themselves escapes.
- **They do not know or understand or have a distorted perception of the connection between certain phenomenon.**
- A number of teachers – during the period of our investigation – for example believed that dividing students into groups for work on a certain task automatically creates cooperation between all members of the groups.
- **They try to apply one pedagogical theory that they know into an area where it is not suitable.**
- For example, I repeatedly met with efforts to use Bloom's taxonomy of objectives for planning objectives in the area of behavioral objectives. Often, however, the main objective is for the student to know the skills needed to describe and explain this, yet it is not among the objectives for them to know how to "do it".
- And in connection with this is a different big problem:
- **They do not know to precisely and specifically determine the core of social competencies. Therefore, we often want to teach them a method which is often inadequate.**

For example if we want to teach effective communication during cooperation on a task in a group, but we assign such a difficult tasks (for example of a geometric nature), then approximately half of the members of each group will only silently wait as those that understand geometry will deal with the problem. Communication – a key activity of the method – is therefore used only in a partial form.

In connection with such specialized equipment in the field of methodology in the development of social competencies we have registered as well the emergence of so-called "myths" relating to the personal and social education[49]. Here are several of them:

[49] The Czech concept of personal and social education (as a part of the climate of the schools, as a cross-curricular topic or as a subject) was created at the Pedagogical Department of the Prague Philosophical Faculty – and it contains overall 11 themes (further specified) in three areas: personal orientation (self-concept; self-regulation; psycho-hygiene; social creativity; cognitive development); social orientations (human relations; getting to know others; communication; cooperation and competition; moral orientation (daily morality and solving problems of a moral nature).

- Personal and social education (further P.S.E): is used when we talk about life…
- P.S.E.: occurs as soon as children are taught in an active manner or can talk among themselves.
- P.S.E.: it is not possible to train social competence when children do not have social competence.
- P.S.E.: reflection after games means that the teacher says what they think and how it should be.
- P.S.E.: where they are groups, there is cooperation.
- P.S.E.: everything relates to anything else – whatever game can fulfill whatever objective.
- P.S.E.: I do not have to have the competencies myself which I want from the children – I am simply a teacher.
- P.S.E.: every teacher "has" a personality and an university degree – they are therefore experts on how to live.

Obviously I consider ways in how to solve these problems. We register similar problems partially even among the students in the field of "pedagogy". In the courses of in-service training we were not overly successful. Against us stood subjective teaching theory, in which the subjective conception of teaching and – obviously – education, which is oriented distinctively on the knowledge of the subject, but also essentially less on the knowledge of social competence and its didactics.

I see one way of solving this is if we will further and more clearly **define social skills curriculum.** Here we obviously enter into the field of debate on what is a social skills curriculum. Social competencies – for example, for us in the Czech Republic is often understood as a part of the hidden curriculum or as a part of the informal curriculum and it is expected that social competence as an objective value of the work of schools will grow out of the optimal social climate of schools and from good mutual relationships. This is obviously often in practice done with social competence referred to in fields of cross-curricular themes without necessarily anchoring it in the work of schools and without systematic evaluation.

– If the social skills curriculum appears in a consistent form, then it is usually as an overview, respectively an overview of skills with examples of the methods for their training. For example, active listening: problem solving in group; communication, but also self-esteem as well as similar themes.
– We consider it to be useful in this case to differentiate between social skills and the so-called personal skills, and for example moral skills.

In the basic curricular documents of the Czech school reform there can be found "personal and social education". From this point-of-view we are on the right path: we have our own overview of personal and social competence, respectively skills which the school should pay attention to in order to move within the framework of standard and formal curriculum.

But … if we begin to deal with the student as the objective in schools, that is the social competence of the student, then we arrive at the same platform which was expressed in the 1970's in the USA, in the nicely titled book by Karen Stone: The subject is me! That is the student, where **the subject is the student himself,** the student's social competence. The student at this same time becomes an element of the curriculum: he is the objective; he is the subject and also partially the means…

And in order to be even more complicated, we would like to add that **a further element of the curriculum becomes even the teacher,** respectively his behavior. Or in the case of the development of social competence, the teacher is not just an actor who thinks up games for social competence and skills. We would be happy if in schools, the skills used in the social competencies of the students and the teachers were not understood only as a part of the hidden curriculum, but also as a part of the evident curriculum.

That is: not only the Sahara, not only the Battle of Hastings, not only the past perfect or squirrels is the subject, but also the students and the teacher are teaching materials…

We would be pleased if this approach found a solid place even at universities preparing teachers and would influence the composition of disciplines of teacher preparation. The curriculum of universities at the moment focuses primarily (in both content and didactics) on the curriculum of the school in which the graduate is to teach. Future teachers will learn about squirrels, but also about how to teach others about squirrels.

Our school reform is however based on the principles of competencies. Four of the six key competencies defined in the reform leads to personal or social competencies. It will therefore be evidently necessary for even universities to take into account that not only squirrels but also the teachers and students are elements of the curriculum.

What is ideal for us from this perspective?

For the faculty to allow the students to not only

1. train social skills,
4. But also – at least as an elective -
2. to study "understanding knowledge" in relationship to social competence
3. to train "practical differentiation" of social skills and
4. to study the methodology of various forms of social competencies of children (respectively P.S.E.).

References

Boudon, R., Bulle, N.& Cherkaoui, M. (2001). *École et société. Les paradoxes de la demokratie*. Paris: PUF.

Janík, T. (2004). Význam Shulmanovy teorie pedagogických znalostí pro oborové didaktiky a pro vzdělávání učitelů. *Pedagogika*, 3, s. 243 -250.

Kasikova, H. (2001). *Kooperativní učení a vyučování. Teoretické a praktické problémy*. Praha: Karolinum.

Mortimer, P. (1995). *Effective schools: current impact and future potentials*. London: Institute of Education, University of London.

Mucchielli, R. (1996). Le travail en équipe, Paris, ESF.

Senge, P. (1990). *The Fifth Discipline*. New York: Currency Doubleday.

Tonucci, F. (1991). *Vyučovat nebo naučit?* Praha: PedF UK.

Valenta, J. (2006). *Osobnostní a sociální výchova a její cesty k žákovi.* Kladno: AISIS.

Walterová, E. (1994). *Kurikulum*. Brno: Masarykova univerzita.

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(C.6)

Livio Riboli-Sasco; Francois Taddei, Training in scientific research for motivated high-school and undergraduate students: We present the results from a program that offers high-school students from disadvantaged areas an experience in research labs and invites them to join a community of passionate for science. Students are selected on motivation only and spend a week in a lab. They discover how science works but also all the jobs available in science, from researcher to technician and engineer, who all contribute to the excellence in research and in the advancement of science. These high-school students are also trained to transfer the scientific procedures to other fields. We invite them to question, dialogue, think critically, and try to reach excellence in understanding the natural world studied by science but also to understand how their community, their city evolves, how can they contribute to reduce violence, discrimination, isolation, etc. We are also now working to create undergraduate studies, which would include a research training. In most universities students discover research at late stages, rarely before their master degree. Indeed, we have observed that high motivation and excellence in scientific creativity raised in young high-school students can be lost when they face traditional scientific studies at university. Such programs already exists, for example in Peking University, Beijing, China and have demonstrated their efficiency. Innovative programs in high-schools can have an important impact on individuals and at a local level. Going further by introducing research experience in the first years of university can have a broad impact to raise creativity in our societies.

(C.7)

Lynn Hogue; Arlyne Sarquis, Weighing Risks and Promoting Scientifically Sound Choices: It is a well-known fact that scientists and other risk professionals frequently have differing views of risks than those held by the general public. This divide is created and fueled in part by the general public's lack of scientific literacy and the highly emotional handling of such issues by the media. Our role as professionals in the chemical sciences compels us to work to dispel the fear and lack of understanding that shroud our profession. This presentation will describe the highly successful Risks & Choices program a collaborative effort between Miami University's Center for Chemistry Education, scientists, and teachers from throughout the United States to prepare students to make informed personal and social choices regarding the effects on human health of exposure to physical and chemical agents. Sample activities that emphasize human and ecological risk assessment and show the relationship between environmental toxins and human health will be shared.

(C.8)

How To Motivate and Assess Students in the English Preparatory Classes and in The Undergraduate Level of The English-Medium Programmes at Dokuz Eylul University

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Abstract

This paper deals with the question " How the students in the English Preparatory Classes and in the English-Medium Programmes at Dokuz Eylul University are motivated and assessed by their English instructors ?" The motivation problems of the students in these classes, the methods which are used in these courses and their classroom applications, tasks and materials will be explained. How the developments in English language teaching and assessments in English-medium programmes in different universites are followed and implied in our university will be told. The student feedback will also be given.

Keywords: Motivation; assessment; English-medium programmes, teaching methods.

1. Introduction

In recent years, many new approaches and methods have been used in English language teaching classes. Multilingual approaches have been increasing in Higher Education. With these new approaches, instructors of English are trying to motivate their students in their courses. The language level and the society which the students are living in are the major points which all of the instructors should focus on while doing assessments or motivating students.

This paper deals with the students in the English Preparatory Classes Department and students in the English-medium programmes. What kinds of levels we teach and what kinds of course books are used, what kinds of motivation activities are used and the advantages of doing exams, how the exams motivate learners to learn more will be told. The main reasons of the motivation problems will be highlighted.

2. Motivation

Multilingual approaches and methods in foreign language teaching have recently started to become common in the world and especially in European countries. While using these methods or approaches the most crucial thing is the language levels and the society of the students. Motivation is the most important thing which triggres learning and teaching.

Motivation is defined by Jun-kai (2008:30) as: "Motivation is defined in different ways by different researchers, but they seem to agree that motivation is responsible for determining human behavior by energizing it and giving it direction."

Jun-kai also comments (2008:30) on "motivation" that "Motivation has been widely accepted by teachers and researchers as one of the key factors that can influence the rate and success of foreign language learning. Teaching method is a form, and the purpose of taking a teaching method is to stimulate the students' motivation in FLT."

From these sentences, we understand that motivation is something which increases succcess by encouraging someone or some people to do something well or achieve success.

O'Malley and Chamot state (1994:72) that " Student motivation for school learning is the result of their *expectations* for success or academic tasks, the *value* they assign to learning, and their attribution of responsibility for successful performance. These factors determine the amount of effort students are willing to expend on learning activities, and how long they will persist in attempting to learn new information. Each of these factors is linked to personal experiences which act to influence a student's overall motivation for school learning. Generally, students who have more "skill" in

performing academic tasks can be expected to have more "will" lead them to expand their involvement in learning."

As Jung, Robertson and Dash (2005:458) state that "It seems to me pointless to talk about motivating students when the teachers are clearly in situations, far too numerous to be mentioned, that inhibits or prohibits any form of effective teaching. It is also clear that there is a "gap in reality" between those who go to the myriad of Conferences held on English Language Learning and those who don't. I feel a distinct difference- the "us and them" attitude at these conferences."

This paragraph tells us that English language teaching teachers learn many new things about motivation from the conferences they attend and apply them in their classes, but there are differences between the teachers who attend these conferences and who don't, because the ones who don't attend cannot have opportunity to learn the new methods and approaches which will help to understand our students better. I agree with this idea. Attending the workshops in our institutions teach us many things, but attending conferences on learning or teaching teach teachers much more things on learning strategies and effective teaching.

3. How the Students in the English Preparatory Classes are Motivated and Assessed at Dokuz Eylul University

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There are four types of courses in the Preparatory Classes Department in the School of Foreign Languages at Dokuz Eylul University. These are reading, listening and speaking, writing and main course. Every course has its own course book. There are four levels of language courses in the Preparatory Classes Department. The names of these levels are respectively A, B, C and D. The students who want to study in the Preparatory Classes Department enter a placement examination in October and September. The students who take the highest marks from this examination are A level students. These students study the course books which are on the upper-intermediate and advanced levels. The B level students study the books which are on the intermediate and upper intermediate levels. The C level students study the books which are on the pre-intermediate, intermediate and upper intermediate. The D level students study the books which are elemantary, pre-intermediate, intermediate levels. They also study the half of the course books which are upper- intermediate levels. At the end of the academic year, all of the students in the Preparatory Classes Department take a proficiency examination. Each participant of this examination has to take at least 70 over the100 points. The students who can pass of this examination or an international proficiency examination such as TOFEL, IELTS or TOEIC can take the compulsory advanced English courses which are taught to the first class and sophomore students. In some departments, the third and the fourth class students also take compulsory advanced English courses, too (Yagcioglu: 2006).

Instructors who teach in the Preparatory Classes Department in the School of Foreign Languages at Dokuz Eylul University regulary attend the workshops on the course books and course materials as a school rule. School of Foreign Languages also invites some professors from different Turkish universities as conference speakers. They give seminars or conferences to the instructors who teach in the Preparatory Classes Department in the School of Foreign Languages at Dokuz Eylul University. Their talk sometimes takes 1 day sometimes 2 days. The British Council Education Service also brings international teacher trainers to the School of Foreign Languages at Dokuz Eylul University in Izmir in Turkey.

All instructors are free to use their own motivation techniques in their own classes. According to the language levels, instructors try to motivate their students or they try to help students to motivate themselves before coming to our language courses. Motivation problems stem from: (Jung, Robertson and Jung, 2005: 457)

a- Cultural misunderstandings;
b- Cross cultural communication breakdown;
c- Contractual problems;
d- Immigration problems;
e- Home sickness;

f- Racial abuse; and
g- Prejudice.

Under the perspective of all of these factors, instructors use the same standard motivation techniques by discussing what kinds of games or words can give energy to the students in the Preparatory Classes Department at the academic meetings in the School of Foreign Languages at Dokuz Eylul University. All of the instructors in the Preparatory Classes Department use the same teachers' books for main course lessons. For main course lessons, the course book series , entitled *Face* 2 *Face* published by Cambridge University Press are used. The same activities in teachers' book of main course lessons are used to motivate students. For listening and speaking courses, the course book series *Just,* by Marshall Cavendish Education are used. For writing courses, the instructors who work in the material preparation committee prepare writing materials for the writing courses.

For reading courses, the course books, entitled *Developing Reading Skills* and *Extending Reading Skills* by Craven and Macmillan Publishers are used.

In order to motivate the students in the English Preparatory Classes in the School of Foreign Languages at Dokuz Eylul University to be ready fort he proficiency examinations, 4 monthly examinations are done during the academic year. The questions of these examinations are prepared by the Testing Committee of The Preparatory Classes Department of the School of Foreign Languages at Dokuz Eylul University. Two quizzes are done twice a month. The questions of these quizzes are also prepared by the same committee of The Preparatory Classes Department of the School of Foreign Languages. There is also a different committee which prepares a different kinds of quizzes twice a month. This committee is called Material Office. Students are ready to have a quiz every week during the academic terms, because one week they enter a quiz which is prepared by the Testing Committee and the other week, they enter another quiz which is prepared by the Material Office. All examination papers are taken back from students and students are never given permission to take any examination papers to their houses. No instructors at school are allowed to give the answers of the examinations which are prepared by the Testing Committee or the Material Office and conducted by the School of Foreign Languages as handout phocopies to their students or to any student they know. All examination papers are checked out and signed by the manager of the School of Foreign Languages of Dokuz Eylul University, Asst. Prof. Dr. Kadim Öztürk before applied and given to the students in the School of Foreign Languages at Dokuz Eylul University.

3.1. Sample Warm up Activities to Motivate Our Students To Our Courses

3.**1**.**1**.The following is one of the activites I applied in my classes in the English Preparatory Classes Department in the School of Foreign Languages at Dokuz Eylul University: (Yildirim, A., Retrieved from: http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Warm-up Activities for Vocabulary Revision

Level: Pre-Int to Advanced	**Duration:** 15+ mins
Skill(s) Targeted:	**Aim:**
Speaking, Listening, Reading,	To use the four skills
Writing, Language awareness	**To raise awareness of how vocabulary and grammar work together (syntax)**

Students Need to Know:
Basic ways to explain vocabulary e.g. synonyms, antonyms, explanations, and examples.

Materials:
Whiteboard and boardmarkers, Selected sentences from reading or listening context.

Procedure:
Retrieved from: (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 1: (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

- Ask for a volunteer to help you demonstrate the warmer.
- The volunteer student should bring pen and paper.
- Seat him/her with back to the board.

Step 2: (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

- Write up an example sentence on the board.
- Make sure you are prepared to explain the sentence word by word clearly.
- Explain each word using a different method. Ask the other students to listen carefully to your explanations.
- The volunteer student writes down every word as she/he guesses it.
- In the end, when the student turns around to face the board, s/he compares what she/ he has written with the sentence there.
- (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 3:

- Elicit the techniques you used to explain the words in the sentence from the rest of the class and board them on one side. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 4:

- Ask students to pair up and sit in the way you and the volunteer did in the demonstration with all A students facing the board and B, and all Bs with their backs to the board. Bs should have a pen and some paper ready to write down the sentence. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 5:

- Write another sentence on the board. When they are ready, start the process and monitor for interesting explanations. Ask early finishers to explain how they explained the tricky words. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 6:

- When everyone has finished, elicit how some of the tricky words were explained. Feed in any necessary meta-language or raise awareness of collocations or useful phrases in the sentence. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 7:

- Continue with the process by swapping the A and B roles around. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Step 8:

- Follow on with the lesson using the key sentences. (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

Notes: (Yildirim, A., Retrieved from: http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc).

Students tend to join in with your explanations in the demonstration; let them do so but make sure you are using an array of explanation methods. One turn each with their back to the board makes a warmer. While two turns each takes most of the lesson. More than two turns each can be too much for any class! Either ask for punctuation to be put in during Step 6 or pre-teach punctuation vocabulary and have A tell B when punctuation is needed.

This activity is excellent for the following follow on or post-task applications: (http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc)

- setting up reading or listening tasks;
- grammar focus;
- vocabulary focus;
- teaching meta-language;
- syntax focus;
- discussion or essay ideas;,
- controversial statements; and
- livening up a tired or bored class……..and many more reasons!

3.1.2. Sample Warm-up Activity For Writing Courses To Motivate Students:

The following is one of my favourite class activities I use during my writing courses to motivate my students in the English Preparatory Classes Department: Vincent, D., Retrieved from: http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc

Level: Elementary/Pre-intermediate	**Duration:** 20 - 40 mins
Skill(s) Targeted: Writing	**Aim:** **Diagnostic – to find out how much the students know about question formation (good for a new class)**
Students Need to Know: The simple past tense.	**Source:** Benet Donald Vincent

Materials:
Blank strips of paper
Procedure:
Step 1:
The teacher writes five statements about him/herself on the board and explains that four of them are true and one is false (sometimes to get this idea across, it is a good idea to write up two general statements (e.g. 'Istanbul is the capital of Turkey') to elicit 'true/false' first). Students guess which one is false (maybe discussing in pairs). Then, the teacher reveals which one is false and corrects it. (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

Step 2:
The teacher pairs the students and gives to each pair 5 or 6 strips of paper. The students are told they are to write questions they want to ask the teacher on the strips. Then one of them is to bring the strip of paper to the teacher, who will write the answer. This continues for around ten minutes until the students lose interest/ run out of room to write questions (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

Step 3:
The teacher gives each pair a minute or so to read all the answers they have and then takes all their strips of paper away (to prepare for step 4). The students are re-grouped; they share the information they have gathered about their teacher and see if they have found out anything different from each other. (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

Step 4:
The teacher writes up interesting questions and those that need error correction and elicits corrections from the class. The teacher can also elicit more/follow-up questions to get the idea of a conversation. If it is a very low-level class, they may also need help with forming the answers. A pronunciation focus can then follow. (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

Step 5:
In their pairs, students ask and answer the questions they have written. Pairs can then be changed so that all the students get a chance to speak to each other. (This works better with a newly formed class.) (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

Variations:
Students can ask questions to find out which is the Teacher's false statement. (http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc)

4. How the Students in the English- Medium Programmes are Motivated and Assessed in English Courses at Dokuz Eylul University:

All of the faculties and departments at Dokuz Eylul University don't have English-medium programmes, but most of them have English-medium programmes. The faculties which have English-medium programmes are as follows: Faculty of Arts and Sciences, Faculty of Engineering, School of Maritime Business and Management, School of Physical Therapy and Rehabilitation, Faculty of Economics, Faculty of Economics and Administrative Sciences, Faculty of Business, Faculty of Architecture, Faculty of Medicine. Students in these faculties have to pass the English proficiency examination before starting their 1 class in their own in their faculties. Students in the Department of History and students in the Department of Archeology don't take courses from the English Preparatory Classes Department. English proficiency examination result is not a requirement for the students in those departments. They are educated in Turkish and their course books are in Turkish. In the Faculty of Education, the language which is used in education is Turkish, but in the Department of English Language Teaching and in the Department of Computer Education and Instructional Technology, students are educated in English.

My talk is about the faculty students who I have taught English. During the 2007-2008 academic year, I gave English courses in the Faculty of Medicine, Faculty of Economics and Administrative Sciences, Department of Computer Education and Instructional Technology and in the English Preparatory Classes Department.

Students in the English-medium programmes enter 2 mid-term examinations, 2 quizzes and a final examination. In the Faculty of Economics and Administrative Sciences. The first class students enter only 1 mid-term examination, a quiz and a final examination.

For the first class students in the Faculty of Economics and Administrative Sciences, the course book which is published by Cambridge University Press and entitled "English Vocabulary in Use-Upper Intermediate Level" is used.

For the first class students in Faculty of Arthitecture, in the Department of Computer Engineering in the Faculty of Engineering and in the Department of Computer Education and Instructional Technology in the Faculty of Education, the course book, published by Cambridge University Press and entitled " English Vocabulary in Use Advanced" is used.

Motivating Students Through Assessment

Raisanen (2006:122) states that "Assessment defines what students learn, and more importantly, how they learn. If the current reforms in higher education are to foster life-long learning and general competences in students, there is a need to critically review the traditional assessment methods used."

From the above paragraph, it can be understood that all traditional assessments are not same and in order to understand how our students learn what we teach, we should change some techniques and we should use some new methods to motivate them.

Smith (2006:115) discusses how assessments motivate students in higher education with the following 2 questions and states that " The question is, however, whether it is possible to strengthen the students's motivation by adapting assessment approaches to the individual student. There are two questions that need to be highlighted when discussing the question:

1. Assuming that intrinsic assessment had a positive impact on the learning process and outcome, is it possible to change the students' orientation from an extrinsic goal-oriented focus to a more intrinsic process-oriented focus?
2. Assuming that informative, non-judgmental feedback during the process enhances learning, is it then possible to strengthen motivation by using formative assessment approaches?"

Smith (2006:115-116) comments on her two questions written above and answers as: "The immediate response to the above question is yes, and in the following I will support this claim. In

order for students to take an interest in the learning process they need to be given an active role in this process, not only as receivers of information, subjected to assessment by others, but as involved participants as assessors and as decision makers. Instead of using an approach which creates a feeling within the students that assessment is carried out by the teacher or others external to the learning process, they take part in deciding on assessment forms, in developing assessment criteria and rubrics which are put into practice in self-assessment and peer-assessment activities."

As we understand from the comments which were done by Smith, assesments trigger motivation and encourage students to learn much more things and during the assessment process, students' skills are strenghtened and they learn better.

Participation the national and international conferences and workshops in Turkey and in foreign countries provides instructors to learn what kinds of new methods are applied in ELT classes and also provides communication between the instructors who teach similar courses in the departments or faculties of their own institutions. What Smith and Raisanen suggest in their talks are preparing quizzes or questions motivate students to learn and increase their participation their courses much more than the other activities.

Other Activities For Motivation

In the first-class courses of the English-medium departments, I motivate students with some other things, too. For example, using relaxation music during writing activities in class hours motivate students to write much beter and they help them to focus on their subjects happily. The music CDs which I often use are as follows:

Healing Massage, AJS music and *Red Relaxation* by New Age Orient Piano.

The music titles of the CD belonging to *Healing Massage* are as follows:

1. Aquarium;
2. Soft sound;
3. Touched;
4. Paradise;
5. Water;
6. Energy; and
7. A new day.

The music titles of CD belonging to *Red* R*elaxation* are as follows:

- Like you;
- Leave it with me; and
- Light.

For speaking class hours, I give some topics and let them think 10 or 15 minutes what they can talk orally as a group and after 15 minutes they discuss the topic I gave them with the other groups in the class. This group activity motivates them to participate the speaking activity more than as an individual talk activity.

For listening hours, I write the words they learnt in their previous course hour and ask their pronunciation before starting my course hour. This encourages them to speak and pronounce the words one by one as a class.

5. Conclusion:

In this paper, how the students in the English Preparatory Classes Department and in the English-medium programmes are motivated and assessed by their English instructors at Dokuz Eylul University in Izmir in Turkey are told. The differences in education in these two departments of the School of Foreign Languages are highlighted. The definition of the word "*motivation*" and motivation problems have been explained.

Sample warm- up activities I have used in my classes and English-medium programmes and departments at Dokuz Eylul University have been told. Motivation through assessment and other motivation activities are the subtitles of this paper.

For my own observation, students in the English Preparatory Classes Department and in the first classes of the English-medium programmes like different kinds of motivation. Preparing examination questions is not enough to motivate students.

As a result of this paper, it can be said that all motivation activities help learners to learn English as a foreign language and they develop their language skills happily.

This paper has revealed the needs of the university teachers while helping students to motivate themselves or to motivate their students to participate their courses. It is also helped to find solutions how the courses can be done effectively with different kinds of motivation activities.

In conclusion, it is hoped that this paper will provide teachers to practise with new ways of teaching and demonstrate how to strengthen the students' language ability.

Furthermore, it is also hoped that this will be a beneficial study and instructors who attend this session will share their own thoughts about motivation and assessment in addition to my study and will use more useful activities in their future classes.

References

Craven, M., (2003). *Developing Reading Skills.* Oxford: Macmillan Publishers.

Craven, M., (2003). *Extending Reading Skills.* Oxford: Macmillan Publishers.

Jung, J., Robertson, P., and Dash, P. (2005). Motivation to Teach EFL-v-the Reality. *The Asian EFL Journal.* Tortola, British Virgin Islands: The Asian EFL Journal Press, pp. 457-458.

Jun-kai, W. (2008). Stimulating in Foreign Language Teaching. *US- China Foreign Language.*Volume: 6, No:1, Serial no:52, USA. Retrieved from: http://www.linguist.org.cn/doc/uc200801/uc20080106.pdf, p.30.

Music For Body Massage and Relaxation. *Healing Massage*. Body Soul Productions.

New Age Orient Piano. *Red Relaxation*. Soft Music Series. Printed in EU.

O'Dell, F., and McCarthy, M. (2005). (6th printing). English Vocabulary In Use. Advanced. Cambridge University Press.

O'Dell, F., and McCarthy, M. (2005). (Second edition). English Vocabulary In Use. Upper-Intermeadiate. Cambridge University Press.

Cunningham, G. and Redston, C. (2007). Elemantary-Face 2 Face. Cambridge University Press.

Cunningham, G. and Redston, C. (2007). Pre-intermediate-Face 2 Face. Cambridge University Press.

Cunningham, G. and Redston, C. (2007). Intermediate-Face 2 Face. Cambridge University Press.

Cunningham, G. and Redston, C. (2007). Upper Intermediate- Face 2 Face. Cambridge University Press.

Harmer, J. (2007). Intermediate- Just: Listening and Speaking. London, Singapore, New York: Marshall Cavendish Education.

O' Malley, J. M. And Chamot, A. U. (1994). Using Learning Strategies For Motivation. *The CALLA Handbook: Implementing the Cognitive Academic Language Learning Approach.* USA: Copyright by Addison-Wesley Publishing Company, Inc., ESL Publishing Group, p. 72.

Pelteret, C., Lethaby, C., Acevedo, A. And Harmer, J. (2007). Pre- Intermediate- Just: Listening and Speaking. London: Marshall Cavendish Education.

Raisanen, C. (2006). Assessing assessment from an activity theory perspective. In: van Leeuwen, C., Zeegers, V., Wilkinson, R. (eds.). *Bridging the Assesment Gap in English- Medium Higher Education.* Germany& the Netherlands: Drukkerij Hooiberg, Epe, AKS- Verlag Bochum., p.122.

Smith, K. (2006). Motivating Students Through Assessment. In: van Leeuwen, C., Zeegers, V., Wilkinson, R. (eds.). *Bridging the Assesment Gap in English- Medium Higher Education.* Germany& the Netherlands: Drukkerij Hooiberg, Epe, AKS- Verlag Bochum., p.115-116.

Vincent, B.D. Introductions-Question Formation. In: Öniz, S. (eds.). Class Activities: *News Online.* Retrieved from: http://www.inged.org.tr/member-area/class-activities/ACT-Introductions.doc

Yagcioglu, O. (2006). Teaching English As an International English at Dokuz Eylul University in Izmir in Turkey. *Proceedings of The 1 world Congress on the Power of Language: Theory, Practice and Performance . Bangkok, Thailand. (will be published).*

Yıldırm, A. Back to the Board. Öniz, S. (eds.). Class Activities: *News Online.* Retrieved from: http://www.inged.org.tr/member-area/class-activities/ACT-Back-To-The-Board.doc

About the Author

Ozlem Yagcioglu has been working as an instructor of English in the School of Foreign Languages at Dokuz Eylul University in Izmir in Turkey since 1997. Before working at Dokuz Eylul University, she worked as an instructor of Turkish and English at Ankara University TOMER for 2 years. She also worked at the Turkish American Association as an instructor of English as a part time instructor. After TOMER, she worked as an English teacher at a state high school in Bigadic in Balıkesir in Turkey for 3 years. She has work experience as an instructor of English in the English Preparatory Classes Department and the Modern Languages Department at Dokuz Eylul University since 1997. She has taught tecnical English, medical English, business English, basic English, advanced and professional English, academic report writing and translation courses at Dokuz Eylul University. She has attended so many national and international conferences and presented papers in Turkey and in many different countries. She has been the member of the INGED (English Language Education Association), IATEFL (International Association of Teachers of English as a Foreign Language), ACTFL (American Council on the Teaching of Foreign Languages), the British Council Teachers' Centre and the Cognitive Science Society.

(C.9)

Gillian Eriksson, Developing Inter-Cultural Excellence and Creative Productivity in graduate online Gifted Education programs: The conceptual age demands that teachers understand the multifaceted online skills, modes of global communication and inter-cultural competence displayed by diverse students today. The challenge for certifying teachers of the gifted is how to infuse these skills as well as principles of gifted education into the central objectives, processes, core information, learning activities and assessments within the program. This becomes more challenging in asynchronous online learning, which needs to go beyond mastery of content to infuse creative thinking and differentiation for each teacher according to their teaching context and the demographics of their student population. The DICE Model (Developing Inter-Cultural Excellence) incorporates strategies of multicultural and global education into online certification courses in gifted education. The conceptual model and sample learning modules of the Gifted Education Program at the University of Central Florida (USA) will be shared and participants will be able to view the work of current students in the program taking the “Nature and Development of Creativity" course online.

(C.10)

Larisa V. Shavinina, Excellence in Education: Lessons from Early Childhood and Adolescent Education of Nobel Laureates in Science: Nobel laureates during their childhood encompassed a wide range of abilities, including the gifted learning disabled, gifted underachievers, the gifted, and children without any special talents. Their divergent trajectories of talent development ultimately led to the same result: amazing scientific discoveries, which testified to the outstanding minds of those who made them. Eventually, all the trajectories led to the same point: zenith in science. This paper sheds light on how and why this happened, and what lessons can be derived for the education of today's gifted children. The discovery of the principles involved in the educational development of Nobel laureates will allow educators to accordingly improve, develop, modify and transcend areas in the current curriculum in an attempt to cultivate scientific talent, of Nobel calibre, in future generations.

About the Author

Larisa V. Shavinina is a Professor at the Université du Québec en Outaouais, Québec, Canada. Her main research focus is the psychology of high abilities broadly defined, including the nature of giftedness, the child prodigy phenomenon, scientific talent in the case of Nobel laureates, entrepreneurial giftedness, and managerial talent, new assessment procedures for the identification of the gifted, as well as high intellectual and creative educational multimedia technologies (HICEMTs) aimed at developing potential abilities of gifted and talented individuals. Over the years Dr. Shavinina's research has expanded to encompass innovation. Her bestselling International Handbook on Innovation (1171 pages) published by Elsevier Science in 2003, the first and only book of this type, that is considered the beginning of innovation science, is aimed at unifying the field of innovation, that is, at merging psychological, management, and business perspectives together. She introduced innovation education as a new direction in gifted education. Innovation is also an important element in Dr. Shavinina's research on giftedness and economy. Her publications have appeared in Gifted Child Quarterly, Journal for the Education of the Gifted, High Ability Studies, Creativity Research Journal, Review of General Psychology, New Ideas in Psychology, and others. She co-edited CyberEducation and Beyond Knowledge. Her forthcoming International Handbook on Giftedness will be published in December 2008.

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(C.11)

Barriers of Adapting Technology by Education Administrator Candidates

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Abstract

There are some barriers of adapting technology for school administrators. These are lack of integration, lack of structure of schools, lack of standards, lack of government support, lack of time, lack of finance, lack of technology skills, lack of training time, lack of needs, lack of curriculum, lack of integration, and lack of interest. The main goal of this research is to find out the barriers of adapting technology for education administrator candidates. For this reason, frequencies, t-test and ANOVA were used to find differences based on gender, student's family's living place, having a computer, and having a technology course.

Keywords: Technology, technology barriers.

Introduction

This article explores barriers of adapting technology by education administrator candidates and differences based on gender, student's family's living place, having a computer, and having a technology course. The paper uses the process of barriers for technology. Using technology can be very frightening words for school administrators. Schoepp (2004) writes, "common sense dictates that in institutions that lack sufficient access to technology, effective technology integration would be a daunting, if not impossible task".

According to Roblyer and Edwards (2000), there are five essential reasons for integrating technology into the schools: increased student motivation; unique instructional opportunities; increased teacher efficiency; enhances students' information age skills; and supports constructivist approaches. Why must school administrator use technology in their school? Aren't their experiences enough to manage the school? Well, in knowledge age, it's not! The educational society is growing very fast. Technology is playing a key role in the schools. School administrators can not manage their school without technology.

There are some barriers of adapting technology for school administrators. These are lack of integration, lack of structure of schools, lack of standards, lack of government support, lack of time, lack of finance, lack of technology skills, lack of training time, lack of needs, lack of curriculum, lack of integration, and lack of interest. But of course, if technology is available, the school administrators must be user to manage their schools.

School administrators can either make or break technology integration into the schools. There are some reasons school administrators have against technology integration. One of the most important barriers is the school administrators' lack of confidence toward the technology and the lack of time available to properly learn and use the technology.

The Aim of the Research

The main goal of this research is to find out the barriers of adapting technology for education administrator candidates. For this reason, frequencies, t-test and ANOVA were used to find differences based on gender, student's family's living place, having a computer, and having a technology course.

Methodology

Operational definition of variables

This study was designed to examine education administrators' perceptions of technology barriers on using technology and to compare their perceptions based on department, class level, gender, student's family's living place, having a computer, and having a technology course.

Independent variables

Student's characteristics: gender, student's family's living place, having a computer, and having a technology course.

Identification of population

The population under investigation included graduate students in the program of school administration and management at the faculty of education in Sakarya University in Turkey.

Sample

Sample selected by the method of random sampling as 37 students from the Education Faculty of Sakarya University in Turkey in Spring Semester 2007-2008 academic year.

Instrument

For this research study, a questionnaire was used. This questionnaire was developed by Schoepp in 2004. Their responses are on a series five point Likert scale (1: strongly disagree, 2: disagree, 3: undecided, 4: agree, 5: strongly agree). The reliability analysis test revealed that the Cronbach's alpha score of this questionnaire is 0,802.

Statistical Method for this Research

In this research, first frequencies and percentages were found. Then t-test and One-Way ANOVA were applied to find the significance differences between the variables using the statistical program. Data were analyzed by using the SPSS 15.

The Demography of the participating students

- The research revealed the demographic structure of the participants.
- The gender of the students filling in the questionnaire was 45,9% (17) male and 54,1% (20) female.
- Students' families were living in 24,3% (9) of states, 32,4% (12) of cities, 24,3% (9) of countries, 5,4% (2) of towns, 13,5% (5) of villages.
- The answer to the question of having computer showed that, 94,6% (35) of students had a computer and 2,7% (1) of students didn't have a computer.
- And finally, 64,9% (24) of students responded yes to the question "Have you ever educated about technology?" while 32,4% (12) didn't have a technology course before.

Frequencies of Individual Items

According to the single item indicating overall perceptions with technology barriers, it appears that the Sakarya University Faculty of Education administrator students agreed with barriers. The 10 of 20 specific items, more than 50% of the students indicated that they were satisfied. At least, 50% agreed or strongly agreed that:

1. The current reward structure does not adequately recognize those utilizing technology.(62,1%);
2. There are no program standards as to what is expected for teaching with technology. (64,8%);
3. There is a lack of sufficient technology training. (81%);
4. There is a lack of technical support regarding the technology. (67,5%);
5. Faculty do not have sufficient time to integrate technology. (75,6%);
6. There is a lack of support from administration. (51,3%);
7. There is inadequate financial support to develop technology- based activities. (83,8%);
8. Technology training is offered at inconvenient times. (81%);
9. The curriculum does not allow enough time to integrate technology. (70,3 %); and
10. There is a scarcity of technology for the students. (51,2%).

There were 9 items that student responses were less positive. At least, 50% disagreed or strongly disagreed that:

1. Faculty lack basic technology skills. (78,3 %);
2. Generic technology training is irrelevant to teacher needs. (67,5 %);
3. Faculty is not interested in integrating technology. (81%);
4. There is not enough evidence that using technology will enhance learning. (64,8 %);
5. Technology is unreliable. (86,4 %);
6. Classroom management is more difficult when using technology. (83,7 %);
7. Software is not adaptable for meeting student needs. (75,6 %);
8. Technology does not fit well for the course I teach. (86,4%);
9. There is a scarcity of technology for faculty. (72,9 %);

There was 1 item that student responses were neither positive nor negative. For this item, 8,1% (3) of the students did not answer the question. 49,5% of the students agreed or strongly agreed, 49,5% of the students disagreed or strongly disagreed.

Statistical Analysis

After the questionnaire was completed and the percentages were taken, it was important to see if the results showed any significant variations due to the asked independent variables. Therefore, t-test and one-way ANOVA were applied to find the differences. While doing so, the value of alpha (α) was accepted as 0,05. All analysis was made according to this value.

Results of t-test analysis

This section presents the results of the statistical test of the three independent variables in the study. Research independent variables of the study were investigated by using t-test. The results of the quantitative data analysis showed that there were some significant relationships between gender, having a computer, and having technology course and student perceptions. (Appendix 1)

The t-test revealed significant differences between student's genders on five of the survey items. The t-test noted significant differences for the following variables.

1. Faculty unsure as to how to effectively integrate technology. (p=0,034) The analysis of t-test indicated that male students (X= 2,94) agree on the survey question more than female students (X= 2,15).
2. There are no program standards as to what is expected for teaching with technology. (p=0,022) The analysis of t-test indicated that male students(X= 2,41) agree on the survey question more than female students (X= 1,60).
3. Generic technology training is irrelevant to teacher needs. (p=0,007) The analysis of t-test indicated that male students(X= 3,52) agree on the survey question more than female students (X= 2,65).
4. Technology is unreliable. (p=0,040) The analysis of t-test indicated that male students(X= 4,58) agree on the survey question more than female students (X= 3,85).
5. There is a scarcity of technology for faculty. (p=0,025) The analysis of t-test indicated that male students(X= 3,58) agree on the survey question more than female students(X= 2,90).
6. The t-test did not reveal any significant difference between having a computer and between having technology course.

One-Way-ANOVA Analysis and Results

This section presents the results of the statistical test of the one independent variable in the study. Research independent variable of the study was investigated by using one way ANOVA test. The results of the quantitative data analysis show that there were some significant relationships. (Appendix 2)

The one way ANOVA test revealed significant differences between student's family's living places on three of the survey items. The one way ANOVA test noted significant differences for the following variables.

1. There is a lack of technical support regarding the technology. (p=0,035) The analysis of one way ANOVA test indicated that there is a significant differences based on living place. With LSD

Post Hoc test, there are some significant differences between city and town(p=0,018), city and village(p=0,011).

2. There is a scarcity of technology for faculty. (p=0,020) The analysis of one way ANOVA test indicated that there is a significant differences based on living place. With LSD Post Hoc test there are some significant differences between city and country(p=0,003), city and village(p=0,011).
3. There is a scarcity of technology for the students. (p=0,020) The analysis of one way ANOVA test indicated that there is a significant differences based on living place. With LSD Post Hoc test, there significant difference between country and city (p=0,001), country and state (p=0,009).

Conclusion and Discussion

The main goal of this research is to find out barriers of adapting technology by education administrator candidates. This research was done in Faculty of Education, Sakarya University in Turkey.

The results of t-test demonstrate that there are some significant differences based on gender, having a computer, and having technology course. The results of one way ANOVA reveal that there are some significant differences based on student's family's living places.

References

Edwards, J. & Roblyer, M.D. (2000). *Integrating Educational Technology into Teaching* (2nd ed.). Columbus, Ohio: Merrill.

Schoepp, K.W. (2004). Technology Integration Barriers in a Technology-Rich Environment: A CBAM Perspective. Doctoral dissertation, University of Calgary, Calgary, Alberta, Canada.

Schoepp, K.W. (2005) Barriers to Technology Integration in a Technology-Rich Environment. Learning and Teaching in Higher Education: Gulf Perspectives, 2(1). Retrieved January 10, 2008 from http://www.zu.ac.ae/lthe/vol2no1/lthe02_05.pdf

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Appendix 1: t-test values

Survey items	(p)value		
	Gender	having a computer	having technology course
1. Faculty unsure as to how to effectively integrate technology.	0,034*	0,202	0,424
2. The current reward structure does not adequately recognize those utilizing technology.	0,707	0,265	0,225
3. There are no program standards as to what is expected for teaching with technology.	0,022*	0,062	0,917
4. There is a lack of sufficient technology training.	0,280	0,241	0,510
5. There is a lack of technical support regarding the technology.	0,082	0,085	0,778
6. Faculty do not have sufficient time to integrate technology.	0,123	0,125	0,462
7. There is a lack of support from administration.	0,408	0,289	0,236
8. There is inadequate financial support to develop technology- based activities.	0,283	0,135	1,000
9. Faculty lack basic technology skills.	0,525	0,482	0,686
10. Technology training is offered at inconvenient times.	0,831	0,165	0,443
11. Generic technology training is irrelevant to teacher needs.	0,007*	0,365	0,234
12. The curriculum does not allow enough time to integrate technology.	0,294	0,123	0,278
13. Faculty is not interested in integrating technology.	0,515	0,397	0,748
14. There is not enough evidence that using technology will enhance learning.	0,632	0,685	0,316
15. Technology is unreliable.	0,040*	0,881	1,000
16. Classroom management is more difficult when using technology.	0,575	0,981	0,618
17. Software is not adaptable for meeting student needs.	0,382	0,497	0,150
18. Technology does not fit well for the course I teach.	0,083	0,419	0,085
19. There is a scarcity of technology for faculty.	0,025*	0,419	0,547
20. There is a scarcity of technology for the students.	0,061	0,384	0,222

Appendix 2: One way ANOVA test values.

Survey items	(p)value
	place
1. Faculty unsure as to how to effectively integrate technology.	0,180
2. The current reward structure does not adequately recognize those utilizing technology.	0,220
3. There are no program standards as to what is expected for teaching with technology.	0,353
4. There is a lack of sufficient technology training.	0,645
5. There is a lack of technical support regarding the technology.	0,035*
6. Faculty do not have sufficient time to integrate technology.	0,694
7. There is a lack of support from administration.	0,411
8. There is inadequate financial support to develop technology- based activities.	0,923
9. Faculty lack basic technology skills.	0,730
10. Technology training is offered at inconvenient times.	0,592
11. Generic technology training is irrelevant to teacher needs.	0,293
12. The curriculum does not allow enough time to integrate technology.	0,466
13. Faculty is not interested in integrating technology.	0,886
14. There is not enough evidence that using technology will enhance learning.	0,809
15. Technology is unreliable.	0,623
16. Classroom management is more difficult when using technology.	0,918
17. Software is not adaptable for meeting student needs.	0,706
18. Technology does not fit well for the course I teach.	0,154
19. There is a scarcity of technology for faculty.	0,020*
20. There is a scarcity of technology for the students.	0,020*

Significiant at prob. < 0,05

(C.12)

Connie Phelps; Jon Hake, The Online Learning Curve: The Online Learning Curve examined the relationship between using technology and student learning in the online environment. The study gathered data from a four year period and measured student responses from eleven iterations of two gifted graduate program courses using student email to the instructor to investigate the impact of technology-related concerns on student learning. The study categorized student email to the instructor in four groups: content, procedures, technology and other areas such as advisement. The researcher gathered archival emails for 49 students identified as first time Blackboard users in an entry level gifted program graduate course with 29 of these students completing a second year online program course. Using a rubric, the researcher scored emails by occurrence in the semester, frequency of emails from each student and the intensity of email content. The study anticipated a steep learning curve for first time online learners and a reduce d curve in a subsequent online course with technology and procedural issues remaining secondary to academic and advisement concerns. Results from the study may form the basis for additional studies related to gifted graduate student subpopulations, considerations for other online student populations and a guide for best practices in the online learning environment.

About the Author

(C.13)

Luz Pérez, The Constructive Self-regulated, Interactive, and Technological Model: The CSIT (Constructive Self-regulated, Interactive, and Technological) model represents a novel conception of learning as a response to the four great social, psychological, educational, and technological changes that have transformed modern society at the start of the 21st century y specially the teaching of gifted and talented students. It is an enrichment model that joins curricular contents, processes of thought and techniques of work. The model CSIT relies on five principles that identify and define the chain of events that happen, or they must happen in the student's head while he or she learns: Principle of sensibility (emotional intelligence), principle of production (analytical intelligence), principle of production, (synthetic and creative intelligence), principle of application (practical intelligence), principle of evaluation (self- regulation). The enrichment units are constructed using academic contents with activities that gather this principles. This model has been applied and evaluated through an investigation done by the Complutense University of Madrid and with students of the Estrella Program. The results have demonstrated a clear improvement in motivation, learning autonomy and in the achievement.

(C.14)

Scaling up wiki-based blended learning environment

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Abstract

The research presented in this paper extends the work already piloted on using wikis as a platform for blended learning (see "Wiki-based process framework for blended learning"; in Proceedings of the 2007 International Symposium on Wikis). The main focus in this research is on designing wiki-based tasks, activities and materials appropriate for large student groups. In addition to that, we are considering other variables such as: individual differences amongst learners, role of the teacher in a blended learning environment, technology competencies of teachers etc. The data for this study have been collected from the two trials set up in the University of Hertfordshire Business School over the last two academic semesters (January 2007-January 2008). The trials included two postgraduate and eight undergraduate modules, five different subject areas (marketing, accounting, economics, management sciences and information systems) and student groups' sizes ranging from 24 to 185 students. The tutors of the modules involved, assumed different roles (e.g. passive facilitator vs. active reviewer). The preliminary results of the first trial have indicated some areas for intervention and improvement in the second trial, in particular regarding the assessment of the wiki-based learning activities. The full analysis of collected data* should give us more insight into questions on usefulness of new technologies such as wikis, in the context of different learning environments as well as into the role of teacher in this new learning environment.

1. Introduction

Since their introduction in the mid nineties, the use of wikis in education has been extensively studied (Burns & Humphreys, 2007; Forte & Buckman, 2007; Mindle & Verma, 2006; Richardson, 2006), debated and documented (see examples of educational wikis and related discussions at Atlassian, c2, Wikispaces, and Wetpaint websites). More and more higher education institutions are experimenting with wikis, aiming at increasing students' engagement and communications and leveraging on "collective intelligence" in curriculum design and delivery.

The research presented in this paper extends the work already piloted on using wikis as a framework for blended learning (Cubric, 2007). The focus in the original work was how to "plan, shape & enforce" wiki learning activities (Lund and Smørdal, 2006).The main outcome was a definition and evaluation of a blended learning process supported by wikis (see Figure 1 below).

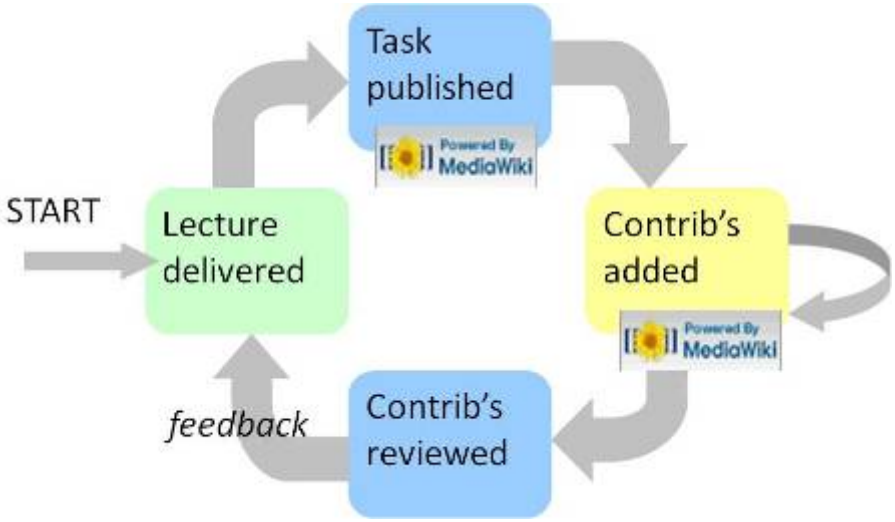


Figure 3: Blended learning process supported by wikis (Cubric, 2007)

The main objective of this research was to further examine to what extent wikis can support student learning and improve the quality of their work, focusing on:

- Scalability (How to use wikis in large groups?)
- Diversity (How to use wikis in teaching different subjects, with different study levels, and different modes of study ?) and
- The role of the teacher (What role should the teacher assume in a blended learning environment?).

The data for this study have been collected from the two trials set up in the University of Hertfordshire Business School over the last two academic semesters (January 2007-January 2008). The trials included two postgraduate and eight undergraduate modules, five different subject areas (marketing, accounting, economics, management sciences and information systems), varying student group sizes ranging from 21 to 182 students, different modes of delivery (e.g. on-line modules), different assessment strategies (not assessed, assessed contributing towards 10%-30% of the final grade), and different wiki engines (proprietary UH "StudyNet" wiki and open source "MediaWiki" platform). The data collected from the trials include: student responses to purposely built questionnaires, students' reflections, tutors' reflections and various usage statistics available on the MediaWiki and UH StudyNet sites.

The preliminary results of the first trial have indicated some areas for intervention and improvement in the second trial, in particular the following:

- Strong correlation between students' engagement and assessment (student contributions were insignificant in modules that were not assessed)
- Strong correlation between student engagement and regularity/quality of feedback (student engagement was increased in modules where tutor acted as an active reviewer)
- Strong correlation between students' engagement and final results (all significant contributors passed the corresponding modules, and none of the students who failed had made any contributions to the module wiki).
- Other findings from the first trial can be summarised as follows:
- Effective use of wikis in large groups (more than 30 students) should be based on the group work assessment and enhanced with sporadic individual feedback
- Assessment of wiki work should not be different than any other assessment; additional assessment criteria are related to presentation and collaborative aspects of the work
- Collaborative writing is not easy for students but could improve as the module progresses, based on tutors' interventions and guidelines
- Some (but not too much!) "scaffolding" is necessary e.g. providing students with guidelines, feedback, examples of literature reviews, NPOV
- Tasks should be introduced gradually in the order of increasing educational competencies, as in for example, Bloom's taxonomy levels (Bloom, 1956)
- Main problems were related to late registration of students and the significant impact on tutor's workload.

In subsequent sections, we describe, evaluate and compare six selected case studies from the UH Business School trials and we conclude with a summary of the main findings related to: blended learning environment and activities for large groups, differences amongst learners and role of the teacher in the blended learning environment.

2. Case studies

In this section, we summarise six case studies carried out in the University of Hertfordshire, based on the different learning and teaching objectives and we conclude with the comparative analysis of obtained data. The Appendix A contains more detailed description of the selected case studies.

2.1 Monitor group functioning

Wikis have many uses in a learning environment, not least as a tool for collaboration, especially in a large group setting. With this in mind a StudyNet based (University of Hertfordshire's Managed Learning Environment) wiki was used on a level two undergraduate module in Retail Marketing. It was implemented to monitor group functioning and individual contributions to the group task to ensure parity and transparency. The idea of using a wiki was to embrace technology to measure something that is typically difficult to assess effectively.

2.2 Support collaborative learning

The objectives of introducing the wiki to this level two module in Project Management were to provide an additional method for students to engage with the module and for lecturers to formatively assess learning, to encourage collaborative learning amongst students and to provide additional feedback to students.

2.3 Develop learning communities

A wiki (using MediaWiki software) was adopted within a Postgraduate module in Corporate Finance. The objectives were firstly to encourage the students to develop a learning community, which could accommodate the needs of part-time (non-campus based) students alongside full-time students, and secondly to encourage the students to take a more active role in their learning. In addition the wiki was also a way of giving ongoing feedback to the students with respect to academic sources of information and the development of critical evaluation skills.

2.4 Foster students' learning autonomy

Innovative processes like trying collaborative platforms (wikis) have the potential to impact both the target audience as well as those that administer the process. This was certainly the case for the tutor of the module of Business Economics level two and its students.

The implementation of wikis within the coursework was motivated by three specific goals: to foster the students learning autonomy, to create a tool for revising for the exam, and to improve exam results from the previous year. Aiming to minimize the foreignness of the wiki application, it was adopted the wiki platform managed by the University of Hertfordshire –"StudyNet wiki" since the students were already familiar with its interface.

2.5 Share reading and learning

As wikis are increasingly being used in business to share knowledge, it was decided that using a wiki would be a good experience for students taking a level two module in Operational Research. The module is of a quantitative nature and in the past, students did very little reading around the subject.

The aim of using a wiki for this module was for students' to read more widely about Operational Research, share their learning with others on the module and learn wiki technology to enhance their employability.

2.6 Support distance learning

There were two groups of students involved in distance / blended learning Business Intelligence Online two semester modules. As part of the distance learning material there are a series of exercises which are either to read an article or to complete self assessment questions. Previously the students had done this and received comments by the email based discussion forums on the modules' website.

In order to be able to give better feedback and to initiate class discussions it was decided to make use of the wiki to enable a freer flow of material.

3. Comparative Data Analysis

In this section we summarize the cases (Tables 1-3) and provide comparative analysis of the data collected through the purposely built questionnaire (see Appendix B).

Table 2: General characteristics.

Case #	Aim	Subject	Level	Number of students	Student contributing regularly*
2.1	Monitor group functioning	Retail Marketing	2	84	77%
2.2	Support collaborative learning	Project Management	3	182	<10%
2.3	Develop learning communities	Corporate Finance	Masters	33	88%
2.4	Foster students' learning autonomy	Business Economics	2	106	65%
2.5	Share reading and learning	Operational Research Models	2	70	82%
2.6	Support distance learning	Business Intelligence Online	3	21	29%

Table 3: Learning activities and assessment.

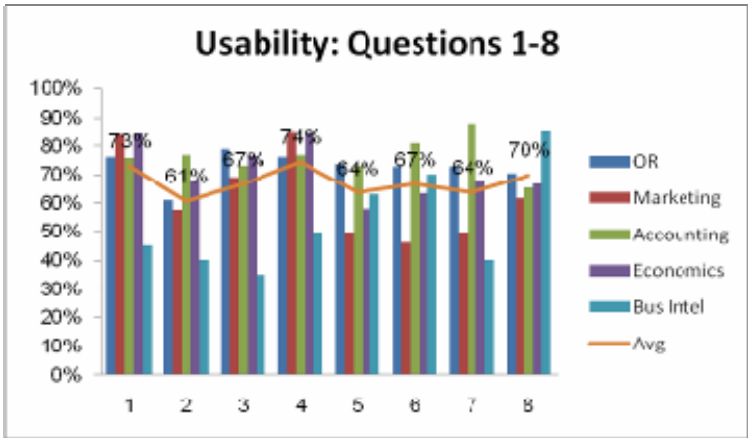
Case	Wiki learning activities	Group or individual access?	Wiki work assessed? (weight%)	Tutor's role
2.1	• Meeting minutes • Sharing research • Progress reports	Group and individual	15%	Monitoring group functioning
2.2	• Literature review • Glossary • Coursework FAQ • Nominate topic for the revision lecture • Exam revisions	Tutorial Group	No	Facilitator
2.3	• Literature review • Theory discussion • Discussion of past examination questions	Individual	10%	Active with regular feedback given
2.4	• Topic analysis • Literature review • Module glossary	Group and individual	30%	Active with regular feedback given
2.5	• Module glossary • Bibliography • Literature Review • Discussion topics • Coursework development	Group access	15%	Facilitator
2.6	• Literature Review • Peer reviews	Individual	5%	Facilitator

Table 4: Type and availability of collected data.

Case	Questionnaire Responses	Students reflections	Tutor reflection	Wiki site data availability
2.1	Yes (26)	Yes (12)	Yes	Yes – only for UH access
2.2	Yes (7)	Yes(4)	Yes	NO–only the HTML archive*
2.3	Yes (26)	Yes (9)	Yes	Yes – only for UH access
2.4	Yes (31)	Yes (31)	Yes	Yes – only for UH access
2.5	Yes (38)	Yes(4)	Yes	Yes
2.6	Yes (20)	Yes (17)	Yes	Yes only UH access

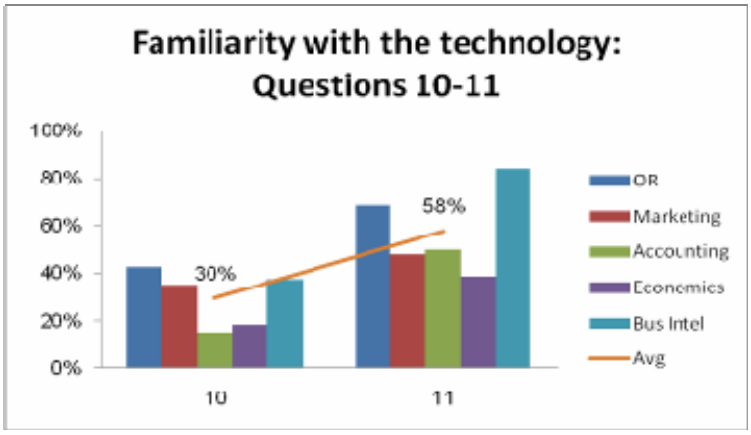
For the purpose of comparative analysis of data, shown on the graphs below, the questions from the questionnaire (Appendix B) are grouped into the following themes:

- Usability (Q1-Q8)
- Familiarity with the technology (Q10-Q11)
- Tutor's support (Q12, Q13, Q22, Q25)
- Learning benefits for students (Q14-Q20)
- Students' satisfaction (Q26-Q29).

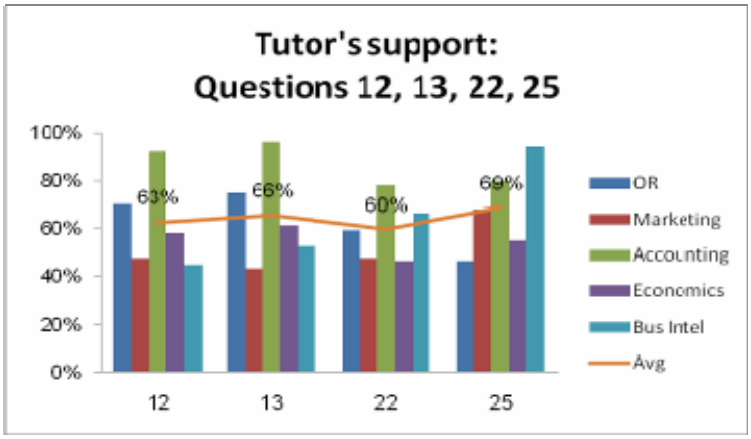


The "Usability" graph shows that majority of students find the wikis easy to use, easy to learn and easy to access. The only exception is the Business Intelligence(on-line) Module (case 2.6) where students had difficulties with remote access and the speed of Internet connections.

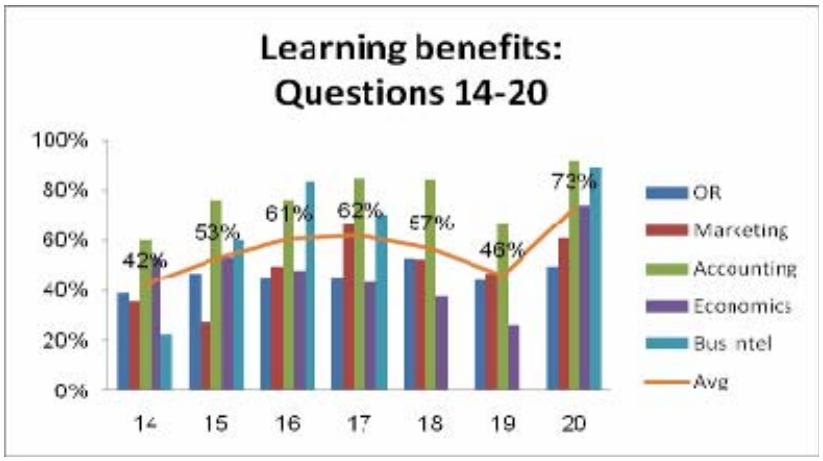
In contrast, only a relatively small percentage of students have heard of (average 58%) or used wikis (average 30%) before (see "Familiarity with the technology" graphs below). As shown by the "Usability" graphs above, the lack of familiarity with the technology did not hinder the students' ability to use wikis.



An average of 63%-69% of student find the instructions, support and feedback from tutor to be useful in helping them in their learning ("Tutor's support" graphs below)

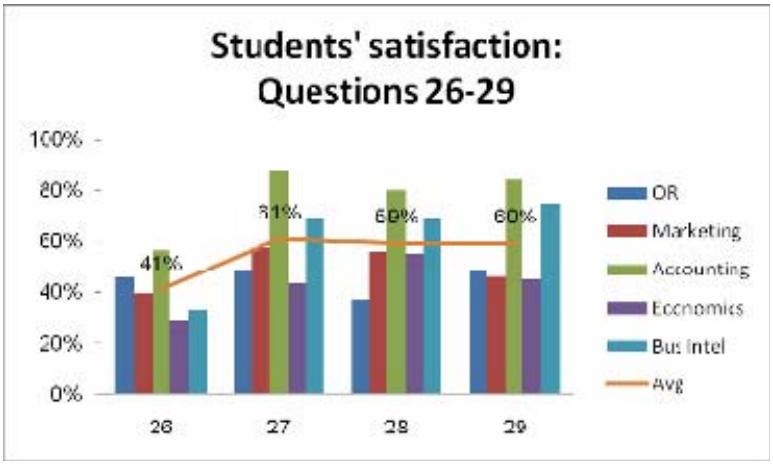


The learning benefits as perceived by students (see "Learning Benefits" graph below) vary significantly for different modules. While this is relative to the type of learning activities used in the specific module, it shows that majority of students see the main benefit as being the ability to read and review the work of other students and that the least beneficial element is the support in preparing for other types of coursework.



Student satisfaction was related to the questions on whether or not they would use wikis without assessment and whether or not they would recommend use of wikis in future. The responses again vary for different modules, but the average responses show that students engagement is highly linked

to the assessment and that their overall satisfaction is related to the level of tutor support (e.g. compare figures for “Tutor Support” and “Students’ satisfaction”).



The limitations of this methodology should be acknowleged regarding the small numbers involved in some of the case studies (case studies 2.3 and 2.6) and the relatively low level of responses (case studies 2.1, 2.2 and 2.4).

4. Conclusions

In this section we summarise the findings and recommendations from all tutors involved in the trials.

4.1 Blended-learning environment for large groups

When there are large numbers of students, the tutor has to create wiki groups with a manageable number of students. The optimal number in a wiki group depends on the nature of the task being set.

If the intention is to have the students write collaboratively about a particular topic, it is useful to have groups with no more than four or five students. Case study 2.4 mentions the challenges of having a wiki group of12 to 16 members engaged in collaborative writing.

In other contexts however it might be appropriate to have wiki groups that correspond to the tutorial groups (provided that these are evenly distributed), and even have a group involving the entire class.

In case 2.2 for instance, the wiki was used on a class-wide basis (182 students) with the intention of providing additional resources and support to the group through creating a shared knowledge base and providing additional input and feedback from lecturers. Tasks were not assessed and thus engagement with the wiki was low.

By requiring each group to add weekly contributions to the wiki, as in case 2.5, students were able to share reading and learning with the entire class. Group members were allocated to the same tutorial to aid communication within the group and to facilitate discussion on their contribution to the wiki. All wiki topics were based on the lectures and linked to the examination. The overall wiki contributions were assessed as a group and each member of the group was awarded the same mark.

On the issue of parity students often complain about the unfair nature of group work (Petress, 2004). Case study 2.1 discusses the benefit of being able to use the wiki to measure individual contributions in a group setting. It is not a time saving tool but the transparent nature of the wiki should lead to greater collaboration and individual accountability and should enhance the students’ perception of the equity of the assessment of group work tasks.

4.2 Blended-learning activities for large groups

As it is noticeable in the case studies, wiki platforms might be used for a variety of tasks inside and outside the classroom. Although mainly used remotely, some tutorials (as in case 2.5) were set in a computer laboratory, giving the students the opportunity to contribute to the wiki with tutor support.

One of the ways that wikis can be used in the context of large groups is to set questions about the topic being discussed in the lecture and ask the students to write an answer collaboratively. From our case studies we conclude that where individual contributions were assessed, students opted to write individually from the outset despite the instructions that they were to engage in collaborative writing. Where no individual contribution was assessed and a group mark was awarded, there could have been scope to develop collaborative writing skills. Students however still chose to contribute individually rather than collaboratively. For instance, in case study 2.4, some students who were asked a question on the relevance of game theory in the context of oligopoly, added their contribution under the following heading: "game theory according to ...following the name of the student" revealing in this way a clear desire to distance themselves from the exercise of writing together.

To help the students to develop collaborative writing skills, the tutor needs to provide a support session where the students become familiar with the concept. For instance, students may be divided in small groups and the tutor provides a question that the groups have to answer. The tutor sets the following rules: one of the students has to write a sentence tentatively answering the question in a sheet of paper. This paper is passed around to each member of the group who are asked to edit, correct or add the answer. At the end of the task someone from the group can read the final outcome to everyone in the class.

Students may also be encouraged to create glossaries, revise academic papers and create a list of authors and their seminal works. These tasks need not to be written collaboratively as in case 2.3. Wikis are a good tool to share students' contributions and to foster peer teaching and learning.

Two types of tasks were prescribed in case 2.2. Students were asked to add to the class glossary and literature reviews and were set questions on lecture related topics to which answers could be developed collaboratively. It is important that use of the wiki for such tasks is integrated into module design rather than as an additional and optional activity.

Similarly, in case 2.5 each group was required to add to the class glossary and literature review. Groups were also required to provide two additional contributions on specified topics during the semester. However, in this case, all group submissions were assessed which led to a high level of interaction with the wiki, whereas they were not assessed in case 2.2 thus leading to a correspondingly lower level of contribution.

A prescriptive approach to the tasks on the wiki can encourage students to contribute more reliably to their team objectives. Case study 2.1 specified the week by week tasks to encourage engagement both in the task (and ultimately the final coursework) and with the team. Whilst the students engaged with the wiki for this purpose, they did not engage with it to write their final report collaboratively. This was completed outside of the wiki. One explanation for this may be that the lecturer did not prescribe this. Either way, when using the wiki for measuring group work, it is important to have a template of activities so that a reliable measurement tool can be developed. Contribution to the tasks set each week in case 2.1 was quite high, with over 74% of the cohort engaging with it and the average percentage for individual contributions worked out at 60%. This is likely to be a result of the group task being broken down into week by week tasks, which were easy to follow and maintain. The tasks were also closely linked to the ongoing group work.

There were few contributors in case 2.2. In addition to other factors (primarily integration into module design and assessment of wiki tasks) a contributory factor may be due to the size and diversity of the group. The students appeared to form smaller cohesive groups but did not appear to form a cohesive cohort either in tutorial groups (up to 28 students) or as a whole (182 students). There appeared to be low trust in sharing knowledge outside smaller groups.

4.3 Differences amongst learners

Students that are late in making their entries report that they have difficulty in adding their contribution once the main points had been discussed by the rest of the students ("first movers" advantage (Viégas et al, 2004)). This problem can be partly offset by the use of groups (4-6 on a first come basis) even where it is the individual contributions which are being assessed. This was identified in case study 2.3 where the contributions to the initial tasks were not organised by group. The tutor quickly established that supporting the students and enabling them to make contributions later in the process was facilitated by the use of non-organised groups i.e. first 6 contributors are Group A and so on.

Interestingly many students, although unfamiliar with contributing to wikis, did not seem to find the technology daunting. This was especially the case in modules with a relatively high degree of tutor intervention/support as in case 2.3, where part of the seminar tutorial times was used to support students in their use of the wiki. In case 2.5 there were some initial problems accessing the wiki when students were off campus, this was resolved by setting up a direct link from the student's virtual learning environment. There was also a wide variation in the presentation of the wiki. Some students who had a good understanding of HTML demonstrated their knowledge whereas others typed in comments without using headings or appropriate formats such as bold typeface, underlining etc. The most common difficulty for students was in uploading pictures and tables.

In case 2.5, students were encouraged to comment on other students' work, however this rarely happened. This may have been because it was assessed work and students did not want to show their lack of knowledge or to imply criticism of other students' work.

The general feeling amongst cohort in case 2.1 was that a certain amount of computer literacy skill was required to use the wiki. Furthermore whilst some recognised that the wiki assisted in facilitating remote collaboration, it was also accused of being a superficial addition that did not facilitate true teamworking. In particular, a new-comer to an established group found that the wiki did nothing to foster cohesion, suggesting that there is no replacement for face to face contact in this context.

Another issue highlighted by the wiki feedback was the additional difficulty of foreign students posting their contributions in English. One could argue that this difficulty is inherent to these students in whatever task is set in the class. Proficient English writers found it difficult to add or to edit the work of peers whose English was clearly not their first language. In case 2.3, the tutor was reluctant to actively intervene to correct grammar and English for fear of the students becoming reliant on an external editor.

4.4 Role of the teacher in the blended-learning environment

The level of technical competence in terms of using wikis varied greatly within the group of tutors in this project. First time tutor users were initially daunted by the technology itself, but soon came to realise that the issues causing difficulties were more related to the overall structure and management of the individual wikis rather than any technical difficulties. Even when assessing individual contributions for a relatively small group, it was necessary to organise the student contributions on a small (5/6) group basis (even if self-selected). In case 2.3 where individual contributions were assessed, the tutor found that the support and feedback process was much easier if the students contributed within small groups rather than as one cohort.

Adopting the wiki technology presents us with a dichotomy. Setting up the wiki required a significant investment in time by the tutors, whilst the technology was fairly straightforward, its 'newness' restricted its full adoption for some. This issue will be overcome with time / familiarity from the point of view of the tutors. From the students perspective however, each new cohort will still have to climb that learning curve.

There were a variety of approaches adopted by the module tutors to the management and intervention within the wikis. Some tutors adopted a passive approach to encourage the contributors to take ownership of their wikis, whereas others intervened more actively with regard to the management of the wiki and use of the wiki to give feedback on contributions. Both approaches have benefits and drawbacks. A passive approach could lead to student frustration and feeling of not being supported, whereas a more interventionist approach could have an inhibiting impact, thus having a stifling effect on contributions. The feedback from modules where an interventionist approach was adopted was however very positive with regard to transparency of contributions and tutor feedback on those contributions.

In case 2.5, a student with significant experience in using wikis was used by the tutor to help set up the wiki environment. This led to the first wiki page being well structured and interesting.

It is also interesting to note, in case 2.5 that that the tutor took a less active role than intended. This was in part due to the large number of groups (ie 20 groups with weekly contributions) and the time it

would have taken to given detailed weekly feedback. However, when students had problems or contributed inappropriately, the tutor gave appropriate advice.

What is not in doubt is that there are different experiences and different levels of adoption in this pilot group both amongst the staff and students. In true blended learning fashion perhaps the way forward is a somewhat utopian approach where assessment environments and activities can be designed to take account of different learning and teaching styles, made more manageable by technologies such as wikis.

5. Future work

In this section we discuss some open questions and areas for future work.

Further quantitative analysis can be performed on the existing data in establishing correlations between different trial variables.

Another interesting area of future work would be using evidence based research that will observe a cohort of students through a number of consecutive modules which all use a wiki based approach to blended learning and establish the added value factor in students' performance.

Problems with parity in group work are clearly issues for students and lecturers alike, so much so that it has become an agenda item for the Faculty Learning and Teaching Group. Refinement of the wiki approach (as in case 2.1) for developing a model to measure levels of individual contribution and group functioning is clearly one potential way forward for this project.

Finally we leave you with a note on our own experience of writing this paper. After embarking on a journey of motivating our students to use wikis and to develop their collaborative writing skills, we decided that we ought to try for ourselves. Thus we have developed this paper using the MediaWiki platform. Like our students we have experienced similar frustrations: from losing the posted notes that were not saved properly to the situation of losing the contribution due to simultaneous editing. We also felt the difficulty as peers in editing the work of each other and thus implying unintentional criticism of colleagues. We had to our advantage the experience of our students which made us aware of the difficulties we could face. We felt awkward at times as we brought together the contributions of seven colleagues from different backgrounds but were determined to share the end product with all our colleagues interested in adopting wikis as a form of blended learning.

6. Acknowledgement

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References

Bloom B. S. (1956) Taxonomy of educational objectives, Handbook I: Cognitive domain. New York: David McKay Co Inc.

Bruns A. & Humphreys S. (2007) Building Collaborative Capacities in Learners: The M/Cyclopedia Project, Revisited. In: Proceedings of the 2007 International Symposium on Wikis 2007

Cubric M. (2007) Wiki-based Framework for Blended Learning. In: Proceedings of the 2007 International Symposium on Wikis 2007

Forte A. & Bruckman A. (2007) Contructing Text: Wiki as a Toolkit for Learning. In: Proceedings of the 2007 International Symposium on Wikis 2007

Guth S. (2007) Wikis in Education: Is Public Better? In: Proceedings of the 2007 International Symposium on Wikis 2007

Lund A. and Smørdal O. Is There a Space for the Teacher in a WIKI? WikiSym'06, August 21–23, 2006

Mindel J. L & Verma S. (2006) Wikis for Teaching and Learning, Communications of the Association for Information Systems (CAIS), Volume 18, Article 1.

Petress, K.C. (2004), The benefits of group study, *Education*, Vol. 124 No.4, pp.587-90.

Richardson W. (2006) Blogs, Wikis, Podcasts and other powerful web tools for the classroom. Corwin Press

Viégas, F.; Wattenberg, M. & Kushal, D. (2004): *Studying Cooperation and Conflict between Authors with History Flow Visualization*. In: Proceedings of the 2004 conference on Human factors in computing systems. New York: ACM

Websites referenced in text:

Wikispaces - Examples of Educational wikis http://educationalwikis.wikispaces.com/Examples+of+educational+wikis [29/05/08]

Wetpaint - Wikis in Education http://wikisineducation.wetpaint.com/page/How+we+use+wikis+in+class?t=anon [29/05/08]

Atlassian Confluence - Using Wikis in Education http://www.wikiineducation.com/display/ikiw/Home [29/05/08]

c2.com - Wiki in Education http://c2.com/cgi/wiki?WikiInEducation [29/05/08]

Appendix A – Case studies

Case 2.1 Monitor group functioning

Context

Wikis have many uses in a learning environment, not least as a tool for collaboration, especially in a large group setting. With this in mind a StudyNet based (University of Hertfordshire's Managed Learning Environment) wiki was used on a level two undergraduate module in Retail Marketing. It was implemented to monitor group functioning and individual contribution to the group task to ensure parity and transparency. The idea of using a wiki was to embrace technlogy to measure contribution to group coursework which is typically difficult to assess effectively.

Scenario

The cohort consisted of 80 full-time students living both on and off campus. Seven wiki topics (to be completed on a week by week basis) linked to the group activity were posted on the StudyNet wiki. These were designed as a monitoring and control mechanism in the group work task. As a starting point students were asked to use the wiki to introduce themselves to other team members, to discuss their choice of company to work on, to justify their choice and to agree on one company for the group work. Guidance was given for each of the wikis and students were asked to use the wiki to: log minutes of meetings; allocate tasks; summarise key actions points; share their research; comment on their findings; produce progress reports as a group and individually and upload their work for the group to review and to consolidate. In a reflective piece at the end, students were asked to comment on group functioning and their learning.

The wiki formed 15% of their coursework assessment (30% overall). 10% was awarded for their group functioning and 5% for their individual reflection on the wiki. Good practice wikis were show cased in lectures, reminders were sent if the weekly wikis had not been updated by the groups and suggestions were made about the likely content of the weekly wikis, but overall the tutor had limited input to the group wikis.

Data

Student feedback was gathered via a survey at the end of the module. 26 students responded, giving a response rate of 32%. Written feedback was also requested to gain feedback on their overall experiences. 100% of the groups contributed to the wiki. 74% of the cohort made individual contributions. Very few students had any issues with the login procedure and the majority were happy sharing their work, but there was an even split regarding the 'ease of use' of the wiki. This could be first time nerves, since 65% had never used one before and 62% felt you had to be computer literate in order to use a wiki.

Students were fairly positive about the value of participating in on line discussions and reading and reviewing work to help their learning, yet very few felt wikis helped in their learning of the subject. This is not necessarily suprising since the main function of this wiki was in measuring individual contributions to group work.

On the issue of the value of wikis for measuring teamwork progress/contributions the verdict was divided. However, only 2 students disagreed strongly. The qualitative comments show another picture:

"wikis were a good way to interact with each other as it helped to increase the communication"

"wikis are a good way of communicating with the whole team. That way everyone knows what piece of work each person has done to contribute to the overall team effort"

"I think that the wikis made group work fairer because our tutor was able to assess how much work each member had done"

"I wish all group projects had an area like it."

"it showed me a new way to work within groups and that although it was group work, we can all contribute without all having to be present at the same time"

The following comments may offer some explanation for the divide:
"this will only work if all members check it regularly"
"wiki was initailly a hard concept to learn"
"I'd never used on as part of a module before ... I was not told enough about how wikis got marked"
"we haven't been taught how to use a wiki effectively therefore we shouldn't have lost any marks"

Further conflict was also demonstrated by the fact that overall, they did not find using the wikis fun, yet they would recommend their use again both next year and in other modules.

Evaluation
As with anything new, adoption and attitudes can be inconsistent. The wiki functions were used to varying degrees by different groups. Some used all of the functions - such as the general discussion site for arranging meetings, the wiki link for 'writing up' group progress, the file section for the uploading and sharing of articles for their presentations, the planner to record meetings and minutes. A few did not even complete the weekly wiki progress task. The relatively high level of engagement is no doubt linked to the fact that it formed part of their coursework marks and it was not suprising that (given the fact they did not find them fun) that nearly 60% said they would not have used the wiki if it was not directly linked to assessment.

Tutor reflection
As a first time wiki user I had a steep learning curve to climb and this cohort were my pilot. Setting up the wiki at the start was time consuming, as was assessing their contributions (so this is not a time saving tool!). With time this will no doubt get easier and I am looking forward to making it better next year. I felt that this is a great tool for measuring group work functioning and contributions. It is both fair and transparent. There were of course mistakes made. These were mainly down to a lack of experience.

Conclusion
Despite the work load, and ambivalence from students, this model for measuring individual contributions in a group setting is one that I feel is worth progressing. The collaboration potential is much greater than encouraged in this first trial, but one which I will focus on in the future. Given that students tend to feel that group work can often be unfair, I think having greater transparency and collaboration opportunities will mean that this issue can only be improved. The signs for improvement are that they need more tutor input and guidance and more help with the technology.

Case 2.2 Support collaborative learning
Context
The objectives of introducing the wiki to the module were to provide an additional method for students to engage with the module, for lecturers to formatively assess learning, to encourage collaborative learning amongst students and for lecturers to provide additional feedback to students.

Scenario
The wiki was used on an undergraduate level three module in Project Management. The module was undertaken by students on a number of pathways in business related Combined Studies and Joint Honours programmes. The 182 students were a diverse group in terms of their experience of information technology and range of other subjects studied. Due to the number of combinations of modules studied and resulting timetable implications, students often work in tutorial groups with students whom they do not already know.
Due to the large number of students it was decided that each tutorial group (8 groups) would be assigned a username for sign on. Students had the opportunity to sign in under their tutorial name, and add their own name or contribute anonymously.

The wiki was introduced in week 4 and students were set the following tasks: developing a glossary, literature reviews, periodic tasks related to lecture topics, requesting topics to be covered in an examination revision lecture and developing answers to sample and past examination questions; all with the opportunity for additional feedback. Wiki contribution did not form part of student assessment.
Tutor support included a brief introduction to wikis and editing and etiquette guidelines during a lecture, information on the wiki and how to use it posted with other module teaching materials on the module's website, periodic setting of the aforementioned tasks and weekly monitoring and, where required by students' contributions, providing feedback. Few contributions were made by students. It is not possible to say whether students browsed lecturer or other students' contributions.

Data
The survey elicited a low response rate - 7 respondents from 182 students, although this is perhaps unsurprising given the low level of contribution to the wiki. One respondent did not complete the survey and a number of questions were skipped by one or more respondents.
From the responses wiki technology (questions 3 to 8 and 10) did not appear to be a barrier to students' use, even where students had not used wikis before (question 12) and, taking into two comments in the students' reflections, access problems appear to be when trying to use the wiki outside the university environment. Some responses in this area were 'not applicable', presumably where students had not contributed to the wiki (2 of 7 respondents answered 'not applicable' to "I have made regular weekly contributions on the module wiki" and 3 of 7 responded "strongly disagree to this statement).
Responses to tutor support were spread between those who agreed or strongly agreed and those who strongly disagreed or answered not applicable to questions 12, 14, 15, 24, 27 and 34, student reflections.
In terms of wiki support for student learning (questions 16-21) responses were spread between "strongly agree" and "strongly disagree". Questions relating to collaborative learning (questions 23 and 25-27) were similarly spread with some "not applicable" responses.
Free format responses (questions 33-34) indicated that earlier incorporation into the module would be desirable, positive response to the use of wikis in teh module, use of wikis from a social/networking perspective and negative responses to the module and use of the wiki.

Evaluation
The low response rate is indicative of the low participation in wiki contributions. However the responses also indicate areas for improvement in the use of wikis, in particular planning of wiki use before the start of the module and improving guidance on off-site access (possible but not evident to students)

Tutor reflection
Opportunities to fully integrate the wiki into the curriculum were limited by deciding to adopt the wiki just before the start of the semester and my workload during the first few weeks of the semester. The major implication of incorporating the wiki into learning and teaching would be in curriculum design and module planning. Once implemented, the wiki was not difficult to incorporate into teaching practise and, although students did not adopt the wiki, I feel that had students used the wiki more this would not have added to the in-session workload for lecturers.
Assessment of wiki contributions would provide an incentive to students and offer the opportunity to encourage collaboration and evaluate the use of wikis more fully. I would like to investigate the fairness of assessing wiki contributions in larger groups where students may not be members of cohesive (and trusting) cohorts.

Conclusions
I would use wikis in future, providing that the wiki could be incorporated into design or at least planning delivery of the module. Given the diverse and disparate nature of this particular large group I would need to consider the prerequisites for collaborative learning in a group of this size and diversity. Notwithstanding the latter comment, wikis could provided opportunities for larger groups to have increased interaction with lecturers and fellow students not provided within the model of 21 contact hours.

Case 2.3 Develop learning communities

Context
A wiki (using mediawiki) was adopted within a postgraduate module in Corporate Finance. The objectives were firstly to encourage the students to develop a learning community, which could accommodate the needs of part-time (non-campus based) students alongside full-time students, and secondly to encourage the students to take a more active role in their learning. In addition the wiki was also a way of giving ongoing feedback to the students with respect to academic sources of information and the development of critical evaluation skills.

Scenario
The postgraduate cohort consisted of 33 students who were a mixture of full-time / part-time students and consisted of a variety of nationalities. The tutor designed the framework for the wiki contributions, gave an initial introduction to the wiki and instructions to enable the students to contribute to the wiki. Instructions were also posted on StudyNet, the virtual learning environment used within the University.
The students were initially encouraged to post individual information on the wiki, to introduce themselves to the rest of the group and also to familiarise themselves with wiki editing. The tutor supported students through email and also within seminar sessions regarding the use of the wiki, but did not intervene with any postings to the wiki.

The original idea in using a wiki was to get the students to build their own reading lists around several topics, critically evaluate academic articles and post contributions to topic related issues or questions. A series of five topics linked to seminar discussions, coursework topics and the examination were posted on the wiki. The tasks associated with the topics involved different sorts of activities ranging from contributions to discussions about issues relating to theoretical theories, to requiring students to find articles relevant to particular theories, posting links to the articles and giving a critical review of the articles.
These contributions to the wiki formed 20% of the coursework grade (10% of the overall grade) and the students were assessed on an individual basis for their contributions to each of the five topics, with a maximum of 4 marks being awarded for each contribution. These marks were then published on StudyNet on a regular basis after the closing date of each wiki contribution. The students were also informed that the work they were doing for their contributions to the wiki would also support their remaining coursework and topics covered in the examination.
The tutor took a very active role in overseeing the wiki and in giving brief individual feedback after contributions to each topic area had been made. This feedback was given via the discussion area within the wiki. The tutor also submitted the student contributions to a plagiarism software programme and was then able to give the students feedback on what was often unintentional plagiarism. Students were penalized for plagiarism in the marks awarded for the particular topic. This provided some developmental support with respect to the remainder of their coursework and enabled the tutor to communicate to the students about how to avoid plagiarism.

Issues
The technical aspects of using a wiki and the design of the stucture of the wiki as ab initio users involved a steep learning curve for all involved, especially the tutor! This required a considerable amount of time at the start and for the first few weeks of operation.
Given that the wiki was being operated within the first semester on a one year programme also presented problems in that there were several students who were late starting on the programme and who therefore had missed the initial introductions to the wiki and had also missed the deadline dates for the first and sometimes the second topic contribution. This meant that continuous ongoing support had to be offered by the tutor and "catch up" mechanisms also had to be put into place to enable the late students to gain the marks that they had missed through not being able to contribute to the initial topic tasks.
There were also some technical problems caused by students who inadvertently deleted links to other students contributions and either were unaware of having done so, or did not know how to rectify the situation. This led to a certain amount of anxiety and the tutor had to intervene on several occasions to restore the original work.
Assessing individual contributions proved to be very time consuming with the initial structure. The structure was then amended to require the students to contribute within self-determined groups of 6. It was then much easier to give feedback, to rectify any problems caused and to assess the contributions.

Data
At the end of the module multiple choice questionnaires (see Appendix B) were distributed to the group who were also asked to give written comments if they wished. 26 responses were collected. Overall the responses for this group on use of the wiki were very positive.
Most students (+70%) found the wiki technology relatively easy to use, even though they were not particularly familiar with the technology.
The students were very happy with the support offered by the tutor (+90%) and liked the opportunity for regular feedback
Most felt that the wiki had supported their learning. Just under 60% of students felt that the wiki had supported their coursework, whereas 92% felt that being able to read and review other students' work had helped their learning and felt comfortable in making their contributions visible to others. 78% thought that tutor feedback had been helpful in improving the quality of their work and 61% felt that other student reviews had been of help.
Only 57% said that they would have used the wiki if it had not been linked to assessment, whereas 88% would recommend the use of a wiki in other Business School modules. Most felt that using the wiki had been fun.

Evaluation
The level of engagement within the wiki was certainly helped by the fact that contributions were assessed but the students regarded this as a positive aspect and enjoyed regular feedback with the opportunity to gain marks throughout the process rather than just at the end. I was surprised by how comfortable the students felt in posting their work for others to read and how much they appreciated being able to see the work of others and to benefit from other students' ideas and views.
"Wiki discussions helped me to read the discussions of different people and thus, increased my information on the topic and some new researches"

"Wiki is quite interesting and I found it is fun. I could learn more from other students' contribution….Wiki encouraged me to learn more because I would not have been reading this much unless I was required to contribute on wiki."
The ease of use of the technology was assisted by the high level of active support offered by the tutor especially at the beginning, although several students did comment that the main sources of difficulty were regarding the deletion of their work by other students and the accessibility of the wiki off campus.

Tutor reflection
Issues
Supervising the wiki was very time consuming, especially at the beginning with helping the students to familiarise themselves with the technology and helping them to correct deletions made in error. It did seem to be more difficult to access the wiki off campus, which caused a certain amount of anxiety.
The tutor had imagined that the students would use the wiki for collaborative writing, but given that they were being assessed on an individual basis, they were very keen to make individual contributions rather than to write collaboratively. This would make this type of assessment very onerous for a large group
Upfront planning with regard to the design of the wiki was very important and in hindsight some of the tasks could have been structured in a manner, which more clearly defined the requirements of the student contribution.

Benefits
The tutor did feel that the wiki gave the less confident and vocal members of the group a chance to contribute to discussions, but did question whether using the wiki actually improved the quality of the discussions and subsequent coursework and examination performance.
An unexpected benefit of using the wiki was that it enabled the identification of plagiarism issues and thus provided an opportunity to clarify the meaning of plagiarism with students without it unduly affecting the whole coursework grade. The wiki was also a good way of guiding the students with regard to correct academic referencing.
The students definitely welcomed the opportunity for ongoing feedback from the tutor and enjoyed the transparency that the wiki offered with regard to their work in relation to others' contributions.

Conclusions
Although the tutor felt that using a wiki involved a good deal of extra work, the tutor was very surprised by how much the students felt that they had benefitted from the wiki and by how positively they felt about their experience. The wiki will be used again on the same module but will be structured in a clearer way with stricter guidelines regarding contributions. Given the diverse nature of the students, individual contributions will still be assessed.
The future
Having used a wiki for the first time, the tutor feels more confident about using it again and hopes that having clearer ideas about how to structure tasks and contributions will mean that it will be less time consuming.
A group structure will still be used for contributions, but contributions will still be assessed on an individual and regular basis.
The initial topic tasks used in this first wiki were, in hindsight, a little ambitious and so less complex initial tasks will be designed, which will have clearer instructions regarding contributions.

Case 2.4 Foster students' learning autonomy
Context
Innovative processes like trying collaborative platforms (wikis) have the potential to impact both the target audience as well as those that administer the process. This was certainly the case for the tutor of the module of Business Economics level two and its students. The implementation of wikis within the coursework was motivated by three specific goals: to foster the students learning autonomy, to create a tool for revising for the exam, and to improve exam results from the previous year. Aiming to minimize the foreignness of the wiki application, it was adopted the wiki platform managed by the University of Hertfordshire –"StudyNet wiki" since the students were already familiar with the StudyNet.

Scenario
The cohort consisted of 111 students divided in seven groups. Each wiki group worked towards their coursework which consisted in five questions that were to be developed throughout the term. The questions were posted every second week usually after the lecture on the subject had been given. The deadline to answer the five

questions was placed in the last week of the term. This was so as some students were not registered in the module in the first few weeks and needed further time to catch up.

The students were asked to contribute (individually) with 300 words towards each question. The wiki coursework was worth 30% of the overall grade of the module. The individual contribution was counted in several different ways. Not only were they encouraged to discuss the main concepts and definitions related with the question, but they could also create glossaries, revise academic papers and create a list of authors and their seminal works. The students were given the choice of creating these per question, or in a page encapsulating the material of the five questions.

Throughout the term, the tutor had an active role in motivating the students to contribute without however participating in the wiki answers. The seminars were used to promote a discussion on the topic that was being developed in the wiki that week. In the middle of the term (fourth week) the tutor provided formative feedback on the wikis. This was an important exercise that motivated the students and also helped to identify who were the students that were not engaging.

Data

The data was collected in two distinctive ways: through a survey administered to the students, and through a set of reflective questions posted in the wiki pages. The rate of response of the questionnaire was around 30%. In contrast nearly all the students that participated in the wiki coursework provided an answer to the reflective questions. As a consequence the percentages found in the questionnaires may not reflect entirely the population of the students in this module.

The results of the questionnaire revealed that 82% of the students had never used wiki technology before, but this does not seem to have been an impediment since 84% thought the technology was easy to use and 77% reported that they did not experience problems when submitting their work. 53% found that the wiki had helped them to learn the subject, but the percentage rises to 74% when the students were asked whether they had learned from the reading and the reviewing of peer contributions. The survey further reveals that the 75% of the students did not find wikis fun and 70% would not have engaged with the wikis if it was not assessed coursework. Nevertheless 75% admitted to be comfortable in sharing their contributions with their peers, and 56% recommended the use of wikis for a second year.

From the reflective questions/answers there were a set of positive points and challenges there were compiled by the tutor:

- Wikis contributed for the clarification of the topics presented in the lecture both due to the individual research but also to the explanations /examples of the peers;
- Students recognise the synergy of working in group: some referring to “the help of thinking outside of the box” as they read each other’s contribution;
- Students learned from their peers both the content of the module as well as the IT skills they needed to post their contributions;
- Many students saw the wiki questions as a way of formative assessment, even though they did not received a mark for their answers until the end of the term. Students noted that they assessed their knowledge on a particular subject by their easiness to contribute;
- Students admitted to have developed their writing and their research skills;
- Students identified the wiki as being good to revise for the exam;
- Students admitted that because of the wiki coursework they had to revise early on;
- Students recognised that their contributions had improved as term progressed;
- Challenges pointed out by the students;
- Some student found the IT requirements a challenge in the beginning of the term;
- Some students would have liked to have met their peers more frequently so that they could divide better their work;
- Other students complained about the poor English of some of their colleagues;
- Some students admitted they did not know how to research;
- Many students point out the difficulty of adding to the question when some of the students had already started to answer; and
- One student pointed out that it was hard to monitor peers concerning plagiarism.

Evaluation

From the data collected there are clear indications that despite the challenges the students enjoyed a series of benefits from the implementation of the wikis.

The wiki coursework appears to be a prime example of peer learning, not only in regards to the IT skills needed to make the entries, but also in regards to the content of the entry. However the routine of answering the wiki

questions far from being an easy task demanded the students assess their knowledge of the topic and to develop an ability to express this knowledge in the form of written posts. Though the survey reveals a large percentage (75%) of students being comfortable with the task of posting, this task proved more difficult to certain students: those for whom English was not their mother tongue and those whose learning style was not reflected at all in a written format. Interestingly these students also have a greater difficulty in exams and standard coursework essays.
Somewhat related to the challenge of writing is plagiarism. Despite the consequences of plagiarism being made very clear at the outset, some groups still displayed copied material without references and/or quotation marks. Some other students however were very conscientious and used to contact the tutor expressing their frustration in their inability to monitor their peers. In an attempt to tackle the problem, one of the students posted a message to his colleagues (including other groups) asking his peers to refrain from committing the offence of plagiarism. His concern was sparked from his evaluation of the contributions posted in his group and my advice that plagiarism was not acceptable. This is a clear example of how some of the students took ownership of the content of their wiki pages.

Tutor reflection
Agreeing to use wiki technology involved a very steep learning curve that was constrained by the habitual limitations of time. Before support could be provided to students the tutor had to become confident in the use of wikis. In order to reduce the initial confusion about the new method of assessment guidelines were developed showing how the assessment was going to be done and included some of the most frequently asked questions. Finally for the first few weeks extra office hours were arranged to demonstrate how to write wiki pages.
A dual benefit was perceived in the use of wikis: on the one hand the wiki questions served as a teaching device in that the students were to research material that was not covered fully in the lecture. On the other hand the wikis served to revise the material covered in the lecture.
The greatest challenge in the use of wikis is to assess the academic quality. Difficulty to single out individual contributions from a group in the StudyNet wikis, made it extremely complicated to assess particular students, especially where the bulk of the students performed poorly and few students made relevant contributions. This was more of an issue of concern in the earlier postings. Wikis written towards the end of the term seem better written, which might be a reflection of an improvement in the skill of collaborative writing. The same grade was given to every individual of the group provided that there had been a contribution; this was done even though it might raise some issues of unfairness.
Finally in the motivation to adhere to this project clouded awareness of the main benefit of the use of wikis that wiki platforms foster the development of the skill of collaborative writing and such a skill is paramount for business students. Disregard of this benefit was not unique to the tutor as it was not highlighted by the students either.

Conclusion
Three measures of success were considered: the creation of a tool for exam revision, the improvement of student learning autonomy and the improvement exam results. The two first goals were successfully met. Judging by the feedback received from the students deep learning did occur, partly due to the autonomy that was given to the students to pursue their own learning (they could choose the format of their contribution). Regarding the third goal, there was neutral impact on the exam grades.

During the next academic year wikis will be implemented for a second time, taking note of comments and difficulties experienced the first time around. In the future smaller working groups will be used. Also a wiki platform will be used where the individual contribution will be more easily distinguished. The students will be motivated to develop collaborative writing skills early and to really work as a team even though they may never had the chance of meeting physically as a group (perhaps using email lists, or video conferencing).
Finally, the practice question will be made easier to answer to give the students confidence in posting their first contribution; this year the practice question was quite difficult and may have discouraged some students at the outset!

Case 2.5 Share reading and learning

Context
As wikis are increasingly being used in business to share knowledge, it was decided that using a wiki would be a good experience for students taking a level two module in Operational Research. The module is of a quantitative nature and in the past, students did very little reading around the subject. The aim of using a wiki for this module

was to encourage students to read more widely about Operational Research, share their learning with others on the module and also to learn wiki technology to enhance their employability.

Scenario
The Operational Research module consisted of 80 students, the majority of whom were full time students taking a Business, Joint Honours or Combined Studies degree, and living both on and off campus. Most students had chosen to take this module rather than it being a compulsory part of their degree. Students worked in self selected groups of four.

Each group of students were required to contribute to the wiki site each week by adding one glossary item, one literature review and two paragraphs on questions based on that week's lecture topic. They were also required to make two additional contributions on a further two specified topics during the semester. All topics were linked to the examination. The tutor took a passive role and did not contribute to the website but was active in advising students on how to upload information to the wiki, suggestions of appropriate content and clarifying requirements.
The wiki contributions accounted for 15% of the overall assessment for the module (overall coursework assessment was 30%). 5% was awarded for the weekly contributions and 10% awarded for the two additional contributions.

Data
Student feedback was obtained at the end of the module in two ways. Firstly, students were given 30 statements about using wikis and were asked to rate each statement from A to E. E.g. 'Using wikis was fun'. The response rate to the statements was almost 50%. Secondly, students were given the opportunity to contribute to an on-line questionnaire, 17 students responded to the questionnaire. Overall, the students' responses from the 30 statements were positive.

- 100% of the groups contributed to the wiki site.
- Over 80% found the wiki technology relatively easy to use, even though they were not familiar with the technology. The students were also very happy with the support given by the tutor.
- Over 70% students were comfortable making their contributions visible to others. The majority felt that the wiki had supported their learning.
- The less positive statements included
- 50% students did not enjoy using the wiki
- 40% did not recommend using the wiki next year
- 30% contradicted the statement that 'wiki supported me in preparing the coursework'
- The qualitative comments were also extremely positive and included:
- "I think it is a good way to be able to share work with people on the same module. It's useful to see the work done by other students as we are all learning the same subject and can learn from one another."
- "Wikis are useful to gather all relevant information for the course in one place".
- "Good source of information especially with difficult topics, as students can relate to work put up be other students".
- "Strongly suggest all modules had a similar set up".
- "Good experience and different teaching method gained my interest".
- "If I had to produce material of the form of wikis, I am now confident I would be able to adhere to all the basic needs".
- "It was a learning curve and challenging, so it was enjoyable and fun".
- "Helped develop team working skills such as delegate work between the group and the need to communicate clearly".

However, a few students requested more training at the beginning as they found using a wiki confusing to understand how to use the site. They also found it difficult, initially, to upload material on to the wiki site.

Evaluation
Overall, the majority of students appreciated being able to use other students' contributions to the wiki site, they enjoyed being able to learn from other students and thought it would be useful for revision. Some students enjoyed learning the technology as it gained their interest and would like to use wikis in the future:- "it's useful to see the work done by other students as we are all learning the same subject and can learn from one another".
The high level of contribution to the wiki site is no doubt linked to the fact that it formed part of their coursework. Students gained additional skills not directly related to using wikis, for example the need for clear

communication when delegating group activities, learning to adapt to new technology and overcoming challenges in life.
The main sources of difficulty, initially, included : the accessibility of the wiki off campus, the alleged removal of student work from the wiki site, the difficulty in uploading information, in particular pictures and files, on to the wiki site
In all cases, these difficulties were resolved. In a number of cases the results from the statements and the questionnaire are contradictory. For example, the majority of students responding to the questionnaire found using the wiki site fun and would like to use wikis again, but this was contradicted in the student responses to the statements.

Tutor reflection
Setting up the technology for group work proved challenging. For this reason, one of our student mentors was employed to help. This mentor had work experience in developing wiki pages and was a tremendous asset in getting started. The mentor had some good ideas on how the main page should be split into sections, he also helped set up student groups with simple user names and passwords, which meant that the initial passwords for all students were known which proved to be very useful.
Initially, the tutor intended to take an active role in using the wiki, but for various reasons this did not happen. Consequently, students were also passive in the way that they used the wikis. The students did submit their assessed work but did not comment or critique other students work.
Although, the tutor was disappointed with their own contribution, the feedback has shown that students still value the experience and have learnt many new skills. Feedback showed that they looked at what others had done and some of the international students used this extensively as another source of learning.
Initially, students found it difficult access the wiki off campus but by setting a direct link from the students StudyNet page (virtual learning environment) for this module, this problem was overcome.
One student changed modules as a result of her concern about using wiki technology

Conclusion
Although, the tutor was not actively contributing to the wiki site, the majority of students still seem to be quite positive about their experience. There are many less obvious benefits from getting students to use wikis, for example, being more confident in addressing new technology and developing skills for employability. Using the wiki technology is relatively easy for standard text but many students reported they had difficulty in uploading pictures, tables and formulae. In order to get the most out of using wikis as a form of collaborative learning, it is essential that the tutor continually interacts on the wiki site to clarify areas of confusion and direct student learning.

Case 2.6 Support distance learning

Context
There were two groups of students involved in distance / blended learning on a two semester Business Intelligence Online module delivered to final year computer science undergraduates. As part of the distance learning material there are a series of exercises which are either to read and summarise an article or to complete self assessment questions. Previously the students had done this and received comments by the email based discussion forums on the modules' website.
In order to be able to give better feedback and to initiate class discussions it was decided to make use of the wiki to enable a freer flow of material.

Scenario
The wiki was used as the first of four assignments . It counted for 5% of the overall assessment and the students were required to upload the completed tutorial work for any five tutorial assignments throughout the two semesters.
The students involved in this wiki exercise were distance and blended learning students. The distance learning students were across the globe whilst the blended learning students were based in the Caribbean and had access to a local tutor.

The first group were aware of the wiki exercise at the beginning of the two semester course whilst the Caribbean group only became aware of it towards the end of the course. These differences in timing may be at the root of some of the differences in responses to questions relating to tutor support and to relevance to the course. Most of the distance learning students chose to complete the assignment early in the first semester and thus most responses were for the early tutorials. The submissions from the Caribbean were of wider variety.

Data
Feedback was elicited using a questionnaire at the end of the module. There were 5 responses to the questionnaire from the (16) distance learning students and 15 from the (19) Caribbean based students. All the Caribbean students who completed the wiki assignment responded to the questionnaire.
Of the 16 distance learning students 12 completed the wiki assignment, but there were two additional students who completed the wiki assignment but did not complete any further work, they are not included in the 16.
The results relate to the overall scores for both groups whilst marked differences are highlighted at the relevant points, although generally the distance learning students were more positive that the Caribbean students.
The majority of students had some difficulty in logging on, accessing, saving and loading wiki pages, despite them being final year Computer Science students.
Most students thought that the technology was easy to use and to learn. But that the structure set by the tutor was not easy. They also thought that to use a wiki you needed to be computer literate.
Most had heard of wikis but had not used wiki technology before. In this context it is suspected that 'used wiki technology' was interpreted as meaning constructing wiki pages.
The support in using the wiki was just in favour of the tutor support being adequate. This was due to a combination of circumstances, firstly that the process of logging on to the wiki for students who are no where near the University is a two stage process which involves first logging on the VPN (secure Virtual Private Network) and then onto the wiki from StudyNet. Unfortunately you can also get onto StudyNet without using the VPN and this was the source of some confusion. The VPN connection is not necessarily of the highest speed when not in the UK and this lead to further connection problems. It has been discovered how difficult it is to provide satisfactory support at a distance, it being difficult to understand what the real problem is. Hopefully this will be resolved as the tutor in Trinidad (Ravi RAgoonath) has created an excellent guide to the process. The distance learning students found the tutor more helpful than the Caribbean students.

The majority of students found the use of the wiki helpful in understanding the course material. It was not found useful in helping with the other coursework, but it was not designed to do this.
Contributions to the wiki were generally made on an irregular basis with only five of the 20 respondents doing it regularly.
Most (12 of 20) would not have used the wiki had it not been linked to an assignment.
Most of the respondents think that the wiki should be continued in future years even though only a small majority (11 of 20) found it fun!

Evaluation
The students generally found that the use of the wiki added to their experience of the module. The wiki was only intended as a way of involving students in other peoples' work and to act as a display of work in much the same way that it would happen in a face to face tutorial.
In this sense it was success as it did lead to discussion of the work using the mechanism of the StudyNet discussion groups. As one would expect the students who came to do the work earlier in the module gained most from the discussions which often went on a great length.
These discussion groups enable points of misunderstanding to be cleared and facilitated a greater depth of learning than was evident from previous years when a wiki was not available.

Tutor reflection
The tutor now appreciates the difficulties in enabling students to perform tasks when you do not have face to face contact with them. The difficulties in having students login to a site using a VPN are not to be underestimated. There is a great need for a strong and obvious structure to be created on the wiki so that work cannot be accidentally erased or overwritten.
From the point of view of creating a discussion forum the wiki worked well and it provides cohesiveness and an additional point of contact for a group which is geographically dispersed.

Conclusion
The use of the wiki was generally speaking a success with most respondents being in favour of it continuation. The login process needs to be made more transparent and this would save a great deal of time for both the students and the tutor. Hopefully this has been dealt with by the guide provided by one of the Caribbean students.
The distance learning students were generally more positive than the Caribbean students this may be due to the lack of direct contact that they had with each other and with a tutor which made the exercise more relevant.

Appendix B Questionnaire

Use the OMR answer sheet provided to mark the answers to all questions. Answer each question with a, b, c, d or e using the following scale:
(a) Strongly Agree (b) Agree (c) Disagree (d) Strongly Disagree (e) Not Applicable

1. Login procedure was easy and always worked.
2. I had no problems accessing the wiki pages.
3. I had no problems saving (i.e. submitting) my work.
4. The time to load the pages was good.
5. Wiki technology was easy to use.
6. Wiki technology was easy to learn.
7. The structure/layout of the wiki pages set by tutor was clear and simple.
8. To use wiki the user must be computer literate.
9. I usually used the wiki on campus.
10. I have used the wiki technology before.
11. I have heard of the wiki technology before.
12. The instructions provided by tutor for using wiki were appropriate.
13. The support provided by tutor in using wiki was appropriate.
14. Wiki supported me in preparing the coursework.
15. Using wiki has helped in my learning of the subject.
16. On-line discussion topics for were interesting and appropriate.
17. Participation in on-line discussions has helped my learning.
18. Building wiki based module glossary has helped my learning.
19. Building wiki based module bibliography has helped my learning.
20. Reading & reviewing other students wiki contributions has helped my learning.
21. I have made regular weekly contributions on the module wiki.
22. Tutor feedback on my contributions have helped me in improving the overall quality of my work.
23. Other students reviews of my contributions have helped me in improving the overall quality of my work.
24. I was comfortable in making my contributions visible to other students.
25. Feedback provided by tutor and other students was fair and useful.
26. I would have used the wiki even if not directly linked to assessment.
27. I would recommend the use of the wiki in other Business School modules.
28. I would recommend the use of wiki for this module in the next academic year.
29. Wiki is a worthwhile supplement to StudyNet.
30. Using wiki was fun.

About the Author

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(C.15)

e-Learning in Nanotechnology

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Abstract

Nanotechnology promises many positive changes in medicine, environment, electronics or any other field. Further progress in this field strictly depends on availability of well educated specialists. At Rzeszow University this problem is of an increased importance because the Nanotechnology Center currently being under construction will be launched in 2010. To meet the forthcoming demand for nanotechnologists, we have to develop and implement relevant teaching strategies here and now. The most important matter to be taken into consideration while developing educational materials in nanotechnology is an exponential growth of new information. Additionally, the transition from generating new ideas to implementing those ideas in industry goes in an extremely accelerated manner in this area. This combination of multiple time-limiting factors makes e-learning the most efficient teaching strategy. We have used the e-learning potential to compile a laboratory course on nanostructure characterization. This is a very important component of a curriculum for nanoscience education because a correct and comprehensive measurement of nanostructure parameters critical to realizing its underlying physical ideas is as challenging as the development of nanostructure technology as even classic methods become specific when applying to nanostructures. Thus fundamentals of methods (scanning probe techniques, ion and photoelectron spectroscopy and electron microscopy) should be followed by application examples to explain students which method or a combination of methods is good for a particular experiment, how to plan the experiment and how to interpret results. For this reason we widely use web-based resources, both research and industrial, in the nanoscience educational materials. The use of Web-based resources as an effective tool to teach the future specialists are discussed.

Keywords: Nanotechnology, characterization, web-based resources, surface and interface science.

1. Introduction

The most simple definition of nanotechnology is the engineering with anything smaller than 100 nanometers with novel properties. In general the nanoscience is the integration of multiple disciplines, technologies, materials, and processes to enable the creation, assembly, measurement, or manipulation of things at the nano and molecular scales. Nanoscale science, engineering, and technology are enabling new materials, devices and integrated systems with great potential. If all the positive expectations of nanotechnology are realized, it will have the potential to become the leading technology for the coming decades. This requires continued research and accelerated innovation. Further progress in this field strictly depends on availability of well educated specialists. The most important matter to be taken into consideration while developing educational materials in nanotechnology is an exponential growth of new information. The fields of nanoscience and nanotechnology are broad and still exploratory, with connections to almost all disciplines and areas of relevance. In this communication we examine the training in the nanotechnology, which derives from microelectronics, surface and interface science, and focuses on fabrication of structures in silicon, carbon (for example, fullerenes and nanotubes), and other inorganic materials that will be, as we expect, one of the main direction of the evolution for the nanoelectronics.

2. General problems in Nanoscience education

The objectives posed by Nanoscience will be gained only provided that competent staff is trained. M.C. Roco, Senior Advisor for Nanotechnology of the National Science Foundation, believed "training people is a key component for long-term success", and foresaw a need for a multdisciplinary trained nanotechnology workforce in 2010-2015 of 900 000 in the USA, 400 000 in Europe, and about

2 million persons in total. He formulated a five-year goal of the NNI as ensuring access to the full range of nanoscale research facilities to 50% of US research institutions' faculty and students, while student access to education in nanoscale science and engineering is enabled in at least 25% of the research universities (Roco, 2001).

The response from European higher education institutions to the expressed need for nano-education focuses mainly on Masters courses, but other forms of education including short courses, formal PhD programs and undergraduate education programs are also available. More recently, vocational training courses in nanotechnology are also being discussed and developed. It is interesting that Judith Lightfeather, an American nano-education expert, claimed: "experts have estimated that future demands will require 15 trained technicians for each scientist in a nanotechnology manufacturing business" (Lighteather, 2005). European or international standards for good quality education in nanosciences and nanotechnology should be developed and initiatives taken for sharing best practices between professors and vocational trainers. The EU can stimulate this under the People programme in FP7 for university graduates funded by DG Research and the new Lifelong Learning programme funded by DG Education (2007-2013) (Ineke, 2008).

E-MRS is planning an "European Whitebook on Nano-Science Education" with contributions from scientists of diverse backgrounds and Disciplines presenting an overview of the state of the art in this existing fields from European and global (by IUMRS) international perspectives (Glasow, 2007).

By this time four leading research and educational institutions in Europe (Chalmers Tekniska Hцgskola, Sweden; Technische Universiteit Delft & Universiteit Leiden ,The Netherlands; Technische Universitдt Dresden Germany and Katholieke Universiteit Leuven, Belgium) propose a joint Erasmus Mundus Master Course entitled "Nanoscience and nanotechnology". The programme offered is an integrated program, with a strong research backbone and a very important international outreach. The objective of this course is to provide top quality multidisciplinary education in nanoscience and nanotechnology (Erasmus Mundus Master Nanoscience and Nanotechnology, 2008). However this does not mean that less known educational institutions are not able to train specialists for this field. E-learning is just right to ensure a high quality of education.

Presently a central problem is not how to locate a proper material in the Internet, but how to implement it in a right way. There are both general-purpose and specialized resources. The first to be referred to among general-purpose resources is NanoEd Resource Portal launched by NCLT (National Center for Learning and Teaching in Nanoscale Science and Engineering) available at http://www.nanoed.org/. The site is designed to both gather and disseminate information on nano-education related topics, including education research, nanoconcepts, teaching materials, seminars, and degree programs. The NCLT is the first national center for learning and teaching of nanoscale science and engineering education in the United States. The center was created in October 2004, through a National Science Foundation award of $15 million for five years. The mission of NCLT is to develop the next generation of leaders in nanoscale science and engineering teaching and learning. Its educational materials are addressed to science teachers and students in grades 7-12, college and university students and faculty, researchers, and post doc students. Additionally the National Science Foundation provided a five-year $20 million grant to the Nanoscale Informal Science Education (NISE) Network (http://qt.exploratorium.edu/nise-resources/) to bring researchers and informal science educators together to inform the public about nanoscience and technology.

However extensive materials relevant to our goal, i.e. teaching students to earn the BA and MA degree in nanotechnology, are developed by many university laboratories and analytical equipment producers and some examples of their web sites are discussed below.

3. Teaching the methods of investigation and characterization of nanostructures

Advances in fundamental nanoscience, design of new nano-materials, and ultimately manufacturing of new nanoscale products will all depend to a great degree on the capability to accurately and reproducibly measure properties and performance characteristics at the nanoscale. The revolution in nanoscale science and technology requires instrumentation for observation and metrology – we must be able to see and measure what we build. It is reasonable that though Richard Feynman challenged the scientific community to explore the "space at the bottom" since 1959, nanoscale R&D activities have been initiated on a full-scale only few years after Gerd Binnig and Heinrich Rohrer have invented the scanning tunneling microscope for seeing and touching

nanostructures on surfaces in 1981. Instrumentation and metrology have been identified by the U. S. National Nanotechnology Initiative (NNI) as one of a number of critical nanotechnology areas as they are both vital to the success and commercialization of nanotechnology.

However a number of methods used in nanostructures research has turned a hundred. Additionally, they are being improved and updated according to specific research goals. Therefore it is a primary task to select the most relevant methods to answer the purposes of research. Everybody goes his/her own way to the nanoscience guided by previous research experience, and a way we choose decides what we will do in a new field. We have been kept to the straight and narrow path leading from microelectronics to nanoelectronics - low dimensional structures, such as: quantum wells, quantum dots and super-lattices grown by MBE-technology. The Centre of Microelectronics and Nanotechnology in University of Rzeszow being under construction in the southern-eastern Poland will constitute the technology and research base for the BA and MA degree course with specialization: semiconductor microelectronics and nanoelectronics as well as for postgraduate course (PhD degree) and the main research projects will be concerning the growth, characterization and application of nanostructures based on II-VI semiconductors materials. This decides which methods we pay special attention, however students will be given an overview of basic instrumentation and metrology needs across all nanoscience and nanotechnology.

Over the past 30 to 40 years a wide range of surface and microanalytical techniques found an application in nanotechnology have evolved. Each technique has its own unique capabilities that are related to the particular physical interaction involved with that technique. With the exception of SPM/AFM, all of the techniques involve the interaction of some type of particle (electron, ion, or photon) with the sample material. Figure 1 illustrates schematic diagrams of the physical process involved in the analytical techniques given special attention, and in Figure 2 is a chart plotting detection sensitivity versus analytical spot size for these techniques. The physics of each particular interaction affect the limits of lateral resolution, depth resolution, and detection sensitivity for each technique. Understanding these interactions, and more importantly the limitations they impose on a technique, can be crucial when selecting an analytical technique for specific problems to be solved.

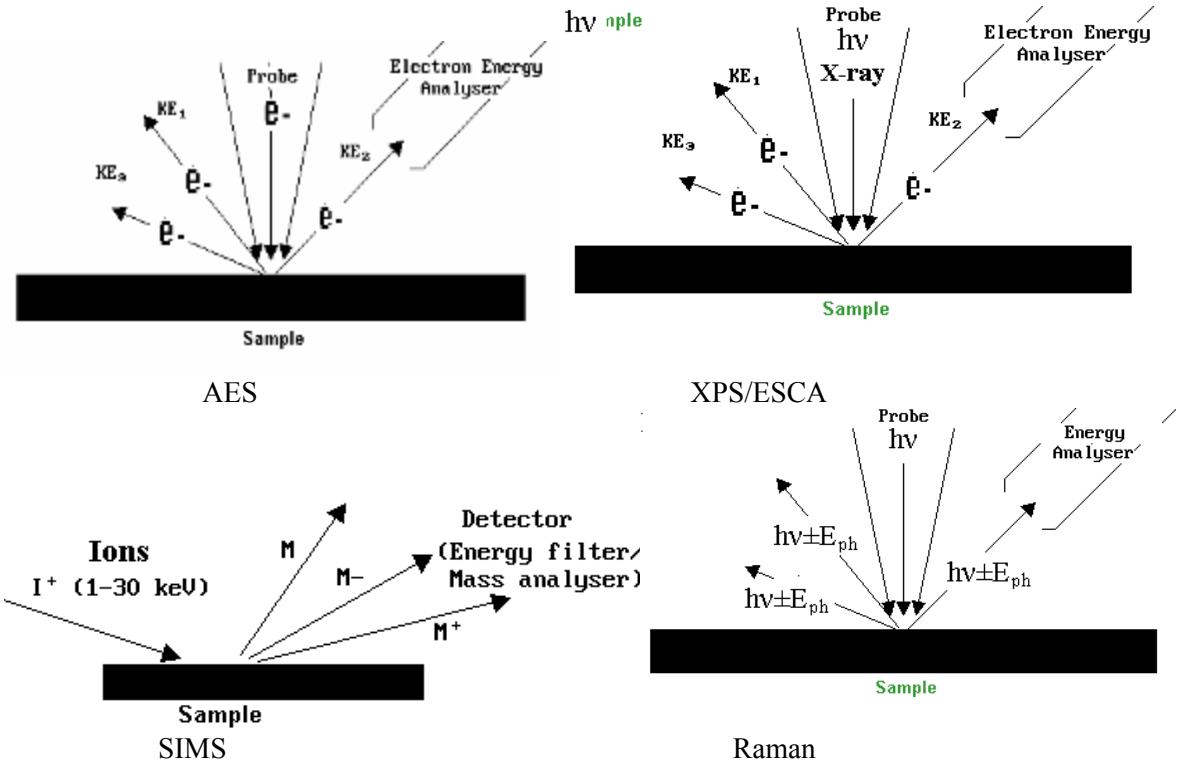

Figure 1: Physics of surface analysis techniques: AES -Auger Electron Spectroscopy; XPS/ESCA - X-Ray Photoelectron Spectroscopy/Electron Spectroscopy for Chemical Analysis; SIMS - Secondary Ion Mass Spectrometry; TOF-SIMS - Time-of-Flight Secondary Ion Mass Spectrometry; Raman - Raman Spectroscopy

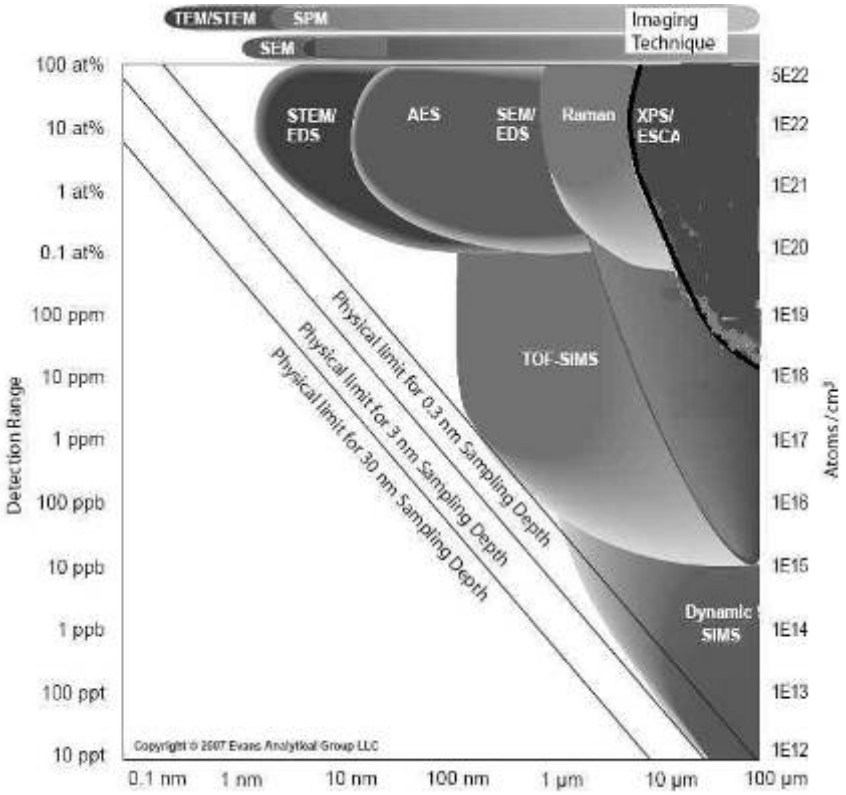

Figure 2: Detection (sensitivity) versus analytical spot size for different analytical techniques (from Evans Analytical Group - www.eag.com).

As it seen from Figure 2 two of the main parameters characterizing technique - the required spatial resolution and the sensitivity (detection limits) are strictly interconnected. One feature in Figure 2 of particular note is the "physical limit" lines shown in the lower left corner of the chart. These lines show the point at which a technique would be sampling a single atom of a given impurity.

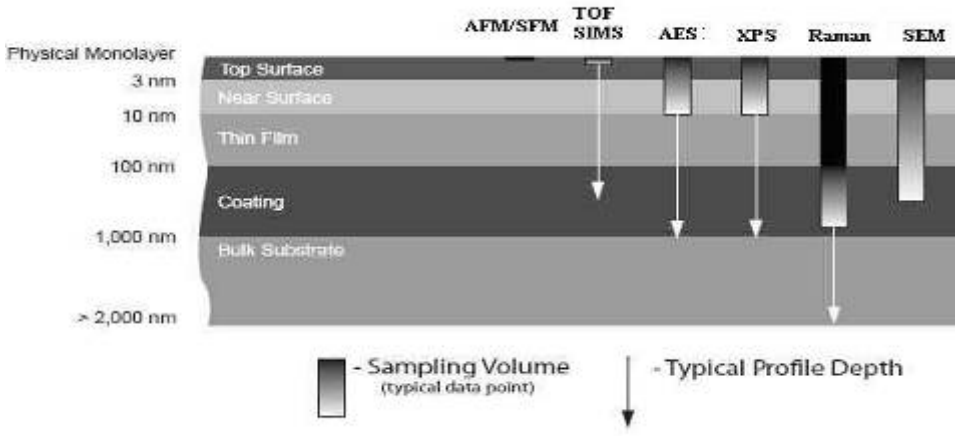

Figure 3: Sampling depth for different analytical techniques (from Evans Analytical Group - www.eag.com).

AES provides much higher spatial resolution than techniques, which use photons or ions to probe a sample. But X-ray and ion-beam offer unique advantages such as sensitivity to the chemical bonding state of assorted materials(XPS), organic structure (TOF-SIMS and Raman), or absolute concentration sensitivity (Dynamic SIMS). Each technique has a different sampling depth (Figure 3.), which sets the absolute depth resolution for that technique. AES, XPS/ESCA, and TXRF have a sampling depth of 30- 100E, making these techniques much more sensitive to surface contamination,

while TOF-SIMS has the shallowest sampling depth, measuring the top 1-3 atomic layers of material, approximately 10Å, on a sample.

All these techniques are the "classical" methods developed to surface analyses, however recently their main parameters have been substantially improved to keep pace with nanotechnology increase resolution.

Because nano-devices can operate on the level of a few molecules, or even a few atoms, accurate atomic-scale imaging is called for. The realm of nanoscale imaging belongs largely to electron microscopy and scanning-probe microscopy. Electron microscopy relies on the fact that electrons have much shorter wavelengths than visible-range photons and can thus resolve much finer details while maintaining a large depth of focus. Electron microscopy is now the most universal and *de facto* obligatory technique for atomic-scale structural characterization.

It is divided into two very different techniques: scanning electron microscopy (SEM), and transmission electron microscopy (TEM) (Figure 4). In SEM, a focused electron beam is scanned across a conductive surface, releasing secondary electrons that are collected by a detector placed above the object at an angle that determines the perspective view.

Magnification is changed by adjusting the size of the scanning area. Resolution ranges down to a couple of nanometers for the most-advanced tools-not fine enough to resolve atomic detail. Transmission electron microscopy takes a different approach: electrons are passed through the specimen, producing a shadow that is magnified by magnetic lenses and projected onto a sensing screen.

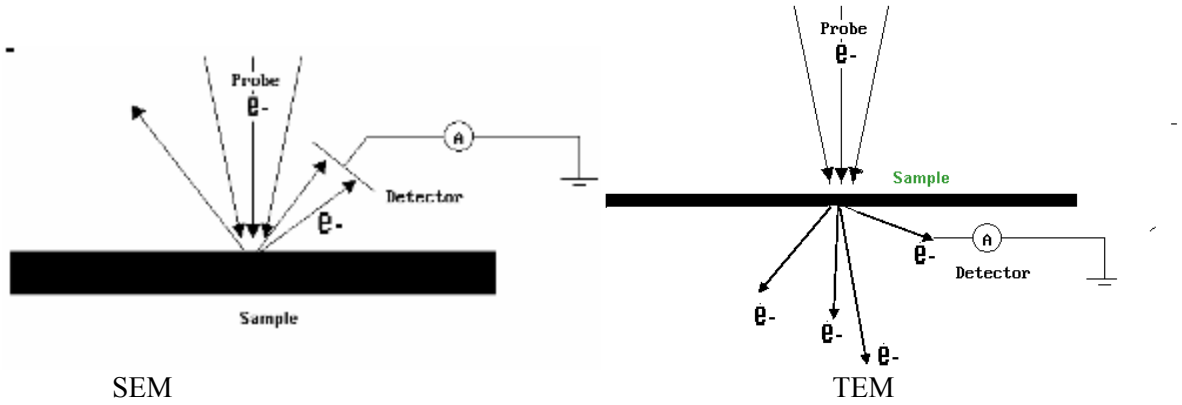

Figure 4: Physics of electron microscopy; SEM - Scanning Electron Microscopy; TEM - Transmission Electron Microscopy.

In scanning transmission electron microscopy (STEM), a variation of TEM, an electron spot is raster-scanned across the specimen and the secondary transmitted electrons detected. Magnification ranges up to 1 million, allowing the imaging of atomic lattices. High-resolution aberration-corrected electron microscopes (both TEM and STEM) already today can provide valuable measurements at the sub-Engstrom level. In general, resolution is accepted as the ability to determine if an image feature represents two objects rather than one. In high-resolution electron microscopy these objects are atoms.

Test samples with atoms separated by known amounts can be used to measure sub-Engstrom resolutions. Specimens with diamond cubic structures can be oriented to provide pairs of atoms in "dumbbell" configurations with well-characterized separations. Figure 5 shows image obtained at resolutions of 0.89E in the LBNL One-Engstrom Microscope (OEM) from some test samples with atoms separated by known amounts.

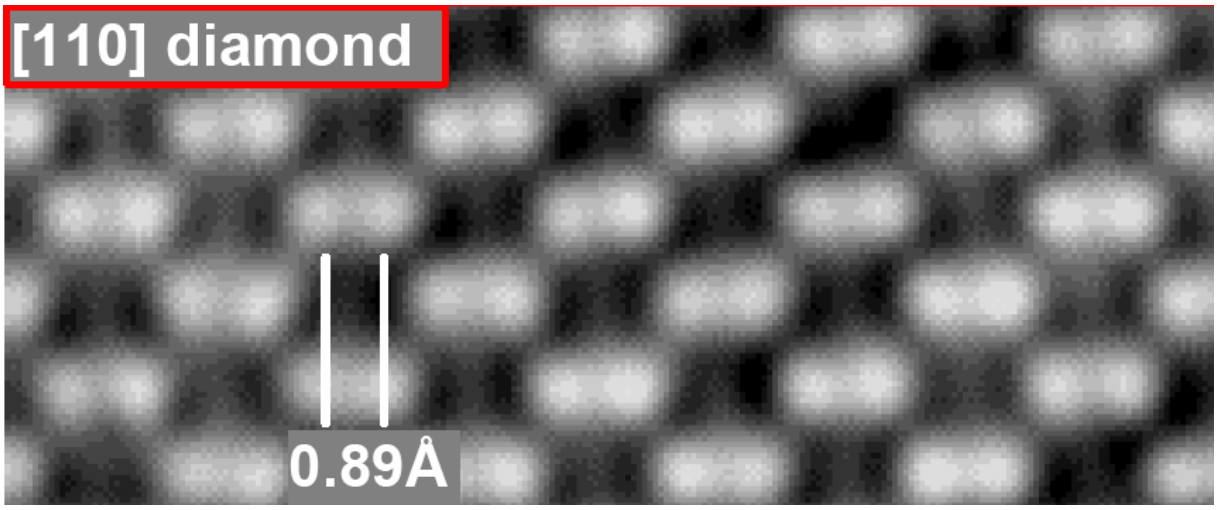

Figure 5: Images obtained on the OEM show the 0.89E carbon atom spacing in [110] diamond.(O'Keefe, M. A. & Allard, L. F. 2004).

Scanning probe microscopy (SPM) is a branch of microscopy that forms images of surfaces using a physical probe that scans the specimen (Figure 6). An image of the surface is obtained by mechanically moving the probe in a raster scan of the specimen, line by line, and recording the probe-surface interaction as a function of position. By using such a probe, researchers are no longer restrained by the wavelength of light or electrons. The resolution obtainable with this technique can resolve atoms.

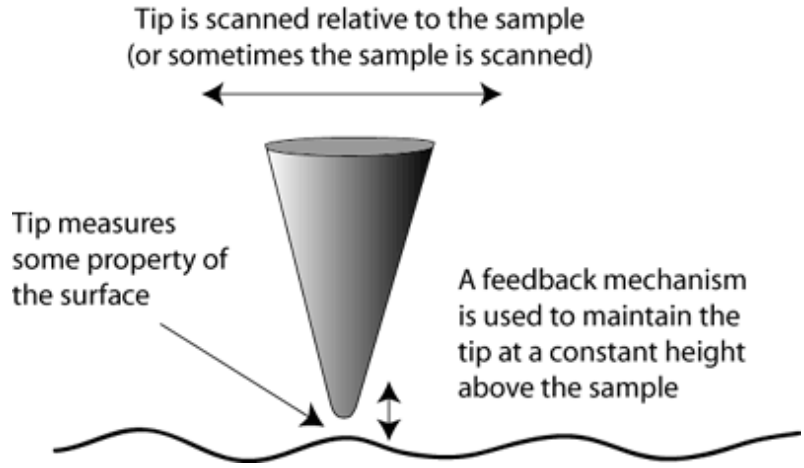

Figure 6: The principles of Scanning Probe Microscopy (www.wikipedia .org).

Scanning Probe Microscopy is a general term, used to describe a growing number of techniques that use a sharp probe to scan over a surface and measure some property of that surface. Some examples are STM (scanning tunneling microscopy), AFM (atomic force microscopy), and NSOM (Near-Field Scanning Optical Microscopy). Many scanning probe microscopes can image several interactions simultaneously. The manner of using these interactions to obtain an image is generally called a mode.

A useful list of excellent surface science lecture courses covering a wide range of levels from introductory to graduate level and each emphasizing different aspects of the subject is available on the UK Surface Analysis Forum (ttp://www.uksaf.org/tutorials.html). Evans Analytical Group has collected and presented on its web site(www.eag.com) extremely interesting materials on most known methods of surface characterization, their practical use and the interpretation of measurements results.

Interesting materials on specific techniques are posted on web-sites supported by producing companies, e.g. Kratos (www.kratos.com) provides materials on XPS, and Jeol (www.jeol.com) – on SEM and TEM.

Though in comparison with other methods SPM is a fairly new one, nevertheless there are extensive e-collections related to different aspects of those methods. We would like to emphasize some them. First of all – the James Madison University SPM Education website (http://spmeducation.virginiananotech.com/)- the clearinghouse for SPM experiments, techniques, labs and ideas that have been published in the scientific educational literature or developed by educators to be used primarily for educational purposes. As to SPM producing companies, NT-MDT Co. should be mentioned first and foremost (http://www.ntmdt.com). Nanoscience Instruments (http://www.nanoscience.com/) publishes the Nanoadvisor educational newsletter which offers reviews on nanoscience programs, funding, resources, and nano-teaching information.

4. Workshop outline for learning nanotechnology

The final stage of learning the methods are workshops which involve a thorough consideration of research articles. These articles are selected by teachers according to their instructional utility and are analyzed by students according to the following strategy.

h. Students' reading is controlled is a step-by-step manner when they are offered all parts of an article one after another.
i. An object of studies is analyzed, i.e. a method of fabrication, possible application, methods providing the most complete characterization. Students suggest a set of methods, the research purpose is discussed.
j. Methods used by authors are considered; specific equipment used in experiments are discussed with a focus on its potentials and limits; user manuals available from a producer or on a Web site are read. Students make assumptions regarding an outcome to be achieved if the selected methods are applied.
k. Sample preparation for the investigation methods are considered (i.e. ion beam milling, angle lap etc.). This stage is not always paid a proper attention. However it is this point that ensures correct findings, especially for nanostructures.
l. Results achieved with each specific method are analyzed with a focus on their completeness, reliability and informative capacity.
m. All results are considered as whole; authors' conclusions are discussed.
n. Directions of further studies are suggested. Two options are possible depending on a purpose of the research under discussion:
   - a purpose was to characterize a structure. Possible continuation may be additional studies with an extended set of methods,
   - a purpose was to study a particular phenomenon. Then the question is whether this structure is optimum to observe that phenomenon and, if it is not, which structure would be better. Answering the latter question requires not only the knowledge of research methods and nanostructure physics, but basic experience in materials science and technology as well.

Students' efficient work during the workshop is supported through continuous referring to different resources including not only common electronic tutorials developed at our university but mostly web-based resources, both research and industrial. The quality of students' learning depends on how accurate is teacher's selection of materials to be used at workshops. This requires that a teacher should make a great deal of pre-workshop arrangements.

5. References

Erasmus Mundus Master Nanoscience and Nanotechnology (2008), www.emm-nano.org/indexnano.htm.

Glasow, P. A.(2007) How should the Higher Education in Materials Sciences and Technology be performed in Europe. E-MRS.EU.Quest.29.08.07.doc.

Ineke, M. (2008) Nano-education from a European perspective, Journal of Physics: Conference Series,100, 1-7.

Lighteather, J. (2005). Nanoscience Education, challenges and opportunities Presentation at the Expert Group Meeting "North-South Dialogue on Nanotechnology, Challenges andOpportunities", held 10-12 February 2005 in Trieste.

O'Keefe, M. A. & Allard, L. F. (2004). *Sub-Engstrom Electron Microscopy for Sub-Engstrom Nano-Metrology* Instrumentation and Metrology for Nanotechnology, Gaithersburg, www.osti.gov/bridge/servlets/purl/821768-E3YVgN/native/821768.pdf .

Roco, M.C.(2001) International Strategy for Nanotechnology Research and Development, J. of Nanoparticle Research, 3, 353-360.

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(C.16)

General physics teaching in the context of the contemporary humanistic paradigm

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Abstract

The system approach is used to outline a strategy which can facilitate the solution of problems concerned with the crisis in education. First, according to the contemporary humanistic paradigm, we determined the factors being critical to the improvement and expansion of an educational environment. These are the hands-on science approach and the fundamental education concept. Second, we outlined a basis to improve the general physics curriculum, considering an experiment the principal factor in the educational technology of learning new integrated topics which cover key concepts, laws and theories. Problem-based teaching will play an important role as it allows thinking development through deconstructing a contradiction in the knowledge basis followed by resolving the contradiction. In this context, we systematized and structured the educational material combining different sections of the physics course and demonstrating its integrity. New experiments have been dev eloped and proper educational tools have been implemented. These are: "A device to demonstrate regularities of stochastic errors", "A device to study a velocity of the Earth's revolution on its axis", "An equipment to study mechanical oscillations of a pendulum", "A device to demonstrate oscillations of a spring pendulum", "A method and a device to study the motion of electrons in electric and magnetic fields", "A method to study properties of the light", "An equipment to study corpuscular and wave properties of electrons". Most experiments have a unique design and are carried out using original tools.

Keywords: Humanistic paradigm, personality-oriented education, general physics, integrated topic, fundamentals, educational experiment.

1. Key requirements of the humanistic paradigm: the hands-on science approach and the fundamentals-based education concept

Current problems in education and in teaching the general physics in particular cannot be solved without using the system approach and solving the key methodological problems related to the crisis of the traditional educational paradigm. This requires to change to the contemporary humanistic educational paradigm based the continuity of cognition and a situation of cognition. The new paradigm aims at arming students with creative skills which ensure further sustainable self-development and self-discipline; contribute to critical and logical understanding of specific situations; direct at solving specific problems the people and the society face; and teach how to live in cooperation with other people here and now under continuous changes.

Humanization of education has been being discussion for a long time. The sense of this concept implies a teacher's attitude to students based on a concern about their future careers and a respect to their dignity. Humanization of education enriches the context of education, transforms organizational forms and improve a level of students' satisfaction. Studies are to be considered not only as a prerequisite to a professional activity and mastering new knowledge and skills, but as a way of developing the contemporary scientific world view as well [1].

A personality-oriented education is also impossible out of humanization of education. The information communication should give proper weigh to students' educational background, capacities and other personal data. However it is difficult to combine these requirements with many technology-based trends in the social life such information-based economy or computer-based, virtual and distance education. Nevertheless the implementation of new instructional instruments makes the

education more effective, and at the same time shifts a focus on instrumental components that makes conditions for interpersonal communication within learning less favorable [2].

To be successful, the humanization of education requires that students are well motivated. The humanistic paradigm aims at bringing together the education and students' motivational needs, relaxing a contrast between students' expectations and an environment where real studies are carried out. The motivation as a system of external and internal factors determining a behavior of an individual includes:

- needs,
- causes,
- a goal,
- tasks,
- intentions,
- interests,
- inclinations.

But first of all the motivation is created by factors related to a practice and its structure. Thus, a curriculum should provide an advanced and flexible structure of activities in a field for students. These activities should occur in different forms to allow both students and teachers realize their potential and ensure freedom of opinion and behavior for both parties participating in the educational process.

Hence, the humanization in education is unlikely to achieve without implementing the activity-based approach. This approach have to provide not only a link between students' theoretical knowledge, practical skills and value orientations.

First of all it should be interpreted as a tool of stimulating students to play an active role in the educational process. Characteristic features of the approach are:

a. It considers an activity a universal and invariant way of a human development that allows transforming the knowledge to an ability to live in a complicated and changing environment;
b. Students master different skills of using the knowledge accumulated by the human in humanities, science and technology.
c. It applies methods of active learning and education that allows implementing the Dewey concept of knowledge self-correcting [3] to achieve learning both by one's own mistakes and successes.
d. A core of the approach is identity of study and discovery, and the knowledge is an ability to act.

Therefore, the problem-based teaching will play an important role in the educational process as it allows thinking development through deconstructing a contradiction in the knowledge basis followed by resolving the contradiction. Through solving problem situations, a student not only learns how-to-do in such cases but also makes conclusions which are his/her own theoretical generalizations.

So, the educational environment needs be transformed to meet current requirements in education. Now, during the information or knowledge age powerfully driven by IT, the knowledge-based education necessarily involves improving the fundamental basis. One of the reasons in that "the lack of the fundamental physical knowledge significantly limits effective learning IT and IT literacy in particular. Students depend on relevant physics information to be successful in mastering IT skills" [4]. However this does not mean only increasing an amount of traditional fundamental disciplines and physics or mathematics in particular in curricula. Since the fundamental knowledge are those presenting the most general laws, the fundamental-based education should refine a large amount of information to a limited number of core concepts. This strategy provides the knowledge of universal nature which allow students efficient working in any environment [5].

Though a theoretical basis of didactic integration is fairly elaborated [6, 7], an effective selection of fundamental components of knowledge is still a great challenge to educators [5].

2. General physics curriculum: problems, ways and principles of improvement

Instructional methods to teach physics are widely discussed in the literature with a focus placed on the necessity to update laboratory courses mostly based on out-of-date equipment and experimental works. However it is not enough to admit weak points in teaching general physics to exist, we also need to change traditional approaches.

The educational research does not sufficiently contribute to solving this problem because the humanitarian tradition prevails the science one in most of them. As a result, a process of developing the scientific thinking in students is still a difficult and ineffective one. This means only the data intensification when intrinsic mechanisms of instructional methods don't work. This kind of research does not further the transformation of scientific knowledge in educational knowledge. A long-standing structure of textbooks, laboratory manuals, teaching models and facilities is still in use. The content of education is represented as ready-to-use knowledge which should be understand and memorized. The main tool of translation is a text.

At the same time there is a lack of educational experiments which can illustrate key concepts in physics and demonstrate their inter-relations. This regards both classical and modern physics including the estimation of measurement errors, noninertial Earth frame of reference, electromagnetism theory by Faraday-Maxwell, special theory of relativity by Einstein, oscillation physics, quantum-mechanical ideas of atom physics.

Apparently, the current status of teaching physics with its insufficient level of implementing science-based principles, using visual methods, fundamentals and knowledge integration shows that students are unlikely to realize an integral physical [picture of the world.

The most recent changes in the educational paradigm should be implemented into the physics teaching content. We believe that:

- New educational experiments are to be developed to complement traditional ones available now;
- PC-assisted laboratory equipment can be introduced only provided that it makes sense;
- Virtual experiments as a substitute for real experiments will be a compulsory component of education.

However the innovation in education should deal not only with educational tools, but also with the content, the didactic structure and methods of presenting to students.

It is important to select those topics in the general physics which combine different concepts, theories and laws to form a cognitive object in integral topics. These topics are fragments of the physical picture of the world and will be supported by instructional experiments.

Equally important is that students don't memorize materials, but mine their knowledge through hands-on activities.

Taken as a whole, learning physics should teach students to solve both general-purpose and professional-oriented problems and should allow them developing adequate practical skills.

A cognition object in an integrated topic is a minimum single structural element of the science knowledge properly structured to represent various links between concepts and other knowledge elements.

In each integrated topic the knowledge will be structured as an increasingly complicating chain. The step-by-step formation of system thinking will be going on through doing a series of tasks each of which develops relevant learning activity.

Thus, new strategies of teaching integrated topics will be a kind of modular educational technologies. To that end the knowledge should be properly structured and formatted as a large-scale functional module, with relevant physical concepts, properties and links being outlined in each module.

A content of an integrated topic should be compiled so that to allow implementing the problem-based teaching, i.e. formulation of a problem, learning through solving a problem and discovery.

Experimental results will encourage students to ask problem questions, and while looking for answers to those questions they would apply the discovery learning method.

3. New educational kits for integrated topics

To ensure the better presentation of the physics course materials we developed new experiments students carry out with original devices using special guidelines. These are, for example:

- A device to demonstrate regularities of stochastic errors,
- A device to study a velocity of the Earth's revolution on its axis,
- An equipment to study mechanical oscillations of a pendulum,
- A device to demonstrate oscillations of a spring pendulum,
- A method and a device to study the motion of electrons in electric and magnetic fields,
- A method to study properties of the light,
- An equipment to study corpuscular and wave properties of electrons.

To illustrate our approach to improving the physics teaching we describe in details the following integrated topic.

4. "A spring pendulum and the electron charge" as an example of developing the integrated knowledge

The knowledge regarding the oscillation physics and electromagnetism is systemized, structured and linked to become a cognition object which is presented using visual and problem-based methods. The "Spring pendulum" device (Fig. 1) was developed and connected to a PC.

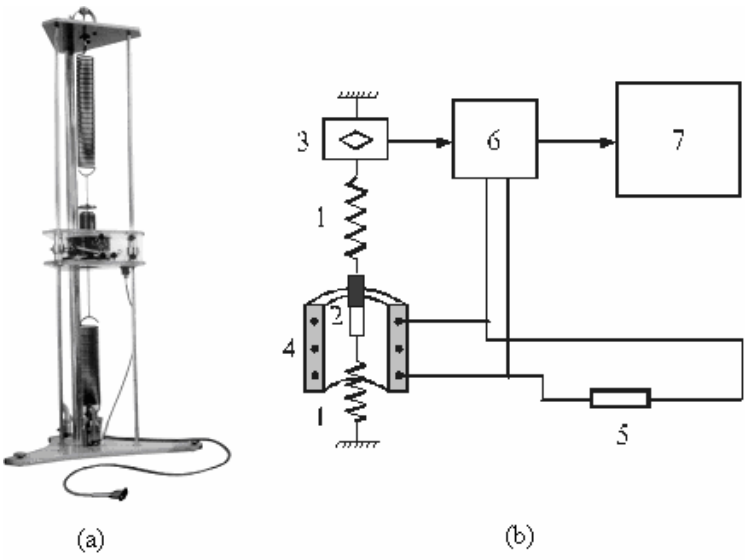

Figure 1: Educational equipment "Spring pendulum". General view (a). Functional scheme; (b): 1 – a spring; 2 – an oscillating body with different magnetic properties; 3 – an electrical dynamometer; 4 –an electrical coil; 5 - a set of resistors; 6 – an analog-to-digit converter; 7 – a computer. (Note: Viscous medium and braking plates are shown on Fig. 2d).

A series of educational experiments (Fig. 2) was developed. These experiments are structural components of six educational modules.

Learning starts from settling a paradoxical problem question, "How to determine the electron charge through exploring vertical oscillations of a spring pendulum?".

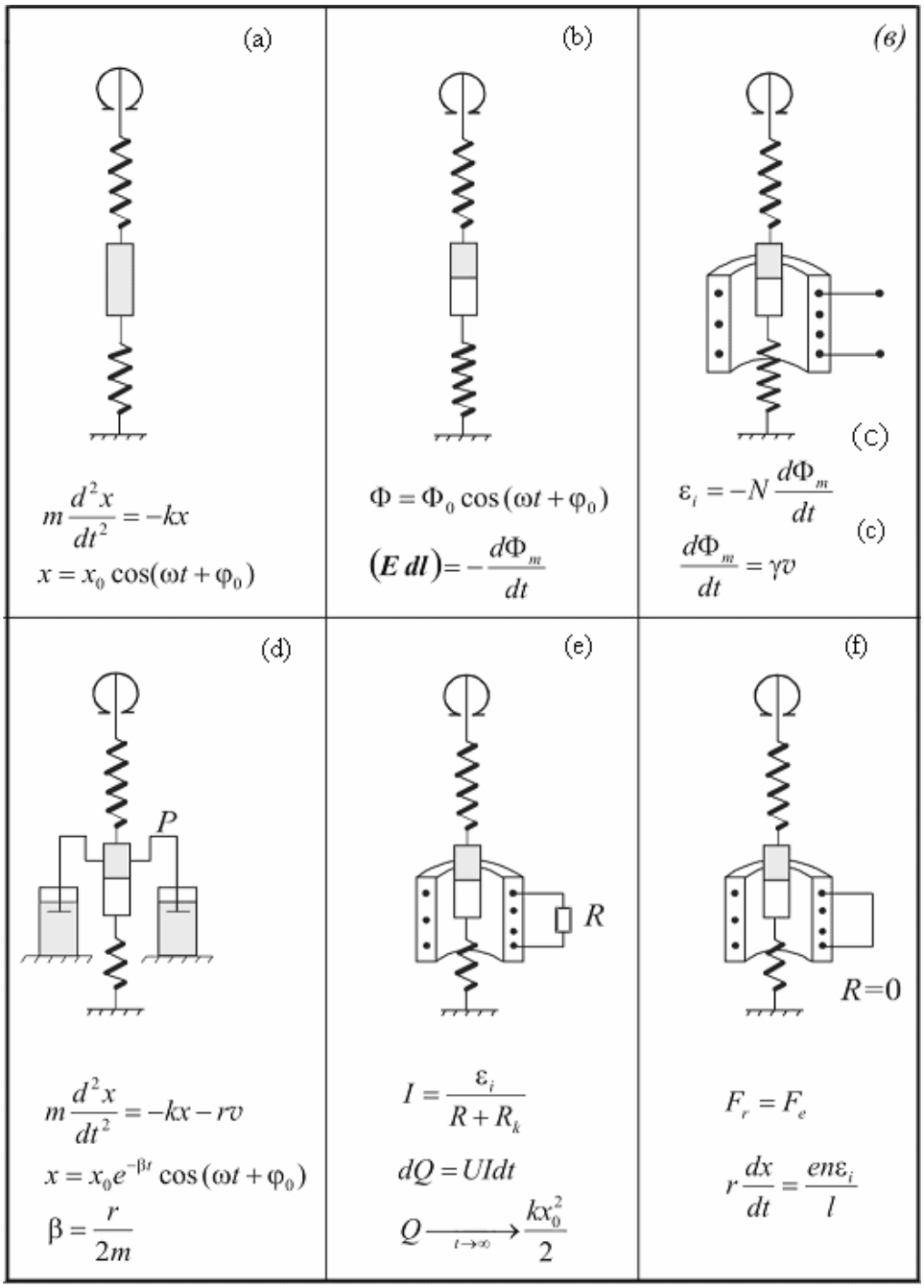

Figure 2: Components of devices for six experiments with a spring pendulum: m – a mass of an oscillating body маса; t – time; R – a resistor connecting coil turns; ω – cycle frequency; Φ_m – magnetic flow; $\boldsymbol{B}$ – a vector of magnetic induction; $\boldsymbol{E}$ – intensity of vortex electric field; R_k – resistance of coil turns; F_e – external force; F_r – brake force; e – electron charge; ε_i – e.m.f.; Q – heat; φ_0 – starting phase; γ – correlation coefficient; k – stiffness of springs; r – resistance coefficient; β – damping coefficient; n – a number of electrons; v – speed of a magnet; x – shift; x_0 – an oscillation amplitude; U – voltage; N – a number of coil turns.

Firstly, students make sure that mechanical oscillations of spring pendulums (Fig. 2a – Fig. 2c) do not depend on magnetic properties of an oscillating body. These oscillations are nearly harmonic that allows assuming that there is no mechanical braking in this oscillating system.

Additionally, it is important that the e.m.f. harmonic oscillations induced at winding ends of a coil with an oscillating ferromagnetic inside (Fig. 2c) have no influence on mechanical properties of this system.

The general scheme of the experiment is on the Figure 3.

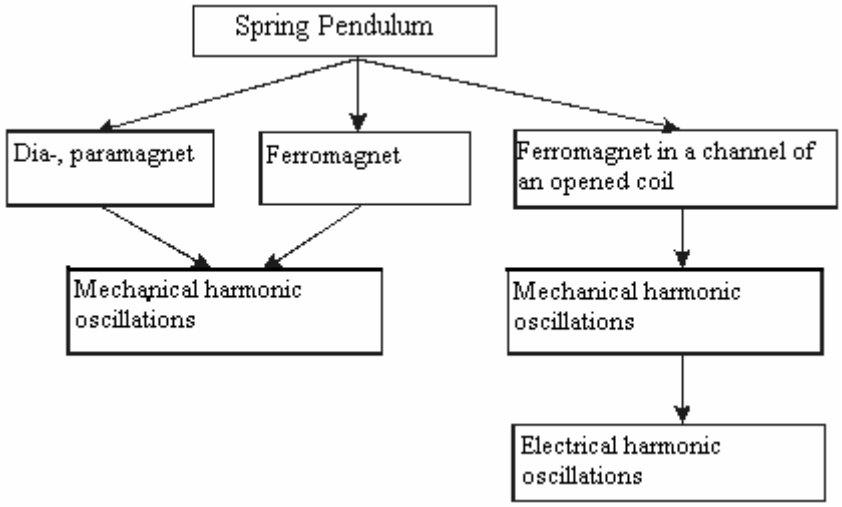

Figure 3: Study of harmonic oscillations.

Secondly, in the oscillating system (Fig. 2d) the damping of oscillations are caused by the resistance force of mechanical origin. Is it resulted from the viscosity of water.

Besides, oscillations are also getting damped when winding ends of an electrical coil with an oscillating permanent magnet inside (Fig. 2e – Fig. 2f) are connected by a resistor R or shorted.

However connecting the winding ends can't change the mechanical properties of the oscillating system. Hence the oscillation damping is caused by a force of non-mechanical origin.

Then what is a cause of breaking?

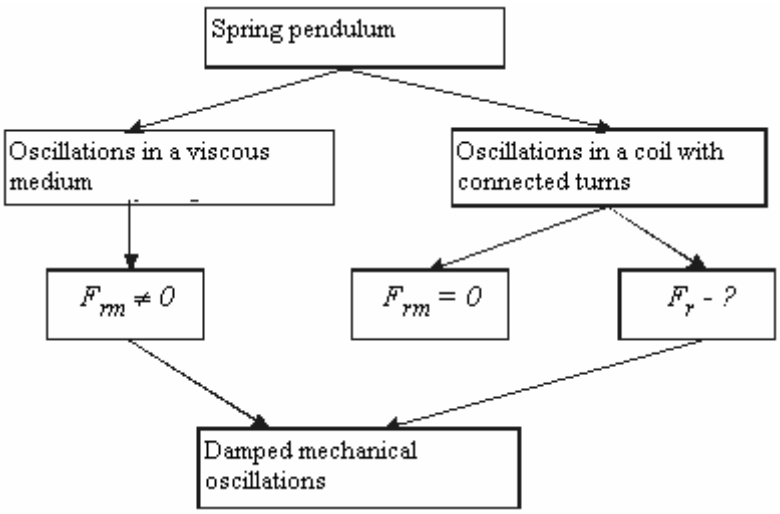

Figure 4: Study of damped oscillations.

According to the law of conservation of energy, connecting the winding ends by a resistor causes a current I to appear in a coil that, in its turn, is responsible for heat generation Q. For this reason the system loses its mechanical energy because it is not restored during oscillations that causes the oscillation damping.

Figure 4 summarizes the results of studied performed for all blocks. Now we have to interpret the cause of the oscillation damping in respect to dynamics.

Thirdly, during the analyses of what causes the brake force F_r and the electric force F_e which makes conductivity electrons in a copper wiring of the electric coil to move we can arrive at a conclusion that the force F_r is concerned with the force F_e: one involves another. Then we link these forces by parameters of the oscillating system and determine the charge of electron.

To conclude we would like to emphasize that the proposed approach to improve the general physics course is based on the humanistic paradigm. Its implementation meets the requirements of fundamentals-based education and activity-based learning, and helps students to mine physics knowledge and develop scientific thinking.

5. References

1. Ignatulin V. Humanistic paradigm in the science education // Alma mater (Vestnik vyshej shkoly). – 2005. – № 8. – P. 31-36 (in Russian).
2. Matvienko P.V., Ohienko S.O. About contemporary paradigms in higher education // Profesijna osvita. – 2002. – № 11. – P. 63-72 (in Ukrainian).
3. Dewey J. Reconstruction in Philosophy-Boston Beacon Press, 1957.-224 p.
4. Berezovska, I. B., Berchenko, N. N. The Role of Physics Knowledge in Learning IT. An Educator's View. Proceedings of the 3rd International Conference on Hands-on Science. Costa MF, Dorrío BV (Eds.); 2006 September 4-9; University of Minho; Braga, Portugal. 2006. P. 57-60.
5. Sydorenko V., Bilevych S. Fundamentals-based approach to vocational training as a priority in higher education in Ukraine // Vyshcha osvita v Ukraini. – 2004. – № 3. – P. 135-141 (in Ukrainian).
6. Lazarev M. System approach to the development of integrated technologies to study engineering courses // Neperervna profesijna osvita: teoriya i praktyka. – 2003. – № 1. – P. 69-78 (in Ukrainian).
7. Sadovnikov I. Fundamentals-based approach as a strategic direction in updating the context of higher education // Alma mater (Vestnik vyshej shkoly). – 2004. – № 10. – P. 29-30 (in Russian).
8. Oryshchyn Y.M. Theory and practice of the improvement of the general physics course through implementing educational experiments. Dissertation summary for PhD in Education / National Education University. – K., 2006. – 40 p. (in Ukrainian).

About the Authors

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(C.18)

Ahmed Al Hamad; Norlaily Yaacob; A. Y. Al-Zoubi; Asma Al Hamad, An Online Evaluation of a 'User Modelled' Personalized e-Learning Recommender System: The development of common standards and web-based delivery systems will help to support the rapid growth of online education and training. These systems usually include course material, assessment facilities, chat and conferencing software, and management tools for student administration and monitoring. Instructors should know how to evaluate e-learning systems. (Haughey and Anderson,1998) stated, "*evaluations in e-learning have tended to focus on the quality of the experience and its impact on collaborative learning and higher-level learning skills*". In general, when designing the evaluation, not only the assessment of the learning in the course is needed but also the assessment of its application in the workspace. one of the most important steps in carrying out a successful evaluation is choosing the right way to go about doing it. Evaluation can be obtained based on information gathered through several research methods such as questionnaire, interviews, surveys, etc. The researcher should choose the design, which is best suited to the question being considered on the study. Several techniques are currently used to evaluate recommender systems. These techniques involve off-line analysis using evaluation methods from machine learning and information retrieval. It is argued that while off-line analysis is useful, Student's satisfaction with a recommendation strategy can only be measured in an on-line context. The main aim of this paper will be to analyze and refine the results obtained after the development of the 'User Modelled' Personalized Recommender System "UMPERS" over A Learning Management System (LMS) available at the Arab Open University (AOU), Jordan. The evaluation of UMPERS will be done online for more general application to the adoption of e-learning systems by students. The evaluation process will depend on a comparison that will be made between students who participated in the study and those who did not, to measure the impact of applying the RS over e-learning environments in higher educational institutions in Jordan. The comparison will rely on the performance of the students in the GR100 course (their marks). Also the RS will be evaluated through the student's answers and results based on the questionnaires and online quizzes delivered to those who agree to participate on the study.

(C.19)

Evaluation of the Intelligent Classes in North Cyprus

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Abstract

As importance of technology has been realized by the administrators working for the ministry of Education, they have started being active by establishing smart classrooms to some schools since 2006. The request for innovation was from the top administrators, and 8 smart classrooms in Lefkosa Turk High School (in Lefkosa) and 7 smart classrooms in Namik Kemal High School (in Magosa) were first established as a start to this project for high schools. Similarly, industrial high schools were established smart classrooms in 2005-2006 academic year. The aim of establishing smart classrooms project is to make all administrators, teachers and students be familiar with technology.This project has been diffusing throughout secondary school from the beginning of 2007-2008.The Aim of the Research With efforts for reconstructing the education system of North Cyprus, it has been realized that there is a need to a new technology which will aid teachers and students mutually;therefore they have started using smart/intelligent classrooms in the vocational and secondary education.

Introduction

A school in education system is a bureaucratic place where systematic education has been done. Classes form cells of the school structure. There are varies of students in each class and teachers teach in these classes. Learning occurs with the interaction created in these classes.

Technologies have key roles to play in supporting new conditions of schooling. Well-designed technologies can deeply engage students in learning; can effectively support collaborative work and there are more complex interactions that are needed.

However, Matzen and Edmunds (2007) have indicated they have found a significant difference between usage of the technology and the constructivist learning environment. Initially, educational technology was used to describe only the limited number of equipment which was used at the classrooms. However, today it has been using widely for the environment, technological system and discipline, and related fields. These resources must be used in designing reformed schools.

The Aim of the Research

With efforts for reconstructing the education system of North Cyprus, it has been realized that there is a need to a new technology which will aid teachers and students mutually; therefore they have started using smart classrooms in the vocational and secondary education. The evaluation of smart classroom applications in North Cyprus is the aim of this study.

The research questions are as follows:

1. What are the distribution of the teachers and students with respect to the school type they teach/study, their gender, having been owning a computer at home, students' level of the classes, teachers' having been taking in-service trainings, teaching experience, having been used technology in their lessons before smart classrooms set up and how frequent smart classrooms are being used?
2. Is there a significant difference between frequency of using smart classrooms, type of school being taught or studied, gender, branch of study of the teachers, teaching experience, having been owning a computer at home and teachers' having been taking in-service trainings?
3. What is the distribution of the responses of the students in using smart classrooms with respect to school type and is there a significant difference between students' using smart classrooms and the school type they study?

4. What is the distribution of the responses of the teachers in using smart classrooms with respect to school type and is there a significant difference between teachers' using smart classrooms and the school type they teach?

Methodology-Research Design

The study describes what has been taken place in North Cyprus in relation to the smart classroom applications. After reviewing the literature, opinions of the school teachers and students are considered to be helpful in describing the application of smart classrooms. Teachers and students of two secondary schools, two high schools and two vocational schools are administered a questionnaire. In this respect, it is a casual comparative study.

Identification of the Population

The population of the study will be the teachers teaching at high schools and vocational high schools and students studying at 9^{th}., 10^{th}., and 11^{th}. grades in 2007-2008 academic year.

Sample

Samples of this study are randomly selected among two high schools and two vocational high schools. Teachers and students of these shools can evaluate smart classrooms because smart classrooms were first set up in these schools at TRNC. Ramdomly selected 200 teachers and 300 students constitute the samples of this study. Three of the schools are in Lefkosa and 1 of them is in Magosa. The number of questionnaires coming back by the teachers and the students can be seen in table 1. As it is revealed in table 1 that, 55 questionnaires by the high school teachers; and 43 questionnaires by the vocational high teachers were back. Also, 109 questionnaires by the high school students and 124 questionnaires by the vocational high school students were back.

Instrument

The instrument has been developed by the researcher. Questionnaires administered to teachers and students are not same totally. There are 20 items in the questionnaire of the teachers and 18 questions in the questionnaire of the students. First 18 questions are parallel with each other in teachers' and students' questionnaire. Last 2 questions of the teachers' questionnaire are different. Reliability analysis of the questionnaires show that, the Cronbach's alpha score is ,754 with the teachers' questionnaire and ,671 with the students' questionnaire. Kalayci (2005, p. 405) has emphasized that results have proven that the questionnaire is highly reliable.

Data Collection and Data Analysis Procedures

Data collection has been completed with the help of the teachers and the students of these schools.

Data are analyzed by using the SPSS 15. Frequency and percentages are used for analysing results of the teachers with respect to type of school, gender, having a computer, in-service training, and frequency of using smart classes, experience and usage of educational technology before using smart classrooms in class. Similarly, frequency and percentages are used for analysing the results by the students with respect to type of school, gender, level of class ve having a computer.

Frequency and percentages have been used to analyze the responses by the teachers with respect to type of school, gender, having a computer, in-service training, frequency of using smart classes and experience. Also, chi-square has been used to see whether there is a significant difference among relationship of using the smart classrooms with respect to type of school, gender, having a computer, in-service training, frequency of using the smart classrooms and experience. Results of the perceptions by the students and the teachers with respect to smart classrooms have been analyzed by using frequency and percentages. The significant differences have been analyzed by using chi-square.

Findings and Discussion

Frequency table of the dependent variables can be seen table 1.

Table 1: Frequency table of the dependent variables.

		Teacher		Student	
		Frequency	**Percent**	**Frequency**	**Percent**
Type of school	High school	55	56.1	109	46.8
	Vocational high school	43	43.9	124	53.2
Gender	Male	41	41.8	117	50.2
	Female	57	58.2	116	49.8
Level of class	9th. Grade	-	-	22	9.4
	10th. Grade	-	-	103	44.2
	11th. Grade	-	-	108	46.4
Having a computer	Yes	89	90.8	198	85.0
	No	9	9.2	35	15.0
In-service training	Yes	12	12.2	-	-
	No	86	87.8	-	-
Frequency of using smart classes	Every lesson	14	14.4	-	-
	Once a week	7	7.2	-	-
	Twice a week	8	8.2	-	-
	Once a month	4	4.1	-	-
	Twice a month	2	2.1	-	-
	Once per two months	3	3.1	-	-
	Once a year	5	5.2	-	-
	Never	54	55.7	-	-
Experience	5 years and below	14	14.3	-	-
	6-10 years	17	17.3	-	-
	11-15 years	29	29.6	-	-
	16-20 years	27	27.6	-	-
	21 years and above	11	11.2	-	-
Usage of educational technology before using smart classrooms in class	Yes	51	52.0	-	-
	No	36	36.7	-	-
	Missing System	11	11.2	-	-

As it is clear in table 1 that 56,1% of the teachers teach at high schools and 43,9% of them teach at vocational high schools. Similarly, 53,2% of the students are students of vocational high schools and 46,8% of them are studying in high schools. 58,2% of the participants are female teachers and 41,8% of them are male teachers. 49,8% of the students are female students and 50,2 % of them are males. 90,8% of the teachers have got computers at home, but 9,2 % of them do not own a computer at home. Benson and Mekolichick (2007) have revealed that faculty members who don't use digital technology may be seen as outdated by students with the accompanying student evaluation outcomes. Therefore, 90,8 % of the teachers' owning a computer and their high number of using computer is a positive sign for the Turkish Cypriot community.

Similarly, 85% of the students have got their own computers at home but 15 % of them do not have any computers at home. On the other hand, 87,8% of the teachers have indicated that they have not taken any teacher training course in relation to smart classrooms, but 12,2% of them took such kind of courses before. 55,7 % of the teachers never make use of smart classrooms in their lessons, but only 14,3 % of them make use of smart classrooms in their every lessons. Frequency on the usage of the smart classrooms shows that smart classrooms are not being used sufficiently. 14,3 % of the teachers have got 5 years and less teaching experience, 17,3 % of them have got 6-10 years of teaching experience, 29,6 % of them have got 11-15 years of teaching experience, 27,6 % of them have got 16-20 years of teaching experience and 11,2% of them have got 21 years and more teaching experience. Before smart classrooms, educational technology equipment such as overhead projectors and film-slides were used at schools. 52 % of the respondents have revealed that they were using these

equipment in their lessons, but 36,7% of them did not make use of them. However, 11,2% of the respondents did not answer this question. This shows that teachers were not using adequate educational technology in their classrooms in those times. Cabbar (1995) has found out that most of the teachers in Izmir province of Turkiye make use of traditional methods and traditional blackboard as teaching equipment in their lessons. Eroldogan (2007) has conducted a similar research and found out that most of the teachers prefer using books and smooth technologies such as blackboards. If materials are not ready and complete, teachers do not prefer using them. Uzunahmet (1996) has revealed that 98,4% of the teachers in TRNC education system like action type of movies, 97,6% of them do not prefer using film-slides and projectors, 93,7% of them do not like slides and projectors, 62,2% of them do not use fabric covered boards and equipments, 94,4% of them do not make use of overhead projector and its equipments, 99,2% of them do not prefer opauge projectors and 44,10% of them never make use of TV set and video in their lessons. Ozdemir (2000) have found out that teachers mostly make use of equipment such as overhead projectors, authentic equipments, models and scale models, signboards, pictures and photographs. They rarely make use of equipment such as computers, videos, TV sets and CD players. On the other hand, they never prefer using equipment such as slide projectors, film-strips, action films, opague projectors, data-show, report boards and fabric covered boards.

Li (2007) have found out that the teachers' attitude towards technology usage is negative since teachers have fear of being replaced by computers and this fear makes them not to use technology effectively. The results suggest that teachers' attitude towards technology uses in schools tends tobe negative, while student attitudes can be summarized as enthusiastic. Most importantly, the fearfulness of being replaced by computers contributes to the oversold, underused phenomenon.

Findings in relation to the the frequency of usage of the smart classrooms

Frequency and chi-square test results of teachers' using smart classrooms in terms of school type can be seen in table 2.

Table 2: Frequency and Chi-square test results of teachers' using smart classrooms in terms of school type.

Type of schools		**Frequency of usage**							
		Every class	Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Never
High School	F	9	3	8	2	1	2	5	25
	%	16.4	5.5	14.5	3.6	1.8	3.6	9.1	45.5
Vocational high school	F	5	4	0	2	1	1	0	29
	%	11.9	9.5	0	4.8	2.4	2.4	0	69.0
Total	F	14	7	8	4	2	3	5	54
	%	14.4	7.2	8.2	4.1	2.1	3.1	5.2	55.7

χ^2=13.414, sd= 2, p=.063

Results in table 2 have revealed that 45,5 % of the teachers teaching for the high schools never use smart classrooms in their lessons. On the other hand, 16,4% of them have indicated that they make use of smart classrooms in their every lesson. 5,5% of them make use of smart classrooms once a week, 14,5% of them prefer using smart classrooms twice a week, 3,6 % of them use these classes once a month, 1,8% of them plan their lessons with smart classrooms once a month, 3,6% of them use these classes once per two months and 9,1% prefer using these classes once a year. 69% of the teachers teaching at vocational high schools never make use of smart classrooms in their lessons. There is not any significant difference between high schools and vocational high schools in terms of frequency in usage [$\chi^2_{(7)}$=13.414, p>.05]. In other words, there is not any significant difference between frequency in usage and the school type. There is a need to have formal written classroom regulations for providing both shool types to use smart classrooms effectively such as Middle East Technical University's smart classroom regulations. With this kind of regulation, standards can be formed for smart classrooms and aim of the smart classrooms can be explained very well (METU Smart Classroom Usage Regulations, 2005).

Frequency and chi-square test results of teachers' using smart classrooms in terms of gender have been revealed in table 3.

Table 3: frequency and chi-square test results of teachers' using smart classrooms in terms of gender.

Gender		Frequency of usage							
		Every class	Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Never
Male	F	5	2	4	0	2	3	2	23
	%	12.2	4.9	9.8	0	4.9	7.3	4.9	56.1
Female	F	9	5	4	4	0	0	3	31
	%	16.1	8.9	7.1	7.1	0	0	5.4	55.4
Total	F	14	7	8	4	2	3	5	54
	%	14.4	8.2	8.2	4.1	2.1	3.1	5.2	55.7

χ^2=10.751, sd=7, p=.150

It is clear in table 3 that 56,1% of the male teachers and 55,4% of the female teachers never make use of smart classrooms in their studies. 12,2 % of the male teachers and 16,1 % of the female teachers make use of smart classrooms in their every lesson. 4,9% of male teachers make use of smart classrooms once a week whereas 8,9% of female teachers make use of these classes once a week. 9,8 % of male teachers and 7,1% of female teachers make use of smart classrooms twice a week. 7,1 % of female teachers make use of these classess once a month, but there is not any male teachers making use of these classes once a month. 4,9% of male teachers make use of these classes twice a month, but there is not any female teacher making use of these classes twice a month in their lessons. There is not female teacher making use of these classroom once per two months, but 7,3 % of the male teachers make use of these classes one time every two months. 4,9% of male teachers and 5,4% of female teachers make use of smart classrooms in their lessons one time per year. There is not any significant difference between female teachers and male teachers in terms of gender [$\chi^2_{(7)}$=10.751, p>.05]. In other words, there is not any significant difference between frequency of usage and gender. Eroldogan (2007) has emphasized that there is not any significant difference between teachers' usage of smooth technologies, internet-based technologies and audio-visual technologies in terms of gender. Dursun (1999) has indicated that there is a significant difference between teacher qualifications in teachers' using computer assisted technologies in terms of males. Isman, Yaratan and Caner (2007) have revealed that there is no significant difference about the integration of educational technology tools based on gender. Also, Isman (2002), have found as a result of his study, conducted in Sakarya province of Turkiye, that there is not any significant difference between teachers' making use of technology and their gender. Similarly, Bain and Rice (2006) have found out that gender differences of students in attitudes, perceptions, and uses of computers are not found to be significant.

Table 4: frequency and chi-square test results of teachers' using smart classrooms in terms of type of lessons.

Type of Lesson		Frequency of usage							
		Every class	Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Never
Teachers of vocational high school	f	3	1	-	-	1	1	-	21
	%	11.1	3.7	-	-	3.7	3.7	-	77.8
Teachers of social sciences	f	6	5	6	3	1	2	3	16
	%	14.3	11.9	14.3	7.1	2.4	4.8	7.1	38.1
Teachers of science and mathematics	f	1	1	-	-	-	-	-	8
	%	10.0	10.0	-	-	-	-	-	80.0
Teachers of fine arts and sports	f	-	-	-	-	-	-	-	5
	%	-	-	-	-	-	-	-	100
Teachers of language	f	4	-	2	1	-	-	1	4
	%	33.3	-	16.7	8.3	-	-	8.3	33.3
Total Total	f	14	7	8	4	2	3	4	54
	%	14.6	7.3	8.3	4.2	2.1	3.1	4.2	56.3

χ^2=30.269, sd=28, p=.350

Frequency and chi-square test results of teachers' using smart classrooms in terms of type of lesson teachers' teach can be seen in table 4.

As it is revealed in table 4 that, 77,8% of vocational high school teachers, 38, 1% of social sciences teachers, 80% of science and mathematics teachers, 100% of fine arts and sport teachers and 33,3% of language teachers never make use smart classrooms in their lessons. On the other hand, 11,1% of vocational high school teachers, 14,3% of social sciences teachers, 10% of science and mathematics teachers, 33,3% of language teachers make use of these classes in their every lesson. 3,7% of vocational high school teachers, 11,9% of social sciences teachers and 10% of science and mathematics teachers make use of smart classrooms once a week in their lessons. 14,3% of social sciences teachers and 16,7% of language teachers make use of these classrooms twice a week. 7,1% of social sciences teachers and 8,3% of language teachers make use of smart classrooms once a month in their studies. There is not any significant difference between teachers' frequency in using smart classrooms in terms of type of lesson they teach [$\chi^2_{(28)}$=30.269, p>.05]. In other words, there is not significant difference between how frequent the smart classrooms are used in terms of type of lesson the teachers' teach. Erden and Erden (2007) have investigated the perceptions of primary school teachers' perceptions with respect to their principals' technology leadership and have found out that technology leadership of the primary school principles is not at the sufficient level. This finding is a sign of the existing problems in relation to the technology usage at teaching and learning practices of the primary school principles and teachers at TRNC. Additionally, results of a National Survey of Schools and Teachers about teaching, learning and computing have shown that only 14% of English teachers, 12% of math teachers, 7% of science teachers, and 2% of social studies teachers in the USA taught in classrooms with a ratio of at least one computer for every four students enrolled (Becker, 2000).

Frequency and chi-square test results of teachers' using smart classrooms in terms of teaching experience they have can be seen in table 5.

Table 5: Frequency and chi-square test results of teachers' using smart classrooms in terms of their teaching experience

	Frequency of usage								
	Every class		Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Never
5 years and below	F	1	3	0	2	0	0	0	8
	%	7.1	21.4	0	14.3	0	0	0	57.1
6-10 years	F	5	1	1	2	1	1	0	6
	%	29.4	5.9	5.9	11.8	5.9	5.9	0	35.3
11-15 years	f	3	2	4	0	1	1	2	16
	%	10.3	6.9	13.8	0	3.4	3.4	6.9	55.2
16-20 years	f	4	0	2	0	0	1	2	17
	%	15.4	0	7.7	0	0	3.8	7.7	65.4
21 years and above	f	1	1	1	0	0	0	1	7
	%	9.1	9.1	9.1	0	0	0	9.1	63.6
Total	f	14	7	8	4	2	3	5	54
	%	14.4	7.2	8.2	4.1	2.1	3.1	5.2	55.7

χ^2=28.678, sd=28, p=.429

It can be clearly seen in table 5 that 57,1% of the teachers who have 5 years and less teaching experience, 35,3% of the teachers who have 6-10 years of experience, 55,2% of them who have 11-15 years of experience, 65,4% of them who have 16-20 years of teaching experience and 63,6% of them who have 21 years and more teaching experience never make use of smart classroom for their lessons. The most interesting point to emphasize here is the higher percentage by the teachers who are new in their profession. 7,1% of the teachers who have 5 years and less teaching experience, 29,4% of the teachers who have 6-10 years of teaching experience, 10,3% of the teachers who have 11-15 years of teaching experience, 15,4% of the teachers who have 16-20 years of teaching experience, and 9,1% of the teachers who have 21 years and more teaching experience make use of smart classrooms in their every lesson. 21,4% of the teachers who have 5 years and less teaching experience, 5,9% of the teachers who have 6-10 years of teaching experience, 6,9% of the teachers who have 11-15 years of teaching experience and 9,1 % of the teachers who have 21 years and more teaching experience make

use of smart classrooms once a week. 9,4% of the teachers who have 6-10 years of teaching experience, 10,3% of the teachers who have 11-15 years of experience, 15,4 % of the teachers who have 16-20 years of teaching experience, 9,1% of the teacher who have 21 years and more teaching experience make use of smart classroom twice a week. 14,3% of the teachers who have 5 years and less teaching experience and 11,8% of the teachers who have 6-10 years of teaching experience use smart classroom once a month. Similarly, 5,9% of the teachers who have 6-10 years of experience and 3,4% of them who have 11-15 years of teaching experience use smart classroom twice a month. Furthermore, 5,9% of them who have 6-10 years of experience, 3,4% of them who have 11-15% experience and 3,8% of them who have 16-20 years of teaching experience make use of smart classrooms two times in every two months. 6,9% of the teachers who have 11-15 years of teaching experience, 7,7% of them who have 16-20 years of teaching experience and 9,1% of them who have 21 years and more experience make use of smart classroom once a year in their lessons. There is not any significant difference between teachers' usage of smart classrooms in terms of teaching experience [$\chi^2_{(28)}$=28.678, p>.05]. In other words, there is not any significant difference between teachers' frequency of using smart classroom and their teaching experience. Eroldogan (2007) has found out that there is a significant difference between computer technologies and teaching experience. It is indicated in the same study that teachers who have 10 years and less teaching experience make much use of all kinds of technologies in their lessons. Dursun (1999) has revealed that there is a significant difference between teacher qualifications in which schools computer assisted education has taken place and teaching experience in which teachers who have 15 years and less teaching experience prefer computer assisted education. However, Isman, Yaratan and Caner (2007) found out that younger teachers use educational technology tools more than the older teachers. However, Isman (2002) in his research at Sakarya province of Turkiye has found out that there is not any significant difference between teachers' usage of educational technology and their teaching experience.

Frequency and chi-square test results of teachers' using smart classrooms in terms of owning a computer can be seen in table 6.

Table 6: frequency and chi-square test results of teachers' using smart classrooms in terms of owning a computer.

		Frequency of Usage							
		Every class	Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Never
I have a computer	F	13	7	7	3	2	3	5	48
	%	14.8	8.0	8.0	3.4	2.3	3.4	5.7	54.5
I do not have a computer	F	1	0	1	1	0	0	0	6
	%	11.1	0	11.1	11.1	0	0	0	66.7
Total	F	14	7	8	4	2	3	5	54
	%	14.4	8.2	8.2	4.1	2.1	3.1	5.2	55.7

χ^2=3.303, sd=7, p=.856

It is revelaed in table 6 that 54,5 % of the teachers who have their own computer, never use computers; on the other hand, 66,72% of them who have not got a computer never use computers. 14,8% of the teachers who have a computer, use smart classroom for their every lesson, whereas 11,1% of the teachers who have not got a computer use smart classroom for their every lesson. The proportion of teachers who have a computer, using smart classrooms once a week is 8%. The proportion of teachers who have a computer, using smart classroom twice a week is 8% whereas those who do not have a computer and use these classrooms twice a week has 11,1% proportion. The proportion of teachers who have a computer, making use of these classroom once a month is 3,4%, whereas those who do not have a computer and make use of these classroom once a month has 11,1% proportion. The proportion of teachers who own a computer and use smart classroom two times a month, is 2,3% and those who own a computer and use smart classroom once per two month, is 3,4. Similarly, the proportion of teachers who own a computer and use these classrooms once a year is 5,7%. There is not any significant difference among the frequency of usage in terms of having a

computer at home [$\chi^2_{(7)}$=3.303, p>.05]. In other words, there is not any significant difference between how frequent teachers using the smart classroom and their owning a computer.

Frequency and chi-square test results of teachers' using smart classrooms in terms of in-service training can be seen in table 7.

Table 7: Frequency and Chi-square test results of teachers' using smart classrooms in terms of in-service training.

	Frequency of usage								
	Every class		Once a week	Twice a week	Once a month	Twice a month	Once every two months	Once a month	Neve r
Yes	F	3	2	0	1	0	0	2	3
	%	27.3	18.2	0	9.1	0	0	18.2	27.3
No	F	11	5	8	3	2	3	3	51
	%	12.8	5.8	9.3	3.5	2.3	3.5	3.5	59.3
Total	F	14	7	8	4	2	3	5	54
	%	14.4	8.2	8.2	4.1	2.1	3.1	5.2	55.7

χ^2=11.771, sd=7, p=.108

Table 7 clearly shows that 27,3% of the teachers who have taken an in-service training regarding the usage of smart classrooms, never use these classrooms in their lessons whereas those who have not taken any in-service training in relation to the usage of these classroom use them at 59,3% proportion. 27,3 % of the teachers who have taken in-service training make use of these classroom in their every lesson, whereas 12,8% of the teachers who have not taken any in-service course regarding the usage of smart classroom make use of these classroom in their every lesson. The proportion of teachers who have taken in-service training and make use of these classes once a week is 18,2% whereas the proportion of those who have not taken in-service training but make use of these classroom is 5,8%. The proportion of teachers who have not taken any in-service training and make use of these classroom twice a week is 9,3%. The proportion of teachers who have taken in-service training and make use of these classrooms once a month is 9,1% whereas those who have not taken any in-serive training but using these classroom once a month is 3,5%. The proportion of teachers who have not taken any in-service training but make use of these classroom is 2,3%, whereas the proportion of those who have not taken any in-service training course but using them two times per two months is 3,5%. The proportion of teachers who have taken in-service training and make use of these classrooms per year is 18,2% whereas the proportion of teachers who have not taken any in-service training but make use of these classroom per year is 3,5%. There is any significant difference among the frequency of teachers' usage in terms of taking in-service training [$\chi^2_{(7)}$=3.303, p>.05].

In other words, there is not any significant difference between using these classrooms by the teachers and taking in-service training course. This result shows that the relation between taking in-service training and frequency of using smat classrooms is quite low. Seminars and/or in-service trainings are conducted by the authorities of the firm who set up the smart classrooms to the schools and/or by the computer teachers of that specific school for the teachers of that specific school. I believe that these seminars and/or in-serive training course should be conducted regularly because technology is chagining rapidly and continuously, and authorities of the firm as well as the computer teachers of the schools need to supply the latest information to the teachers. However, Wilson and Notar, 2003, p. 702) conducted a research and found out a significant difference between using technology and in-service training.

Similarly, another research conducted by Lewin and Wadmany (2006) has shown that during the three-year period of teaching and learning in a technology-based environment, changes occurred in the beliefs and educational practices of all the participant teachers. These researchers show that technology and in-service training are interrelated to each other.Silman and Gundogdu (2007) have conducted a research about the usage of the computers in the TRNC education system and found out that the teachers in the TRNC schools believed in the benefits of computers in education.

This finding is a proof that the teachers have got positive attitudes towards using computers. By conducting in-service trainings to support these positive attitudes of the teachers, frequency of using smart classrooms can be increased among the teachers. Coklar, Kilicer and Odabasi (2007) suggest that in-service trainings should not provide only how to use the technology but also technopedagogical approach should be considered. Teachers need to be provided to integrate pedagogy and technology to each other with the technopedagogical approach.

Perceptions of the students in relation to the smart classrooms with respect to school type

Chi-square test results and responses of the students using smart classrooms in terms of school type can be seen in table 8.

There are significant differences among students' responses in terms of school type in nine questions. However, there are not significant differences among students' responses in terms of school type at the remaining nine questions.

Table 8: Chi-square test results and reponses of the students using smart classrooms in terms of school type

	Type of school	yes		no		partial		$\chi 2$
		F	%	f	%	f	%	
1. I am well aware that there are smart classrooms in my school.	High school	98	89.9	4	3.7	7	6.4	8.976
	Vocational high school	97	78.9	19	15.4	7	5.7	*P*=.011
	Total	195	84.1	23	9.9	14	6	
2. Smart classrooms are introduced to the students at my school.	High school	47	43.5	40	37	21	19.4	3.819
	Vocational high school	48	39.3	59	48.4	15	12.3	*P*=.148
	Total	95	41.3	99	43	36	15.7	
3. Lessons are conducted at smart classrooms.	High school	91	83.5	4	3.7	14	12.8	13.997
	Vocational high school	78	62.9	19	15.3	27	21.8	*P*=.001
	Total	169	72.5	23	9.9	41	17.6	
4. Smart classrooms are convenient to technology.	High school	90	82.6	3	2.8	16	14.7	7.650
	Vocational high school	88	71.5	15	12.2	20	16.3	*P*=.022
	Total	178	76.7	18	7.8	36	15.5	
5. Hardware of the smart classrooms is sufficient for conducting lessons actively.	High school	64	58.7	9	8.3	36	33	6.128
	Vocational high school	63	51.6	24	19.7	35	28.7	*P*=.047
	Total	127	55	33	14.3	71	30.7	
6. Lessons conducted at smart classsroms are more productive.	High school	78	72.2	7	6.5	23	21.3	6.129
	Vocational high school	72	58.1	18	14.5	34	27.4	*P*=.047
	Total	150	64.7	25	10.8	57	24.6	
7. Teachers conduct their lessons much better in smart classrooms.	High school	69	63.3	13	11.9	27	24.8	1.611
	Vocational high school	72	58.5	22	17.9	29	23.6	*P*=.447
	Total	141	60.8	35	15.1	56	24.1	
8. Lessons conducted at smart classrooms are more comprehensive.	High school	69	63.9	14	13	25	23.1	3.204
	Vocational high school	69	55.6	27	21.8	28	22.6	*P*=.202
	Total	138	59.5	41	17.7	53	22.8	
9. Smart classroms are boring.	High school	11	10.2	88	81.5	9	8.3	15.783
	Vocational high school	27	21.8	71	57.3	26	21	*P*=.000
	Total	38	16.4	159	68.5	35	15.1	
10. Smart classrooms enhance student participation to lessons.	High school	60	55	18	16.5	31	28.4	.911
	Vocational high school	70	56.9	15	12.2	38	30.9	*P*=.634
	Total	130	56	33	14.2	69	29.7	
11. Knowledge on the screen (visual knowledge) facilitates recalling.	High school	84	77.1	7	6.4	18	16.5	6.963
	Vocational high school	86	69.4	22	17.7	16	12.9	*P*=.031
	Total	170	73	29	12.4	34	14.6	
12. It creates trouble to change classroom in order to go to smart classrooms	High school	53	48.6	45	41.3	11	10.1	4.466
	Vocational high school	47	37.9	54	43.5	23	18.5	*P*=.107
	Total	100	42.9	99	42.5	34	14.6	
13. I have an opportunity to take note in smart classrooms.	High school	84	77.	11	10.1	14	12.8	6.971
	Vocational high school	76	61.3	18	14.5	30	24.2	*P*=.032
	Total	160	68.7	29	12.4	44	18.9	

14. Our communication with the teachers is better in smart classrooms.	High school	64	58.7	17	15.6	28	25.7	.982
	Vocational high school	65	52.4	21	16.9	38	30.6	*P*=.611
	Total	129	55.4	38	16.3	66	28.3	
15. Atmosphere in the smart classrooms is more convenient for listening to the lesson.	High school	81	74.3	4	3.7	24	22	6.315
	Vocational high school	84	67.7	16	12.9	24	19.4	*P*=.043
	Total	165	70.8	20	8.6	48	20.6	
16. I prefer classes to be conducted at smart classroms.	High school	72	66.1	15	13.8	22	20.2	3.815
	Vocational high school	68	54.8	28	22.6	28	22.6	*P*=.148
	Total	140	60.1	43	18.5	50	21.5	
17. Teachers make use of the same methods while they are teaching at the ordinary classes and smart classes.	High school	22	20.2	56	51.4	31	28.4	4.168
	Vocational high school	37	29.8	63	50.8	24	19.4	*P*=.124
	Total	59	25.3	119	51.1	55	23.5	
18. Teachers have the same roles while teaching at ordinary classes and smart classes.	High school	64	58.7	21	19.3	24	22	3.106
	Vocational high school	62	50	36	29	26	21	*P*=.206
	Total	126	54.1	57	24.5	50	21.5	

It is revealed in question number 1 that 89,9% of the students studying at high schools are aware that there are smart classrooms in their school, whereas 6,4% of them partially aware about the existence of smart classrooms. However, 3,7% of them are not aware the existence of the smart classrooms. On the other hand, 78,9% of the vocational high school students are aware that there are smart classrooms in their schools. 5,7% of them are partially aware the existence of the smart classroom, whereas 15,4% of them are not aware that there are smart classrooms in their schools. If we look at the totals, we see that 84,1 % of the students are aware of the existence of the smart classrooms at their schools, whereas 6% of them partially aware that there are smart classrooms in their schools. However, 9,9% of the students are not aware the existence of the smart classrooms in their shools. There is a significant difference among the responses of the students in terms of school type [$\chi^2_{(2)}$=8.976, p<.05]. In other words, there is a significant difference between the students who are and are not aware of the existence of the smart classroom in their schools and the type of the school they study. Percentages and frequency results prove that high schools are more aware the existence of these classess in their schools. Smart classrooms are set up before at the vocational high schools than at the high schools. However, students of vocational high schools are not well informed about the existence of these classrooms in their schools.

Results shown question number 2 have revealed that 43,5% of the students studying at high schools reveal that smart classrooms are introduced to them. 19,4% of the high school students claim that smart classrooms are partially introduced to them whereas 37% of them say that smart classrooms never introduced to the students in their schools. Similarly, 39,3% of the vocational high school students reveal that smart classrooms are introduced to them in their schools, whereas 12,3% of them claim that smart classrooms are partially introduced to them. However, nearly half of the vocational high school students (48,4%) have emphasized that smart classrooms are not introduced to them. Total results have revelaed that 41,3% of the students are introduced smart classroom in their classrooms whereas 15,7% of them have indicated that smart classrooms are partially introduced in their schools. On the other hand, 43% of them have mentioned that they are not introduced smart classrooms in their schools. There is not any significant difference among the responses of the students in terms of school type they study [$\chi^2_{(2)}$=3.819, p>.05]. In other words, there is not a significant difference between the students who are and are not introduced the smart classrooms in their schools and the type of the school they study.

83,5% of the students studying in high schools have claimed that their lessons are conducted at smart classrooms. 12,8% of them say that teachers partially do their lessons in the smart classrooms whereas 3,7% of them emphasize that none of their lessons are conducted at the smart classrooms. Similarly, more than half of the students (62,9%) studying in vocational high schools have claimed that their lessons are conducted at smart classrooms. 21,8% of vocational school students have revealed that they partially use smart classrooms for their lessons whereas 15,3% of them have

mentioned that they do not use smart classrooms in their lessons. Total results have shown that 72,5% of the students have indicated that their lessons are conducted at smart classrooms whereas 17,6% of them have emphasized that their lessons are partly conducted at these classrooms. On the other hand, 9,9% of them have revealed that none of their lessons are conducted at smart classrooms. There is a significant difference among the students' responses to the question about the usage smart classrooms for conducting lessons in terms of school type [$\chi^2_{(2)}$=13.997, p<.05]. In other words, there is a significant difference between the responses on whether smart classrooms are used for conducting lessons or not and the school type the respondents study (question number 3).

Results have shown in question number 4 that more than half of the students (82,6%) studying in high schools think that smart classrooms in their schools are convenient to the technology whereas 14,7% of them believe that these classes are partly convenient to the technological innovations. However, 2,8% of them emphasize that smart classroom are not convenient to the technology. Similarly, more than half of the students studying in vocational high schools (71,5%) think that smart classroom in their schools are convenient to the technology whereas 16,3% of them believe that these classrooms are partly convenient to the technology. On the contrary, 12,2% of these students think that the smart classrooms in their schools are not convenient to the technology. Total results have revealed that more that 76,7% of the students believe that the smart classrooms in their schools are convenient to the technology whereas 16,3% of them think that these classrooms in their schools are partially convenient to the technology. On the other hand, 7,8% of these students have revelaed that smart classrooms in their schools are not convenient to the technology. There is a significant difference among the responses of the students in terms of school type [$\chi^2_{(2)}$=7.650, p<.05]. In other words, there is a significant difference between students' responses on whether technology is convenient to the technology and school type they study.

Results in question number 5 have revealed that more than half (58,%) of the high school students think that hardware of the smart classrooms are sufficient for conducting lessons whereas 33% of them believe that hardware of these classrooms are partially sufficient for conducting lessons. On the contrary, 8,3% of these students think that hardware of smart classrooms are not suitable for conducting lessons. More than half of the vocational high school students (51,6%) indicate that hardware of the smart classrooms are sufficient for conducting lessons whereas 28,7% of them think that hardware of these classrooms are partially sufficient for conducting lessons. However, 19,7% of the vocational high students think that hardware of these classrooms are not sufficient for conducting lessons. As total results show, 55% of the students believe that hardware of the smart classrooms are sufficient for conducting lessons in these classess whereas 30,7% of them think that hardware of these classrooms are partially sufficient for conducting lessons. On the other hand, 14,3% of the students indicate that hardware of these classrooms are not sufficient for conduting lessons there. There is a significant difference among the respondents's responses in terms of school type [$\chi^2_{(2)}$=6.128, p<.05]. In other words, there is a significant difference between the responses given to the question whether hardware of the smart classrooms are sufficient for conducting lessons or not and school type the students study.

Results of question number 6 have shown that, 72,2% of the high school students think that lessons conducted at smart classrooms are more productive whereas 21,3% of them believe that lessons conducted at these classrooms are partly productive. However, 6,5% of them indicate that lessons conducted at these classrooms are not productive. More than half of the vocational school students (58,1%) emphasize that lessons conducted at smart classrooms are more productive whereas 27,4%) of these students believe that lessons conducted at these classrooms are partly more productive. On the contrary, 14,5% of them say that lessons conducted at these classrooms are not more productive than their regular classrooms. Total scores indicate that 64,7% of the students believe that lessons conducted at smart classrooms are more productive. 24,6% of these students say that lessons conducted at these classrooms are partially more productive whereas 10,8% of them think that lessons at smart classrooms are not more productive than their regular classrooms. There is a significant difference among the respondents' responses in terms of school type [$\chi^2_{(2)}$=6.129, p<.05]. In other words, there is a significant difference between the responses given to the question whether lessons conducted at smart classrooms are more productive than the regular classrooms and school type the students study.

Results of question number 7 have revealed that more than half of the students studying in high schools (63,3%) think that their teachers conduct lessons much better in smart classrooms. 24,8% of them believe that that their teachers conduct lessons partly better than in smart classrooms whereas 11,9% of them think that their teachers do not conduct much better lessons in smart classrooms. 58,5% of the students studying at vocational high schools think that their teachers conduct lessons much better in smart classrooms whereas 23,6% of them believe that their teachers conduct lessons partially better than in smart classrooms. However, 15,1% of these students claim that their teachers do not conduct lessons much better in smart classrooms. Total results reveal that 60,8% of the students believe that their teachers conduct lessons much better in smart classrooms. 24,1% of them think that their teachers conduct lessons partly better than in smart classrooms whereas 15,1% of them emphasize that their teachers do not conduct much better lessons in smart classrooms. There is not any significant difference among the responses in terms of school type [$\chi^2_{(2)}$=1.611, p>.05]. In other words, there is not any significant difference between the responses of the students to the question whether teachers conduct much better lessons in smart classrooms or not and school type.

It is clearly revealed by the results of question number 8 that 69,3% of the students studying in high schools think that lessons conducted at smart classroom are more comprehensive. 23,1% of them believe that lessons conducted at smart classroom are partially more comprehensive whereas 13 % of them emphasize that lessons conducted at smart classroom are not more comprehensive. More than half of the students (55,6%) studying at vocational high schools believe that lessons conducted at smart classrooms are more comprehensive. 22,6% of the students reveal that their lessons conducted at smart classroom are partially comprehensive whereas 21,8% of the students believe that lessons conducted at smart classroom are not comprehensive. Total results emphasize that 59,5% of the students think that lessons conducted at smart classrooms are more comprehensive. 22,8% of them believe that lessons conducted at smart classroom are partially comprehensive whereas 17,7% claim that lessons conducted at smart classrooms are not comprehensive. There is not any significant relationship among the responses of the students in terms of school type [$\chi^2_{(2)}$=3.204, p>.05]. In other words, there is not any significant difference between the students' responses to the question whether lessons conducted at smart classrooms are more comprehensive or not and the school type. However, Barnard (2002) has found out in a study that 45% of the students learn better through smart classrooms; in other words, using the smart classrooms have enhanced student learning.

It is clearly stated in question number 9 that 10,2% of the students studying in high schools have indicated that smart classrooms are boring. 8,3% of the high school students have partially found smart classrooms boring whereas 81,5% of them have not found these classes boring. Similarly, 21,8% of the students studying in vocational schools believe that smart classrooms are boring whereas 21% of them say that these classes partially boring. However, more than half of the students (57,3%) reveal that smart classrooms are not boring. If we look at the total results, we see that 16,4 % of the students find smart classrooms boring whereas 15,1% of them believe that smart classrooms are partially boring. On the other hand, more than half of the respondent students (68,5%) have revealed that smart classrooms are not boring. There is a significant difference among the responses of the students in terms of school type they study [$\chi^2_{(2)}$=15.783, p<.05]. In other words, there is a significant difference between the responses of the students to the question whether smart classrooms are boring or not and the type of the school they study.

It is clear by the results of question numer 10 that, 55% of the students studying in high schools have claimed that smart classrooms enhance student participation to lessons. 28,4% of them think that the smart classrooms partially enhance student participation to lessons whereas 16,5 % of them belive that they do not have much opportunities to take part in the lesson. Similarly, 59,9% of the vocational high school students think that smart classrooms enhance their participation to lessons. 30,9% of them believe that these classrooms partially enhance student participation to lessons whereas 12,2% of them think that they do not have much opprortunities to take part in the lesson. Total results reveal that 56% of the students think that smart classrooms enhance students participation whereas 29,7% of them believe that these classrooms partially enhance student participation to lessons. However, 14,2% of te students say that they do not have much opportunities to participate to lessons. There is not any significant difference among the responses of the students in relation to the school type [$\chi^2_{(2)}$= .911, p>.05]. In other words, there is not any significant difference between the responses to the question whether smart classrooms enhance student participation or not and the type of the school they attend.

Barnard (2002) has found out in a research that 58% of the students believe that using the smart classrooms enhances student attendance to the lessons.

Results by question number 11 have emphasized that, 77,1% of the students studying in high school think that knowledge on the screen (visual knowledge) facilitates recalling whereas 16,5% of them believe that visual knowledge partially facilitates recalling. However, 6,4% of them reveal that knowledge on the screen does not facilitate recalling. 69,4% of the vocational high school students emphasize that visual knowledge facilitates recalling whereas 12,9% of them think that visual knowledge partially facilitates recalling. On the contrary, 17,7% of the students say that visual knowledge does not facilitate recalling. Total results of the students reveal that 73% of the students think that knowledge on the screen (visual knowledge) facilitates recalling whereas 14,6% of them believe that visual knowledge partially facilitates recalling. On the other hand, 12,4% of the students do not believe the importance of the visual knowledge. There is a significant difference among the responses to this question in relation to the school type [$\chi^2_{(2)}$=6.963, p<.05]. In other words, there is a significant difference between the responses of the participants to the question where knowledge on the screen (visual knowledge) facilitates recalling and the schools type the respondents study.

Results in item number 12 have revealed that nearly half of the high school students (48,6%) believe that changing their traditional classroom for going to the smart classroom is a trouble whereas 10,1% of them think that it partially creates trouble to change classroom in order to go to the smart classroom. On the other hand, nearly half of the students (41,3%) emphasize that it does not create any trouble to change classroom in order to go to the smart classroom. 37,9% of the vocational high school students think that it creates trouble to change classroom in order to go to smart classrooms whereas 18,5% of them believe that it partially creates trouble to change classroom to go to the smart classroom. However, 43,5% of them think that it does not create any trouble to change classroom to go to the smart classroom. Total results reveal that 42,9% of them think that it creates trouble to change classroom to go to the smart classroom whereas 14,9% of them believe that it partially creates trouble. On the contrary, 42,5% of them emphasize that it does not create any trouble to change their traditional classroom for going to the smart classroom. There is not any significant difference among the responses and the school type [$\chi^2_{(2)}$=4.466, p>.05]. There is not any significant difference between the responses of the students to the question whether it creates trouble to change classroom to go to the smart classroom and school type.

It can be clearly seen by the results of question number 13 that, 77% of the high school students indicate that they have opportunities to take note while they are in smart classrooms. 12,8% of these students believe that they have partially opportunities to take note whereas 10,1% of them claim that they do not have any opportunities to take note while they are studying at smart classrooms. More than half of the students (61,3%) studying at vocational high schools emhphasize that they have opportunities to take notes at smart classrooms whereas 24,2% of them claim that they have partially have opportunities to take notes at smart classrooms. On the contrary, 14,5% of them think that they do not have any opportunities to take notes at smart classrooms. Total results reveal that 68,7% of the students claim that they have opportunities to take notes at smart classrooms. 18,9% of them indicate that they partially have opportunities take notes at smart classrooms whereas 12,4% of them claim they do not have any opportunities to take notes at smart classrooms. There is a significant difference among the responses given to this question in terms of school type [$\chi^2_{(2)}$=6.971, p<.05]. In other words, there is a significant difference between the students's responses to the question whether students have many opportunities to take notes at smart classrooms and school type.

Results of question number 14 have revealed that, 58,7% of the students studying at high schools have good communication with their teachers in smart classrooms. 25,7% of them indicate their communication with their teachers at smart classrooms are partially better in smart classrooms whereas 15,6% them reveal that their communication is not better at smart classrooms. More than half of the students (52,4%) of the students studying at vocational high schools indicate that they have better communication with their teachers at smart classrooms. 30,6% of them think that they have partially better communication with their teachers at smart classrooms whereas 16,9% of them indicate that they do not have better communication with their teachers at smart classrooms. Total results reveal that 55,4% of them indicate that they have better communication with their teachers at smart classrooms. 28,5% of them think that they have partially better communication with their teachers at smart classrooms whereas 16,3% of them think that they do not have better communication with their

teachersr at smart classrooms. There is not any significant relationship among the responses given to this questions in terms of school type [$\chi^2_{(2)}$=.982, p>.05]. In other words, there is not any significant difference between responses given by the students to the question whether they have better communication with their teachers at smart classrooms and the school type they study. 74,3% of the high school students think that atmosphere in the smart classrooms is more convenient for listening to the lesson whereas 22% of them believe that tmosphere in the smart classrooms is partially convenient for listening to the lesson. On the contrary, 3,7% of them reveal that atmosphere in the smart classrooms is not convenient for listening to the lesson. 67,7% of the vocational high school students think that atmosphere in the smart classrooms is more convenient for listening to the lesson whereas 19,4% of them indicate that atmosphere in the smart classrooms is partially convenient for listening to the lesson. However, 12,9 % of them reveal that atmosphere in the smart classrooms is not convenient for listening to the lesson. Total results reveal that 70,8% of the students think that atmosphere in the smart classrooms is more convenient for listening to the lesson. 20,6% of the students think that atmosphere in the smart classrooms is partially convenient for listening to the lesson whereas 8,6% of them believe that atmosphere in the smart classrooms is not convenient for listening to the lesson. There is a significant difference among the responses in terms of school type [$\chi^2_{(2)}$=6.315, p<.05]. In other words, there is a significant difference between the responses of the students to the question whether atmosphere in the smart classrooms is more convenient for listening to the lesson or not and the school type (question number 15).

66,1% of the high school students prefer classes to be conducted at smart classrooms whereas 20,2% of them partially prefer classes to be conducted at smart classrooms. On the contrary, 13,8% of them do not prefer classes to be conducted at smart classrooms. 54,8% of the vocational high school students prefer classes to be conducted at smart classrooms whereas 22,6% of them partially prefer classes to be conducted at smart classrooms. On the other hand, 22,6% of the students do not prefer classes to be conducted at smart classrooms. Total results reveal that 60,1% of the students prefer classes to be conducted at smart classrooms whereas 21,5% of them partially prefer smart classrooms. However, 18,5% of them do not prefer smart classrooms for their lessons. There is not any significant difference among the responses of the students in terms of school type [$\chi^2_{(2)}$=3.815, p>.05]. In other words, there is not any significant difference between the responses by the students to the question whether students prefer smart classrooms for their lessons and school type they study. Students do not believe the importance and benefit of technology used by the teachers because they do not always see that technology benefits their learning, and this finding may have implications for both teaching and learning (D'angelo and Woosley, 2007). Therefore, it is necessary for teachers' to design the content of the lesson appropriately with the technology to be used. Ladona (1998) has found out that students prefer smart classrooms better than traditional classrooms, but it is emphasized that traditional classrooms and traditional methods should not be ignored in the teaching and learning practices. There should be a balance between traditional classrooms and smart classrooms, but the amont of time spent in the smart classrooms needs to be increased since technology is available and students are benefiting it (question number 16).

Results by question number 17 have revealed that 20,2% of the high school students claim that teachers make use of the same methods while they are teaching at the ordinary classes and smart classes. 28,4% of them think that their teachers partially make use of the same methods while they are teaching at the ordinary classes and smart classes whereas 51,4% them emphasize that their teachers do not make use of the same methods while they are teaching at the ordinary classes and smart classes. 29,8% of the vocational high school students claim that their teachers make use of the same methods while they are teaching at the ordinary classes and smart classes whereas 19,4% of them maintain that their teachers partially make use of the same methods while they are teaching at the ordinary classes and smart classes. On the contrary, more than half of the students (50,8%) emphasize that their teachers do not make use of the same methods while they are teaching at the ordinary classes and smart classes. According to the total results, 25,3% of the students think that teachers make use of the same methods while they are teaching at the ordinary classes and smart classes whereas 23,5% of them believe that teachers make partially use of the same methods while they are teaching at the ordinary classes and smart classes. On the other hand, more than half of the students emphasize that their teachers do not make use of the same methods while they are teaching at the ordinary classes and smart classes. There is not any significant difference among responses by the students in terms of

school type [$\chi^2_{(2)}$=4.168, p>.05]. In other words, there is not any significant difference between responses by the students to the question whether teachers make use of the same methods while they are teaching at the ordinary classes and the smart classes and the school type they study.

Results by question number 18 have shown that, 58,7% of the students studying in high school think that teachers have the same role while teaching at the traditional classroom and the smart classroom. 22% of them reveal that their teacher partially have the same role while teaching at the traditional classroom and the smart classroom whereas 19,3% of them think that their teachers do not have the same role while they are teaching at the traditional classroom and the smart classroom. 50% of the vocational high school students think that their teachers have the same roles while teaching at the traditional classroom and the smart classroom whereas 21% of them believe that their teachers partially have the same roles while teaching in the mentioned classes. On the contrary, 29% of them emphasize that their teachers do not have the same roles while in the traditional classroom and the smart classroom. Total results claim that 54,1% of the students think that teachers have the same roles while teaching at the traditional and the smart classrooms. 21,5% of these students reveal that their teachers partially have the same role while teaching at the traditional and the smart classroom whereas 24,5% of them think that their teachers do not have the same roles while teaching at the traditional classroom and the smart classroom. There is not any significant difference among the students' responses in terms of school type [$\chi^2_{(2)}$=3.106, p>.05]. In other words, there is not any significant difference between the responses of the students to the question whether their teachers have the same roles while teaching at the traditional classrooms and the smart classrooms and the school type.

Perceptions of the teachers in relation to the smart classrooms with respect to school type

Chi-square test results and responses of the students using smart classrooms in terms of school type can be seen in table 9.

There are significant differences among students' responses in terms of school type in four items. However, there are not significant differences among students' responses in terms of school type at the remaining items.

Table 9: Chi-square test results and reponses of the students using smart classrooms in terms of school type.

	Type of School	Yes		No		Partially		χ2
		f	%	f	%	f	%	
1. I am well aware that there are smart classrooms at my school.	High School	53	96.4	1	1.8	1	1.8	7.362 P=.025
	Vocational High School	34	79.1	6	14	3	7	
	Total	87	88.8	7	7.1	4	4.1	
2. Smart classrooms are introduced to the teachers.	High School	21	38.2	22	40	12	21.8	8.402 P=.015
	Vocational High School	13	30.2	28	65.1	2	4.7	
	Total	34	34.7	50	51	14	14.3	
3. Classes are conducted in smart classrooms.	High School	51	92.7	1	1.8	3	5.5	19.015 P=.000
	Vocational High School	23	54.8	6	14.3	13	31	
	Total	74	76.3	7	7.2	16	16.5	
4. Smart classrooms are convenient to technology.	High School	48	88.9	0	0	6	11.1	4.973 P=.083
	Vocational High School	28	71.8	1	2.6	10	25.6	
	Total	76	81.7	1	1.1	16	17.2	
5. Harware and software of the smart classroom are sufficient for conducting active classes.	High School	33	61.1	2	3.7	19	35.2	1.027 P=.598
	Vocational High School	22	52.4	3	7.1	17	40.5	
	Total	55	57.3	5	5.2	36	37.5	
6. Classes are more productive at smart classes.	High School	37	72.5	0	0	14	27.5	5.432 P=.066
	Vocational High School	25	62.5	4	10	11	27.5	
	Total	62	68.1	4	4.4	25	27.5	
7. Teachers conduct better lessons at smart classrooms.	High School	34	66.7	1	2	16	31.4	1.639 P=.441
	Vocational High School	25	62.5	3	7.5	12	30	
	Total	59	64.8	4	4.4	28	30.8	
8. Lessons conducted at smart classrooms are	High School	38	73.1	4	7.7	10	19.2	.293 P=.864
	Vocational High School	31	77.5	3	7.5	6	15	

understood better.	Total	69	75	7	7.6	16	17.4	
9. Smart classrooms are boring.	High School	2	3.8	46	88.5	4	7.7	1.280 p=.527
	Vocational High School	3	7.5	32	80	5	12.5	
	Total	5	5.4	78	84.8	9	9.8	
10. Students have got much opportunity in participating to lessons.	High School	29	55.8	1	1.9	22	42.3	3.025 P=.220
	Vocational High School	22	55	4	10	14	35	
	Total	51	55.4	5	5.4	36	39.1	
11. Visually conducted lessons from screen facilitate students' recalling.	High School	50	94.3	0	0	3	5.7	2.886 P=.236
	Vocational High School	35	87.5	2	5	3	7.5	
	Total	85	91.4	2	2.2	6	6.5	
12. Changing classroom for going to smart classroom creates trouble	High School	16	30.2	17	32.1	20	37.7	2.211 P=.331
	Vocational High School	17	42.5	8	20	15	37.5	
	Total	33	35.5	25	26.9	35	37.6	
13. There is an opportunity for students for note-taking.	High School	41	78.8	1	1.9	10	19.2	4.590 P=.101
	Vocational High School	26	65	5	12.5	9	22.5	
	Total	67	72.8	6	6.5	19	20.7	
14. Communication among teachers and the students at the smart classrooms are better.	High School	38	71.7	4	7.5	11	20.8	2.357 P=.308
	Vocational High School	22	56.4	4	10.3	13	33.3	
	Total	60	65.2	8	8.7	24	26.1	
15. Atmospehere at smart classrooms is convenient for listening to the lesson better.	High School	43	81.1	0	0	10	18.9	4.552 P=.103
	Vocational High School	32	80	3	7.5	5	12.5	
	Total	75	80.6	3	3.2	15	1.1	
16. I prefer my lessons to be conducted at smart lessons.	High School	33	62.3	4	7.5	16	30.2	2.430 P=.297
	Vocational High School	24	60	7	17.5	9	22.5	
	Total	57	61.3	11	11.8	25	26.9	
17. Curriculum is convenient to conduct the lessons at smart classrooms.	High School	16	31.4	9	17.6	26	51	4.329 P=.115
	Vocational High School	20	51.3	7	17.9	12	30.8	
	Total	36	40	16	17.8	38	42.2	
18. I make use of the same methods while teaching at the smart classrooms and the traditional classrooms.	High School	2	3.8	29	55.8	21	40.4	5.437 P=.066
	Vocational High School	7	17.9	21	53.8	11	28.2	
	Total	9	9.9	50	54.9	32	35.2	
19. As a teacher, my roles are the same whether I conduct my classess at smart classrooms or traditional classes.	High School	23	44.2	9	17.3	20	38.5	3.716 P=.156
	Vocational High School	22	55	10	25	8	20	
	Total	45	48.9	19	20.7	28	30.4	
20. Getting prepared to the smart classrooms takes my time a lot.	High School	23	45.1	7	13.7	21	41.2	7.008 P=.030
	Vocational High School	25	64.1	8	20.5	6	15.4	
	Total	48	53.3	15	16.7	27	30	

It is revealed by the results of question number 1 that, nearly all of the teachers (96,4%) teaching at high schools are aware that there are smart classrooms in their school, whereas 1,8% of them partially aware about the existence of smart classrooms. However, 1,8% of them are not aware the existence of the smart classrooms. On the other hand, 79,1% of the teachers teaching at vocational high schools are aware that there are smart classrooms in their schools. 7% of them are partially aware the existence of the smart classroom, whereas 14% of them are not aware that there are smart classrooms in their schools. If we look at the totals, we see that 87 % of the teachers are aware of the existence of the smart classrooms at their schools, whereas 4,1% of them partially aware that there are smart classrooms in their schools. However, 7,1% of the teachers are not aware the existence of the smart classrooms in their shools. There is a significant difference among the responses of the teachers in terms of school type [$\chi^2_{(2)}$=7,362, p<.05]. In other words, there is a significant difference between the responses of the teachers whether they are aware of the existence of the smart classroom in their schools and the type of the school they teach. Percentages and frequency results prove that high school teachers are more aware the existence of these classess in their schools. Smart classrooms are set up

before at the vocational high schools than at the high schools. However, teachers of vocational high schools are not well informed about the existence of these classrooms in their schools.

Results shown by question number 2 have revealed that 38,2% of the teachers teaching at high schools claim that smart classrooms are introduced to them. 21,8% of the high school teachers emphasize that smart classrooms are partially introduced to them whereas 40% of them say that smart classrooms never introduced to the teachers in their schools. Similarly, 30,2% of the vocational high school teachers reveal that smart classrooms are introduced to them in their schools, whereas 4,7% of them claim that smart classrooms are partially introduced to them. However, more than half of the vocational high school teachers (65,1%) have emphasized that smart classrooms are not introduced to them. Total results have revelaed that 34,7% of the teachers are introduced smart classroom in their classrooms whereas 14,3% of them have indicated that smart classrooms are partially introduced in their schools. On the other hand, 51% of them have mentioned that they are not introduced smart classrooms in their schools. There is a significant difference among the responses of the teachers in terms of school type they study [$\chi^2_{(2)}$=8.402, p<.05]. In other words, there is a significant difference between the responses of the teachers whether they are introduced the smart classrooms in their schools or not and the type of the school.

Nearly all of the teachers (92,7%) teaching in high schools have claimed that they do lessons at smart classrooms. 5,5% of them say that they partially do their lessons in the smart classrooms whereas 1,8% of them emphasize that none of their lessons are conducted at the smart classrooms. Similarly, more than half of the teachers (54,8%) teaching in vocational high schools have claimed that their lessons are conducted at smart classrooms. 31% of vocational school teachers have revealed that they partially use smart classrooms for their lessons whereas 14,3% of them have mentioned that they do not use smart classrooms in their lessons. Total results have shown that 76,3% of the teachers have indicated that their lessons are conducted at smart classrooms whereas 16,5% of them have emphasized that their lessons are partly conducted at these classrooms. On the other hand, 7,2% of them have revealed that none of their lessons are conducted at smart classrooms. There is a significant difference among the teachers' responses to the question about the usage smart classrooms for conducting lessons in terms of school type [$\chi^2_{(2)}$=19.015, p<.05]. In other words, there is a significant difference between the responses on whether smart classrooms are used for conducting lessons or not and the school type the respondents teach (question number 3).

Results from question 4 have shown that nearly all of the teachers (88,9%) teaching in high schools think that smart classrooms in their schools are convenient to the technology whereas 11,1% of them believe that these classes are partly convenient to the technological innovations. None of the high school teacher emphasize that smart classroom are not convenient to the technology. Similarly, more than half of the teachers teaching in vocational high schools (71,8%) think that smart classroom in their schools are convenient to the technology whereas 25,6% of them believe that these classrooms are partly convenient to the technology. On the contrary, 2,6% of these teachers think that the smart classrooms in their schools are not convenient to the technology. Total results have revealed that 81,7% of the teachers believe that the smart classrooms in their schools are convenient to the technology whereas 17,2% of them think that these classrooms in their schools are partially convenient to the technology. On the other hand, 1,1% of these students have revelaed that smart classrooms in their schools are not convenient to the technology. There is not any significant difference among the responses of the teachers in terms of school type [$\chi^2_{(2)}$=4.973, p>.05]. In other words, there is not a significant difference between teachers' responses on whether technology is convenient to the technology and school type they teach.

Results in table 9 (item number 5) have revealed that more than half (61,1,%) of the high school teachers think that hardware and software of the smart classrooms are sufficient for conducting lessons whereas 35,2% of them believe that hardware and software of these classrooms are partially sufficient for conducting lessons. On the contrary, 3,7% of the teachers think that hardware and software of smart classrooms are not suitable for conducting lessons. More than half of the vocational high school teachers (52,4%) indicate that hardware and software of the smart classrooms are sufficient for conducting lessons whereas 40,5% of them think that hardware of these classrooms are partially sufficient for conducting lessons. However, 7,1% of the vocational high teachers think that hardware and software of these classrooms are not sufficient for conducting lessons. As total results show, 57,3% of the teachers believe that hardware and software of the smart classrooms are sufficient for

conducting lessons in these classess whereas 37,5% of them think that hardware and software of these classrooms are partially sufficient for conducting lessons. On the other hand, 5,2% of the teachers indicate that hardware and software of these classrooms are not sufficient for conduting lessons there. There is not any significant difference among the respondents's responses in terms of school type [$\chi^2_{(2)}$=1.027, p>.05]. In other words, there is not any significant difference between the responses given to the question whether hardware and software of the smart classrooms are sufficient for conducting lessons or not and school type the teachers teach.

Results by question number 6 have shown that, 72,5% of the high school teachers think that lessons conducted at smart classrooms are more productive whereas 27,5% of them believe that lessons conducted at these classrooms are partly productive. All of the teachers indicate that lessons conducted at these classrooms are productive. More than half of the vocational school teachers (62,5%) emphasize that lessons conducted at smart classrooms are more productive whereas 27,5%) of the teachers believe that lessons conducted at these classrooms are partly more productive. On the contrary, 10% of them say that lessons conducted at these classrooms are not more productive than their regular classrooms. Total scores indicate that 68,1% of the teachers believe that lessons conducted at smart classrooms are more productive. 27,5% of the teachers say that lessons conducted at these classrooms are partially more productive whereas 4,4% of them think that lessons at smart classrooms are not more productive than their regular classrooms. There is not any significant difference among the respondents' responses in terms of school type [$\chi^2_{(2)}$=5.432, p>.05]. In other words, there is not any significant difference between the responses given to the question whether lessons conducted at smart classrooms are more productive than the regular classrooms and school type the teachers teach.

Results by question number 7 have revealed that more than half of the teachers teaching in high schools (66,73%) think that they conduct lessons much better in smart classrooms. 31,4% of them believe that that they conduct lessons partly better than in smart classrooms whereas 2% of them think that their teachers do not conduct much better lessons in smart classrooms. 62,5% of the teachers teaching at vocational high schools think that their teachers conduct lessons much better in smart classrooms whereas 30% of them believe that their teachers conduct lessons partially better than in smart classrooms. However, 7,5% of them claim that they do not conduct lessons much better in smart classrooms. Total results reveal that 64,8% of the teachers believe that they conduct lessons much better in smart classrooms. 30,8% of them think that they conduct lessons partly better than in smart classrooms whereas 4,4% of them emphasize that they do not conduct much better lessons in smart classrooms. There is not any significant difference among the responses in terms of school type [$\chi^2_{(2)}$=1.639, p>.05]. In other words, there is not any significant difference between the responses of the teachers to the question whether teachers conduct much better lessons in smart classrooms or not and school type.

It is clearly revealed in table 9 (item number 8) that 73,1% of the teachers teaching at high schools think that lessons conducted at smart classroom are more comprehensive. 19,2% of them believe that lessons conducted at smart classroom are partially more comprehensive whereas 7,7 % of them emphasize that lessons conducted at smart classroom are not more comprehensive. 77,5% of the teachers teaching at vocational high schools believe that lessons conducted at smart classrooms are more comprehensive. 15% of the teachers reveal that their lessons conducted at smart classroom are partially comprehensive whereas 7,5% of the teachers believe that lessons conducted at smart classroom are not comprehensive. Total results emphasize that 75% of the teachers think that lessons conducted at smart classrooms are more comprehensive. 17,4% of them believe that lessons conducted at smart classroom are partially comprehensive whereas 7,6% claim that lessons conducted at smart classrooms are not comprehensive. There is not any significant relationship among the responses of the teachers in terms of school type [$\chi^2_{(2)}$=.293, p>.05]. In other words, there is not any significant difference between the teachers' responses to the question whether lessons conducted at smart classrooms are more comprehensive or not and the school type.

It is clearly stated by the results of question item number 9 that, 3,8% of the teachers studying at high schools have indicated that smart classrooms are boring. 7,7% of the high school teachers have partially found smart classrooms boring whereas 88,5% of them have not found these classes boring. Similarly, 7,5% of the teachers teaching at vocational schools believe that smart classrooms are boring whereas 12,5% of them say that these classes partially boring. However, 80% of the teachers reveal

that smart classrooms are not boring. If we look at the total results, we see that 5,4 % of the teachers find smart classrooms boring whereas 8,9% of them believe that smart classrooms are partially boring. On the other hand, 84,8% of the respondent teachers have revealed that smart classrooms are not boring. There is not any significant difference among the responses of the teachers in terms of school type. [$\chi^2_{(2)}$=1.280, p>.05]. In other words, there is not any significant difference between the responses of the teachers given to the question whether smart classrooms are boring or not and the type of the school they teach.

It is clear by the results of item number 10 that, 55,8% of the teachers teaching at high schools have claimed that smart classrooms enhance student participation to lessons. 42,3% of them think that they smart classrooms partially enhance student participation to lessons whereas 1,9 % of the teachers belive that students do not have much opportunities to take part in the lesson. Similarly, 55% of the vocational high school teachers think that smart classrooms enhance students' participation to lessons. 35% of them believe that these classrooms partially enhance student participation to lessons whereas 10% of them think that students do not have much opprortunities to take part in the lesson. Total results reveal that 55,4% of the teachers think that smart classrooms enhance students' participation whereas 39,1% of them believe that these classrooms partially enhance students' participation to lessons. However, 5,4% of the teachers say that students do not have much opportunities to participate to lessons. There is not any significant difference among the responses of the teachers in relation to the school type [$\chi^2_{(2)}$=3.025, p>.05]. In other words, there is not any significant difference between the responses given to the question whether smart classrooms enhance student participation or not and the type of the school they teach.

Results by question number 11 have shown that, nearly all of the teachers (94,3%) teaching at high schools think that knowledge on the screen (visual knowledge) facilitates recalling whereas 5,7% of them believe that visual knowledge partially facilitates recalling. None of the teachers reveal that knowledge on the screen does not facilitate recalling. 87,5% of the vocational high school teachers emphasize that visual knowledge facilitates recalling whereas 7,5% of them think that visual knowledge partially facilitates recalling. On the contrary, 5% of the teachers say that visual knowledge does not facilitate recalling. Total results of the teachers reveal that 91,4% of the teachers think that knowledge on the screen (visual knowledge) facilitates recalling whereas 6,5% of them believe that visual knowledge partially facilitates recalling. On the other hand, 2,24% of the teachers do not believe the importance of the visual knowledge. There is not a significant difference among the responses to this question in relation to the school type [$\chi^2_{(2)}$=2.886, p>.05]. In other words, there is not any significant difference between the responses of the participants to the question where knowledge on the screen (visual knowledge) facilitates recalling and the school type the respondents teach.

Results by question number 12 have revealed that, 30,2% of the high school teachers believe that changing their traditional classroom for going to the smart classroom is a trouble whereas 37,7% of them think that it partially creates trouble to change classroom in order to go to the smart classroom. On the other hand, 32,1% of them emphasize that that it does not create any trouble to change classroom in order to go to the smart classroom. 42,5% of the vocational high school teachers think that it creates trouble to change classroom in order to go to smart classrooms whereas 37,5% of them believe that it partially creates trouble to change classroom to go to the smart classroom. However, 20% of them think that it does not create any trouble to change classroom to go to the smart classroom. Total results reveal that 35,5% of them think that it creates trouble to change classroom to go to the smart classroom whereas 37,6% of them believe that it partially creates trouble. On the contrary, 26,9% of them emphasize that it does not create any trouble to change their traditional classroom for going to the smart classroom. There is not any significant difference among the responses and the school type [$\chi^2_{(2)}$=2.211, p>.05]. There is not any significant difference between the responses of the teachers to the question whether it creates trouble to change classroom to go to the smart classroom or not and school type.

It can be clearly seen by the results of question number 13 that, 78,8% of the high school teachers indicate that the students have opportunities to take note while they are in smart classrooms. 19,2% of the teachers believe that students have partially opportunities to take note whereas 1,9% of them claim that students do not have any opportunities to take note while they are teaching at smart classrooms. More than half of the teachers (65%) teaching at vocational high schools emhphasize that students

have opportunities to take notes at smart classrooms whereas 22,5% of them claim that students have partially have opportunities to take notes at smart classrooms. On the contrary, 12,5% of them think that students do not have any opportunities to take notes at smart classrooms. Total results reveal that 72,8% of the teachers claim that students have opportunities to take notes at smart classrooms. 20,7% of them indicate that students partially have opportunities to take notes at smart classrooms whereas 6,5% of them claim students do not have any opportunities to take notes at smart classrooms. There is not any significant difference among the responses given to this question in terms of school type [$\chi^2_{(2)}$=4.590, p>.05]. In other words, there is not any significant difference between the teachers' responses to the question whether students have many opportunities to take notes at smart classrooms and school type.

Results by question number 14 have revealed that, 71,7% of the teachers teaching at high schools have good communication with their students at smart classrooms. 20,8% of them indicate their communication with their students at smart classrooms are partially better in smart classrooms whereas 7,5% them reveal that their communication is not better at smart classrooms. More than half of the teachers (56,4%) teaching at vocational high schools indicate that they have better communication with their students at smart classrooms. 33,3% of them think that they have partially better communication with their students at smart classrooms whereas 10,3% of them indicate that they do not have better communication with their students at smart classrooms. Total results reveal that 65,2% of them indicate that they have better communication with their students at smart classrooms. 26,1% of them think that they have partially better communication with their students at smart classrooms whereas 8,7% of them think that they do not have better communication with their students at smart classrooms. There is not any significant relationship among the responses given to this questions in terms of school type [$\chi^2_{(2)}$=2.357, p>.05]. In other words, there is not any significant difference between responses given by the teachers to the question whether they have better communication with their students at smart classrooms and the school type they teach. Yau, Gupta, Karim, Ahamed, Wang, and Wang (2007) found out in their research that smart classrooms develop cooperative learning among the students.

81,1% of the high school teachers think that atmosphere in the smart classrooms is more convenient for listening to the lesson whereas 18,9% of them believe that tmosphere in the smart classrooms is partially convenient for listening to the lesson. None of them reveal that atmosphere in the smart classrooms is not convenient for listening to the lesson. 80% of the vocational high school teachers think that atmosphere in the smart classrooms is more convenient for listening to the lesson whereas 12,5% of them indicate that atmosphere in the smart classrooms is partially convenient for listening to the lesson. However, 7,5 % of them reveal that atmosphere in the smart classrooms is not convenient for listening to the lesson. Total results reveal that 80,6% of the teachers think that atmosphere in the smart classrooms is more convenient for listening to the lesson. 1,1% of the students think that atmosphere in the smart classrooms is partially convenient for listening to the lesson whereas 3,2% of them believe that atmosphere in the smart classrooms is not convenient for listening to the lesson. There is not any significant difference among the responses in terms of school type [$\chi^2_{(2)}$=4.552, p>.05]. In other words, there is not any significant difference between the responses of the teachers to the question whether atmosphere in the smart classrooms is more convenient for listening to the lesson or not and the school type (question number 14).

62,3% of the high school teachers prefer classes to be conducted at smart classrooms whereas 30,2% of them partially prefer classes to be conducted at smart classrooms. On the contrary, 7,5% of them do not prefer classes to be conducted at smart classrooms. 60% of the vocational high school teachers prefer classes to be conducted at smart classrooms whereas 22,5% of them partially prefer classes to be conducted at smart classrooms. On the other hand, 17,5% of the teachers do not prefer classes to be conducted at smart classrooms. Total results reveal that 61,31% of the teachers prefer classes to be conducted at smart classrooms whereas 26,9% of them partially prefer smart classrooms. However, 11,8% of them do not prefer smart classrooms for their lessons. There is not any significant difference among the responses of the teachers in terms of school type [$\chi^2_{(2)}$=2.430, p>.05]. In other words, there is not any significant difference between the responses by the teachers to the question whether students prefer smart classrooms for their lessons and school type they teach (question number 16).

Reasults by question number 17 have revelaed that 31,4 % of the high school teachers agree that curriculum for their lessons is convenient to conduct the lessons at smart classrooms. 51% of them think that the curriculum of their lesson is partially convenient to conduct lessons at smart classrooms whereas 17,% of them emphasize that the curriculum of their lessons is not suitable for conducting their lessons at smart classrooms. On the other hand, 51,3% of the teachers teaching at vocational high schools agree that the curriculum of their lesson is convenient to conduct their lessons at smart classrooms. 30,8% of them emphasize that the curriculum of their lesson is partially convenient to conduct their lessons at smart classrooms whereas 17,9 % of them agree that curriculum of their lesson is not suitable for conducting their lessons at smart classrooms. Total results claim that 40% of the teachers think that the curriculum of their lesson is convenient to conduct lessons at smart classrooms. 42,2% of them claim that the curriculum of their lessons are partially convenient to conduct their lessons at smart classrooms whereas 17,8% of them agree that the curriculum of their lesson is not suitable to conduct their lessons at smart classrooms. There is not any significant difference among the responses in terms of school type [$\chi^2_{(2)}$=4.329, p>.05]. In other words, there is not any significant difference between the responses by the teachers given to the question whether the curriculum of their lessons are suibable for conducting their lessons at smart classrooms and the school type they teach.

Results by the question number 18 have revelaed that, 3,8,% of the teachers teaching in high school think that they use the same methods while teaching at the traditional classroom and the smart classroom. 40,4% of them reveal that they partially use the same method while teaching at the traditional classroom and the smart classroom whereas 55,8% of them think that they do not make use of the same methods while they are teaching at the traditional classroom and the smart classroom. 17,9% of the vocational high school teachers think that they make use of the same method while teaching at the traditional classroom and the smart classroom whereas 28,2% of them believe that their teachers partially use the same methods while teaching in the mentioned classes. On the contrary, 53,8% of them emphasize that they do not use the same methods while in the traditional classroom and the smart classroom. Total results claim that 9,9% of the teachers think that they use the same methods while teaching at the traditional and the smart classrooms. 35,2% of them reveal that they partially make use of the same metohds while teaching at the traditional and the smart classroom whereas more than half of them (54,9%) think that they do not make use of the same roles while teaching at the traditional classroom and the smart classroom. There is not any significant difference among the teachers' responses in terms of school type [$\chi^2_{(2)}$=5,437, p>.05]. In other words, there is not any significant difference between the responses of the teachers to the question whether they use the same methods while teaching at the traditional classrooms and the smart classrooms and the school type.

Results in table 9, item number 18 reveal that 44,2% of the high school teachers claim that they have the same roles while they are teaching at the ordinary classes and smart classes. 38,5% of them think that their they partially apply to the same roles while they are teaching at the ordinary classes and smart classes whereas 17,3% them emphasize that they do not use of the same roles while they are teaching at the ordinary classes and smart classes. 55% of the vocational high school teachers claim that they apply to the same roles while they are teaching at the ordinary classes and smart classes whereas 10% of them maintain that they partially have the same roles while they are teaching at the ordinary classes and smart classes. On the contrary, 25% of them emphasize that they do not have the same roles while they are teaching at the ordinary classes and smart classes. According to the total results, 48,9% of the teachers think that they apply to the same roles while they are teaching at the ordinary classes and smart classes whereas 30,4% of them believe that they partially have the same roles while they are teaching at the ordinary classes and smart classes. On the other hand, 20,7% of the teachers emphasize that they do not apply the same roles while they are teaching at the ordinary classes and the smart classes. There is not any significant difference among responses by the students in terms of school type [$\chi^2_{(2)}$=3.716, p>.05]. In other words, there is not any significant difference between responses by the teachers to the question whether teachers have the same roles while teaching at the ordinary classes and the smart classes and the school type they teach (question number 19).

Results by the question number 20 have revealed 45,1% of the teachers teaching at high schools indicate that getting prepared to the lessons to conduct at smart classrooms takes their time a lot. 41,2% of them think that getting prepared to the lessons to conduct at smart classrooms partially takes their time a lot while 13,7% of them emphasize that getting prepared to the lessons to conduct at smart classrooms does not take their time a lot. 64,1% of the teachers teaching at vocational high schools

believe that getting prepared to the lessons to conduct at smart classrooms takes their time a lot whereas 15,4% of them think that getting prepared to the lessons to conduct at smart classrooms partially takes their time a lot. On the contrary, 20,5% of them emphazise that getting prepared to the lessons to conduct at smart classrooms does not take their time a lot. Total results reveal that 53,3% of the teachers believe that getting prepared to the lessons to conduct at smart classrooms takes their time a lot. 30% of them state that getting prepared to the lessons to conduct at smart classrooms partially takes their time a lot whereas 16,7% of them indicate that getting prepared to the lessons to conduct at smart classrooms does not take their time a lot. There is a significant difference among the responses by the teachers in terms of school type [$\chi^2_{(2)}$=7.008, p<.05]. In other words, there is a significant difference between the responses given by the teachers to the question whether it takes their time to get prepared to the lessons to conduct at smart classrooms or not and the school type they teach.

Conclusion

It is clear that introducing a new technology into any learning situation in any country requires a great deal of thought and planning, and a good deal of developmental testing. It requires multidisciplinary approaches involving teachers, researchers, technologists, developers and pupils. And it requires specific training for all of these groups, and possibly changes in attitudes as well as approach (Hartley, 2007).

Teachers do not make use of smart classrooms efficiently and sufficiently. Insufficient and limited usage of these classrooms cause decreasing of productivity of the smart classrooms and make students getting bored.

There are not enough in-service trainings conducted. I believe that it is not a correct and good way to request teachers to use the smart classrooms without supplying them with necessary knowledge and practice because it is not an issue to be solved by the computing knowledge of the teachers. They need special education on how to use smart classrooms. Teachers need to be shown how to conduct their lessons in smart classrooms and how to develop their teaching materials convenient for these classrooooms in practice. Although teachers and students agree that smart classrooms are beneficial for both sides, the percentage of making use of smart classrooms for their lessons have been decreasing and these classrooms are becoming unfruitful for the teachers and the students day by day. The main reason of these classes having been not used frequently and being unfruitful is due to the lack of in-service training for the teachers.

There are not any significant differences between respondents' school type, gender, teachers' teaching experience, having been owning a computer, teachers' taking in-service training, and branch of study. Therefore, smart classrooms should be widespread. In-service trainings should be conducted for teachers' using them more effectively. Additionally, curriculum needs to be revised and teaching with technology should be embedded in most of the curriculum of the lessons. Software needs to be developed for the smart classroom purposes. Internet connections should be supplied in these classrooms by improving the internet infrastructure of the schools, Also, standards of smart classrooms should be determined and legal arrangements should be made.

References

Bain, C. D. & Rice, M. (2006). The Influence of Gender on Attitudes, Perceptions, and Uses of Technology. *Journal of Research on technology in education, 39*(2), 119– 132.

Barnard, C. A. (2002). Smart Classrooms: A Survey of Faculty and Student Reactions at Northern Illinois University, Spring 2002.

Benson, D., E and Mekolichick, J. (2007). Conceptions of self and the use of digital technologies in a learning environment. *Education. 127*(4), 498-510.

ChanLin, L. J. (2007). Perceived importance and manageability of teachers toward the factors of integrating computer technology into classrooms. *Innovations in Education and Teaching International, 44*(1), 45–55.

D'angelo, j. M & Woosley, H. A. (2007). Technology in the classroom: Friend or foe, *Education*, *127*(4), 462-471.

Hartley, J. (2007). Teaching, learning and new technology: A review for teachers.*British Journal of Educational Technology, 38*(1)*,* 42–62

Ladona, T. (1998). *The SMART classroom verses the traditional classroom: What the student's are saying*. (Report No. IR018-934). East Lansin, MI: National Center for Research on Teacher Learning. (ERIC Document Reproduction Service No. ED421963).

Levin, T. & Wadmany, R. Teachers' Beliefs and Practices in Technology-based Classrooms: A Developmental View. *Journal of Research on* Technology *in Education, 39*(2), 157–181

Li, Q (2007). Student and Teacher Views About Technology: A Tale of Two Cities? *Journal of research on technology in education, 39*(4), 377-397.

Lorenzetti, J., P. (2006). Constructing the Smart Classroom at State Fair Community College. *Distance Education Report,15*, 6-7.

Marold, K. A. (2002). The 21st Century Learning Model: Electronic Tutelage Realized *Journal of Information Technology Education, 1(*2).

Matzen, N. J. & Edmunds, J. A. (2007). Technology as a catalyst for change: The role of professional development. *Journal of research on technology ın educatıon, 39*(4), 417-430.

Stover, D. (2007). Roleof Technology From tools to skills, how can students navigate today's virtual world? *American School Board Journal, 2*, 28-30

Wilson, J. & Notar, C. (2003). Use of computers by secondary teachers: A report from a university service area. *Education,* 123(4), 695-704.

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Formative Peer Evaluation of Teaching: a Process that Improves Instructional Practice in Greek Secondary Education

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Abstract

Teachers' evaluation is considered to be an important prerequisite for their professional development and educational effectiveness. For this reason, most of the recent educational reforms place emphasis on this issue.

In Greece, however, teachers' evaluation is lacking for a period of about thirty years. This lack is due to various socio-political and educational reasons and, mainly, on the negative tradition created before this period by the 'government Inspectors', which evaluated teachers using mainly subjective criteria.

Over the last years efforts are made to find ways for the formation of an evaluation system for teachers and instruction. The present study is an attempt towards this direction by examining the implementation of a pilot programme of formative peer evaluation of teaching, a completely novel procedure for Greek reality.

Fifty-six secondary school teachers participated in the study. Peer observation referred to classroom environment and instruction. Teachers were asked to complete a questionnaire examining their attitudes towards this new experience. The results indicated that formative peer evaluation meets the approval of Greek secondary school teachers, improves instructional practices and promotes communication as well as collaboration among teachers.

The above results will be discussed in relation to the implementation of such an evaluation system to Greek reality and its contribution to the upgrading of instruction and to the increase of teachers' effectiveness in the classroom.

Introduction

Teachers' professional development in Greece

In Greece, a number of In Service Training (INSET) programmes have been carried out, although the term "Teachers' Professional Development" (TPD) has not being used for most of them. Their common aim was to make teachers competent and effective in certain issues (e.g. teachers' training in information technology, or the new demands created by the introduction of new curricula), but they did not intend to promote teachers' self-reflection, interaction and co-operation. The common characteristics of INSET Programmes in Greece during the past 12 years according to the relevant literature are:

- They are centrally planned and implemented.
- They are carried out without a prior search for teachers' needs.
- Their content is divergent to the real training needs of teachers.
- Teachers are vigilant for the quality to the training programmes, the training material, and the trainers, (although they are positive towards training, and they are well aware of their need for training).
- Their effectiveness has not been evaluated.

(Bagakis 2007; Hatzipanagiotou, 2001; Katanou, 2004; Kazamias, & Kassotakis, 1995; Lignos, 2006; Mavroyiorgos, 1998; Papanaoum, 2003; Papaprokopiou, 2002; Stylianidou, Bagakis, & Stamovlasis, 2004; Zouganeli, 2007).

Such characteristics led to INSET programmes' of limited effectiveness, which is not much different than the international research findings. For instance, Darling-Hammond (1990) denotes that within a framework which ignores school culture and treats training as a linear route imposed from the top (authority) with passive teachers as receivers', changes can only be marginal.

There is a need, therefore, for different types of training in Greece which:

- Should be formed on the basis of the knowledge and skills' level of each teacher (Goodson, 1995).
- Should promote self-reflection, so that teachers understand their everyday work, assess it, experiment to improve it and develop professionalism of interaction and co-operation (Hargreaves, & Fullan, 1995).
- Should be planned in collaboration with the school unit and be implemented in it. Such training efforts seem to produce important benefits in individual and communal level, by broadening the role of school and transforming it into a school "that learns" (Bagakis, 2007; Xochellis, & Papanaoum, 2000).

Teachers' evaluation in Greece

An inspectorate system operated in Greece from 1834 to 1981, which did not have a commonly accepted objectives and criteria, as the selection of the inspectors was based mainly on the political beliefs of the candidates than on meritocratic principles, and hence, their judgements were accused to be subjective. Teachers were evaluated on domains that they were never trained for, such as "managerial skill", or "teaching methodology", or on hardly definable characteristics such as "virtue". Moreover, evaluation was fragmental and in most cases the most fundamental element of evaluation, that is, feedback, did not exist.

In 1982, the inspectorate system was abolished, (Law 1304/1982) and a new institution, that of School Counsellors, was introduced (Decree 214/84). Teachers' evaluation was part of their duties, but until today, this duty has not been put in use. Since 1982, three Laws concerning teacher evaluation have been voted by the Parliament, but no one of them has been implemented. The main reasons for the lack of implementation of teachers' evaluation in Greece are related to policies of the central authorities, and to teachers' unions' strong opposition. In particular:

The central authorities have not proceeded to evaluate other aspects of the Greek educational system which does not cause teachers' unions' opposition, such as curricula, textbooks or education officers. Also, despite the poor performance of Greek students in international assessment studies (OECD, 2001; OECD, 2004; OECD, 2007; TIMSS, 1996) no systematic research has been carried out attempting to identify the reasons for their poor performance. Moreover, Greek students have never been assessed systematically on a national level.

Teachers, on the other hand, express a complete lack of trust to the central authority in issues related to evaluation and meritocracy (OECD, 1996). The suggested evaluation systems have been characterised by the teachers' unions as an overt attempt to control and direct teachers work. Also according to Demetropoulos (2004), civil servants -and therefore teachers- in Greece, are characterized by a sense "relaxation", limited responsibility and a denial to fully undertake their duties, which facilitates the adoption of a negative attitude towards their evaluation.

Finally, the lack of educational evaluation for 24 years, per se, has limited the development of an "evaluation culture" among teachers.

Peer Evaluation

Kassotakis (2008) argues that, given the negative evaluation context in Greek education, it is appropriate for teacher evaluation to start with friendly types, which may be accepted by teachers, and will be focusing on their support and professional development. Formative peer evaluation would be such an approach.

The main arguments that establish the appropriateness of teachers as a vehicle for peer evaluation and teacher professional development stressed in the relevant literature are:

- Teachers are the best and most abundant source of instruction leadership available in schools today (Anderson, & Pellicer, 2001).
- Teachers are particularly well qualified to critique their colleagues' teaching when the objective is to improve quality of instruction, because they know better how children think and learn and the conditions that promote thinking and learning, than do students, administrators, and other constituencies of education (Keig, 2000; Kerchner, Koppich, & Weeres, 1997, as ref. in Anderson, & Pellicer, 2001).

- The culture of teaching comprises a strong norm of privacy in teaching that inhibits its growth (Danielson, & McGreal, 2000; Shulman, 1993, as ref. in Chism, 1999). Through peer evaluation teaching practice becomes a community property. Collective dialogue and sharing of successes and discoveries makes teachers aware of solutions that other teachers have made to facilitating students learning. Moreover, teaching is too important to leave to individual experimentation and private trial-and-error learning (Chism, 1999).
- Colleagues' perspective on a situation is a little different from their own and the provision of alternative points of view offers possibilities for a more balanced and accurate interpretation and confrontation of a school situation (Danielson, & McGreal, 2000).
- Teaching entails learning from experience, which is difficult to do without colleagues. It's difficult because to learn from experience, one must have a clear view, and that's hard to get in the booming, buzzing confusion of the classroom. Peers can help one another step back and see more clearly, and therefore learn from, their own teaching practice (Hutchings, 1996).
- Colleagues who respect and trust each other, through professional dialogue about teaching in a safe environment managed and led by teachers can be invaluable in helping to improve each other's teaching (Danielson, & McGreal, 2000; Keig, 2000).
- Peer evaluation puts teachers in charge for the quality of their work. It has the potential to provide the ultimate recognition of the expertise of teachers in the critical areas of teaching and learning (Anderson, & Pellicer, 2001; Chism, 1999; Hutchings, 1996).
- Traditional evaluation of teacher performance is generally recognized as a problematic, emotionally loaded process that is of low utility to teachers as a means for improving instruction. Peer evaluation is a promising alternative well accepted by teachers (Anderson, & Pellicer, 2001; Chism, 1999).
- Peer evaluation constitutes a large subset of a multi-perspective feedback / evaluation system (Peiperl, 1999; Danielson, & McGreal, 2000).

THE STUDY

Aims

The present study attempted to design, implement and assess a formative peer evaluation of teaching programme in Greek secondary education. The part of the study presented in this paper, focus on the investigation of the acceptance of the formative peer evaluation of teaching programme as well as its contribution to the improvement of teaching practice. This aim may be analysed to the following specific objectives:

a. To determine whether the devised observation/evaluation form was functional and effective.
b. To explore, through participating teachers' views and attitudes, the extent to which the programme was accepted and contributed to the improvement of their teaching practice.
c. To record teachers' views on the basic advantages and disadvantages of the programme as it was implemented.

Method

Sample

The sample of the study consisted of 56 secondary education teachers of various subjects (mainly Language, Mathematics and Science) who worked in 12 different school units of Attica (prefecture of Athens) during 2007-08 school year. Twenty nine of them worked in 4 lower secondary schools (Gymnasiums) and 27 of them in 8 Upper Secondary Schools (Lyceums). Five of the schools were Regular public schools (with 25 teachers), 2 of them were Laboratory (Experimental) public school (with 23 teachers), and the remaining 2 were Private schools (with 8 teachers). All participants took part in the study voluntarily.

The programme

The basic characteristics and processes of the formative peer evaluation of teaching programme, and its assessment were the following:

- Teachers formed couples or triads freely on the basis of mutual respect and trust, in order for their relationship to be characterised of sincerity, mutual interest, trust and openness in the

comments and the advice of the colleague. Evaluator and evaluee roles were rotated so that their relation to remain bilateral.

- Every participant should observe/evaluate her/his colleagues teaching at least twice and vice versa.
- The evaluee invited her/his colleague to observe/evaluate him/her.
- Before each observation/evaluation an informative session took place (pre-observation/evaluation conference).
- Every observation/evaluation should last 1 teaching hour (40-45 minutes).
- During or shortly after each observation/evaluation the evaluation form should be completed.
- Shortly after each observation/evaluation a feedback session took place (post-observation/evaluation conference). Feedback should be based on records on the evaluation form.
- The recorded in the evaluation form should remain confidential.

The evaluation form focused on two domains: "Classroom Environment" and "Elements of instruction". It comprises of two parts, the first was an adaptation of the rubrics proposed by Danielson (2007) for the above domains, while the second consists of open ended questions focusing on the same domains. The second part is similar with forms mostly used in higher education (Chism, 1999; Killen 1995; North Carolina State University, 2003; The University of Texas at Austin, 2005).

Research Instrument

The questionnaire, that investigated participating teachers' views and attitudes for the peer evaluation programme, included 28 closed and open ended questions with sub-questions. The majority of closed ended questions for investigation of views and attitudes were followed by a five point Likert type scale (5 = very much or detailed, 4 = much or adequately, 3 = moderately or soon, 2 = little or very soon, 1 = at all).

The questions aimed at investigating three main areas of information. The first area -questions 1 to 8- recorded the demographic characteristics of the participating teachers. The second -questions 9 to 20- attempted to record the views of the teachers for the instrument -the form- of peer evaluation they used. The third area -questions 21 to 28- targeted at bringing out teachers' views and attitudes towards the process and the effectiveness of formative peer evaluation of teaching programme, as it was implemented in their schools.

Results – Discussion

Implementation of the formative peer evaluation of teaching programme

According to the returned evaluation forms and to teachers' answers in the questionnaire, teachers carried out and received 2 peer evaluation sessions, which was the minimum programme requirement.

The number of observations / evaluations per school level (gymnasium/lower secondary and lyceum/upper secondary), and per school type (Regular public, Laboratory public, Private) are presented in Table 1.

Table 1: Number of observations/evaluations of teaching per school level and school type.

	Number of teachers	**Number of observations / evaluations**
Gymnasium	29	58
Lyceum	27	53
Regular public	25	50
Laboratory public	23	46
Private	8	15
Total	**56**	**111**

It seems that teachers carried out -and received- the minimum number of required observations/evaluations. This is not interpreted as a sign of indifference towards peer evaluation, but it is a consequence of teachers' demanding set of school duties, on which classroom observations/evaluations and conferences were added.

Moreover, the programme was not supported by schools' administration, and further, in the year the programme was implemented, a number of difficulties had disordered school operation (e.g. school occupation by protesting students, for about 1 month).

The adequacy of feedback during both conferences, according to the participating teachers' answers to the questionnaire, is presented in Table 2.

Table 2: How would you characterise the discussion / feedback during conferences?

	Mean value	**S.D.**
Pre- observation / evaluation conference	3.25	0.939
Post- observation / evaluation conference	3.73	0.751

Feedback in the post- observation/evaluation sessions appeared to be a little lower than "adequate" (4 on the Likert scale), while in the pre- observation/evaluation sessions the was closer to the "moderate" (3 on the Likert scale). Obviously teachers placed emphasis in the post-observation/evaluation conference, as this difference is statistically significant (t[55]=4,342, p=0,000).

The above data indicates that, as a whole, the programme's requirements were sufficiently met. Therefore, teachers' views and attitudes towards the programme were based on their experiences, a fact that increases the validity of their answers. On the other hand, the minimum required number of observations/evaluations of teaching, as well as the almost adequate feedback shows that the exchanged information, feedback and support among participants were sufficient but not optimum.

Thus, the results produced by the programme should be considered as the outcome of a sufficient but not optimum implementation.

Views and attitudes towards the evaluation form

Participants considered that the two domains: "Classroom environment" and "Elements of instruction" on which the evaluation focused, were very important for improving their teaching practice (M=4.23 S.D.=0.687). This finding substantiates the choice made for the programme to focus on these domains.

Domain: "Classroom environment"

Teachers expressed strong agreement with the evaluation statements-components that comprised the domain "Classroom environment", as presented in Table 3.

Table 3: Level of agreement with components of domain: "Classroom Environment".

	Mean value	**S.D.**
Creating an environment of mutual respect	4.79	0.414
Managing student behaviour	4.70	0.464
Creating an environment of co-operation	4.61	0.562
Creating an environment of high expectations for learning and achievement	4.54	0.538

The internal consistency among the above mentioned components was high (Cronbach alpha=0.679). The relatively higher level of agreement with the components "Creating an environment

of mutual respect" and "Managing student behaviour" may implies that Greek teachers consider as relatively more important the classroom environment components which are controlled by teachers and as relatively less important those which are student-centred.

Domain: "Elements of instruction"

Teachers' agreement with the 8 statements-components that comprise the domain "Elements of instruction" was also high, as shown in Table 4.

Table 4: Degree of agreement with components of the domain "Elements of instruction".

	Mean value	**S.D.**
Ability to communicate	4.82	0.386
Lesson presentation	4.77	0.467
Ability to convince for the importance of subject matter	4.71	0.456
Flexibility and responsiveness to student questions and needs	4.70	0.464
Engaging students in learning	4.57	0.735
Using questioning and discussion techniques	4.48	0.539
Ability to use a variety of teaching techniques	4.30	0.685
Persistence for the success of all students	4.23	0.738

The internal consistency among the components of this domain was even higher (Cronbach alpha=0.819).

The hierarchical presentation of the components of this domain shows that the higher level of agreement was expressed for teacher controlled characteristics of teaching, (ability to communicate, presentation of the lesson) whilst the lowest in order were the teaching characteristics that focus on students needs (variety of teaching techniques, persistence for the success of all students).

The relatively lower expressed importance to the latter components may be related to:

- Greek teachers' weaknesses rooted in deficits in their initial education and training.
- Integral difficulties to use individualized teaching and a variety of teaching techniques in classes of about 30 students and a much extended syllabus.
- The existence of unmotivated students. Teachers have to deal with students, who cannot follow the learning pace imposed by the curriculum due to learning deficits from the past or to low ability, and also students who are completely university entry examinations oriented, and totally ignore non examined subjects.

Utility of the evaluation form

Overall, participating teachers assessed the utility of the evaluation form as very good (M=4.05, S.D.=0.705).

Open ended questions investigated which, in their views, were the advantages and the disadvantages of the form. Out of the 56 teachers, 33 referred to advantages of the evaluation form. The most frequently mentioned advantage was: "It is explicit and comprehensive. It contains all the necessary elements that characterize an instruction successful", with 20 references.

Respectively, 21 teachers referred to disadvantages. The most frequently mentioned disadvantage was «It did not take into account the level of students and the unevenness of the class», with 6 references.

Teachers' views about the two parts of the evaluation form are presented in Table 5.

Table 5: Teachers' views on the parts of the evaluation form.

	Which part covers more thoroughly the two domains of the evaluation?		Which part assists more in the detection of strong and weak points of teaching?		Which part facilitates feedback more?	
	N	%	N	%	N	%
1st part (rubrics)	10	17.9	6	10.7	3	5.4
2nd part (open ended questions)	7	12.5	6	10.7	12	21.4
Both parts equally	39	69.6	43	76.8	41	73.2
None	0	0.0	1	1.8	0	0.0
Total	56	100.0	56	100.0	56	100.0

The above indicate that teachers found both parts equally useful and their combination efficient. Teachers' who favoured one part over the other, seem to believe that open ended questions better support feedback process, and to a much lower extent that rubrics cover more thoroughly the two domains of the evaluation.

Concluding, the evaluation form was well accepted by teachers and supported the programme implementation. Also, its structure appeared to be successful.

Views and attitudes towards the effectiveness of the programme to improve teaching practice

Participants expressed the view that the programme is effective in improving teaching practice (Table 6).

Table 6: Effectiveness of the programme to improve teaching practice.

	Mean value	**S.D.**
In general, does peer evaluation assist teachers to improve their teaching practice?	4.07	0.871
Did it assist you, personally, to improve your teaching practice?	3.61	0.846

Teachers expressed high appreciation for the general potential of formative peer evaluation of teaching to improve teaching practice. Their appreciation appeared to be an indication of the effectiveness of the programme. Teachers' perceived level of personal improvement was however significantly lower (t[55]= 4,078, p= 0,000).

This finding was not surprising. Teachers appeared to think that the programme was a good idea for improving teaching practice, but certain problems may have accounted for a lower personal improvement, such as: a) work overload, b) small duration of the programme and limited number of observations/evaluations of teaching, c) incompatibility with or limited feedback from the peer evaluator.

The investigation whether the perceived improvement (general and personal) was differentiated by any of the demographic variables (School level, School type, Gender, Subject, Age, Years of Service and Studies), demonstrated only one statistically significant difference regarding personal

improvement and school type. In particular, teachers of Regular public schools tend to believe that they benefited more from the programme than teachers of Laboratory public schools (Table 7).

Table 7: Personal improvement and school type.

	School type	N	Mean value	S.D.	DF	F	p
Did it assist you, personally, to improve your teaching practice?	Regular public	25	3,88	0,781	53	3.665	0.032
	Laboratory public	23	3,26	0,864			
	Private	8	3,75	0,707			

A post hoc analysis (Scheffe multiple comparisons: $p_{regular\text{-}laboratory} = 0.037$, $p_{regular\text{-}private} = 0.925$, $p_{laboratory\text{-}private} = 0.344$) showed that laboratory public schools' teachers felt that were assisted significantly less than the others.

A further investigation on the aspects of teachers' work improved by formative peer evaluation of teaching is presented on Table 8:

Table 8: Other aspects of teacher work that formative peer evaluation of teaching improves.

The program improves	Mean value	S.D.
the level of co-operation among teachers	4,20	0,755
teachers self-confidence	4,07	0,790
sharing of good teaching practices	4,00	0,831

The above data show that teachers strongly believed that the programme improved simultaneously and evenly co-operation among teachers, self-confidence as well as the sharing of good teaching practices, as the above mean differences were not statistically significant.

Comments regarding personal improvement

The comments teachers made regarding the influence of the programme on the improvement of their personal teaching practice are summarised as follows:

- The main positive factors which facilitated their improvement were: "The accurate colleague remarks" (14 references) or "The observation of colleagues' teaching practice" (9 references). In other words teachers mainly mentioned the basic benefits of formative peer evaluation.
- The main negative factors which inhibited their improvement were: "The limited number of evaluations of teaching, the work overload, and the lack of time" (7 references), "The observed lessons did not help, I did not change my teaching practices at all" (4 references). These comments demonstrate the necessity for a long-term and better supported programme implementation which in turn calls for school administration support.

Emotions regarding the programme

Participation to formative peer evaluation of teaching caused pleasant, positive feelings to the majority of the teachers. In particular, 49 teachers responded to this open ended question and mentioning that they experienced:

- Very positive, positive or pleasant feelings (28 teachers).
- Anxiety at first, positive feelings afterwards (11 teachers).
- Neutral feelings (5 teachers).
- Embarrassment - light stress which subsequently decreased (2 teachers).
- Insecurity – light stress (2 teachers).
- Anxiety (1 teachers).

The positive attitude of teachers towards the formative peer evaluation of teaching programme was also evident when they declared that they would like to participate again in a similar one (Table 9).

Table 9: Future participation in a similar programme?

	Would you participate again in an analogous programme?	**Percentages %**
Yes	47	83.9
No	3[a]	5.4
I don't know	6	10.7
Total	**56**	**100.0**

[a] These three teachers expressed the views that a) "educational evaluation is useless", b) "educational evaluation is unimportant" and c) "teacher personality is the factor that largely determines teaching", respectively.

Advantages, Disadvantages and suggestions about the programme

Advantages were mentioned by 40 of the 56 teachers. The most frequent of them coincided with the main arguments advocating for its implementation:

- "It provided valuable feedback. It helped in exchanging views and the 'opening' of the classroom. It helped to reveal teaching deficiencies and mistakes in a friendly atmosphere" (15 references).
- "It improved communication and dialogue among colleagues" (11 references).
- "It improved teaching practice" (9 references).

Disadvantages were mentioned by 27 of the participating teachers. The most frequent of them is related to the fact that the programme is time-consuming: "The lack of time. The procedure was time-consuming. Two observations/evaluations of teaching were not enough" (17 references).

Suggestions for programme improvement were made by 29 teachers. The most frequent of them were:

- "To place greater emphasis on feedback (more practical / more specific)" (5 references).
- "Extended programme operation. More observations/evaluations of teaching» (5 references).

The advantages, the disadvantages, and the suggestions made by teachers stress the need to support programme implementation, especially by school heads. Some supportive measures could be: a) to adjust teaching hours of pairs or triads in order to facilitate reciprocal observations/evaluations, b) a small reduction of teaching hours during programme implementation, c) availability of a room for the sessions d) easement with copies, workshops etc.

Conclusions

The main conclusions from the results of this study are the following:

Peer evaluation of teaching is a form of evaluation that may well be implemented in Greek secondary education on a school level basis. It is a form of evaluation which is well accepted by teachers, does not arise negative feelings or stress and it may offers a lot to the improvement of their teaching practice and professional development. It may also promote communication and cooperation among teachers, and limit the "privacy" of teaching as well as the isolation of teachers. Besides, it is a "bottom up", friendly approach, in complete contrast with the traditional methods of hierarchical, "top down", summative teacher evaluations, which faced the fierce opposition by teachers' unions, since they were considered as policies that indented to control teachers (DOE, 2005; OLME, 2003). Peer evaluation ensures consensus among evaluators and evaluees, has an accepted theoretical framework,

domains, evaluation criteria, and convinces teachers that the product of the evaluation process is for the benefit and the upgrade of education as a whole.

The evaluation form which was devised and used appeared to have essentially supported the peer evaluation of teaching programme, since it was characterized as very practical and it was in congruity with teachers beliefs. Its construction in two parts proved to be successful. Forms analogous of the first part (rubrics) have already used successfully, in numerous evaluation systems (e.g. Heneman, & Milanowski, 2003; Oklahoma Teacher Enhancement Program, 2007; Pennsylvania Department of Education, 2008). The same stands for its second part (open ended questions) regarding mainly tertiary education (e.g. North Carolina State University, 2003; The University of Texas at Austin, 2005). Moreover, it seems appropriate for the poor evaluative culture of Greek education, since in the first part the specified evaluation criteria allows evaluators to focus their observation on the important components of teaching and simultaneously provides the evaluation framework on which the open ended questions of the second part must be answered. The open ended questions of the second part, conversely, allows deeper reflection and free expression on issues related to teaching practice, something that promotes feedback during post- observation/evaluation conference.

According to teachers, the improvement of their teaching practice due to the programme was significant, although its application was sufficient not optimum as it did not receive any support from the heads of the schools where it was implemented. Formative peer evaluation of teaching (based on the programme of the present study) therefore, appears an effective process for the professional development of Greek secondary teachers. This supports similar findings of numerous relevant studies (e.g. AFT / NEA, 1998; Allen, & LeBlanc, 2005; Anderson, & Pellicer, 2001; Boyle, Lamprianou, & Boyle, 2005; Keig, 2000; Shinkfield, 1994; Slater, & Simmons, 2001).

The only factor that differentiated the perceived teacher improvement appeared to be the type of school. Although generalisable conclusions can not be made due to the limited sample of the study, this finding implies that Regular public schools teachers are more "thirsty" for feedback about their teaching. Private schools and mostly Laboratory public schools may have explicit or implicit feedback provisions, but most Regular public school teachers, where the great majority of Greek students study, do not get any feedback, although they seem to need it.

The main restriction of the study is –as mentioned above- its sample. It was small and convenient in the sense that it was not representative of Greek secondary teachers. The difficulties of such an emprise are evident; however the benefits of such an attempt would be evident as well.

References

AFT / NEA (1998). *Peer Assistance and Peer Review*. An AFT / NEA Handbook. Washington DC.

Allen, D. W., & LeBlanc, A. C. (2005). *Collaborative Peer Coaching That Improves Instruction. The 2 + 2 Performance Appraisal Model*. California: Corwin Press.

Anderson, L. W., & Pellicer, L. O. (2001). *Teacher Peer Assistance and Review*. California: Corwin Press.

Bagakis, G. (2007). Reflections on the Greek educational changes after our participation in the project Carpe Vitam. Leadership for Learning [Αναστοχασμοί για τις ελληνικές εκπαιδευτικές αλλαγές μετά τη συμμετοχή μας στο πρόγραμμα Carpe Vitam. Leadership for Learning]. In: G. Bagakis, K. Demertzi, & T. Stamatis (Eds.) A school that learns. Self-evaluation and development of a school in the framework of the international project Carpe Vitam. Leadership for Learning *[Ένα σχολείο που μαθαίνει. Η αυτοαξιολόγηση και η ανάπτυξη ενός σχολείου στο πλαίσιο του Διεθνούς Προγράμματος Carpe Vitam. Leadership for Learning]* (pp. 263-273). Athens: Livani.

Bagakis, G., Demertzi, K., & Stamatis T. (Eds.). (2007). A school that learns. Self-evaluation and development of a school in the framework of the international project Carpe Vitam. Leadership for Learning *[Ένα σχολείο που μαθαίνει. Η αυτοαξιολόγηση και η ανάπτυξη ενός σχολείου στο πλαίσιο του Διεθνούς Προγράμματος Carpe Vitam. Leadership for Learning]*. Athens: Livani.

Boyle, B., Lamprianou, I., & Boyle, T. (2005). A Longitudinal Study of Teacher Change: What makes professional development effective? Report of the second year of the study. *School Effectiveness and School Improvement*, 16(1), 1-27.

Chism, V. N. N. (1999). *Peer review of teaching. A Sourcebook*. MA: Anker Publishing Company Inc.

Danielson, C. (2007). *Enhancing Professional Practice: A Framework for Teaching*. (2nd Ed.). Association for Supervision and Curriculum Development.
Danielson, C., & McGreal, T. L. (2000). *Teacher Evaluation to Enhance Professional Practice*. Alexandria, VA: Association for Supervision and Curriculum Development.
Darling-Hammond, L. (1990). Teacher professionalism: why and how? In: A. Lieberman (Ed.), *Schools as collaborative cultures: creating the future now*, (pp. 25-50). London: Falmer Press.
Demetropoulos, E. (2004). Educational evaluation, volume A΄. Evaluation of education and educational work *(Εκπαιδευτική αξιολόγηση τόμος Α΄. Η Αξιολόγηση της εκπαίδευσης και του Εκπαιδευτικού έργου)* (5th Edition). Athens: Grigori.
DOE [Greek Federation of Primary School Teachers] (2005). Administration Board decision for the action plan of 2005-2006 (Oct 11, 2005) *[Απόφαση Δ.Σ. για πρόγραμμα δράσης 2005-2006 (11-10-2005)]*. Retrieved April 5th, 2008, from: http://www.doe.gr/rarticle.php?id=312&lan=0/.
Goodson, I. F. (1995). Sponsoring the Teacher's Voice: Teachers' Lives and Teacher Development [Στηρίζοντας τη φωνή του εκπαιδευτικού. Η ζωή του εκπαιδευτικού και η εξέλιξη των εκπαιδευτικών]. In: A. Hargreaves, & M. Fullan (Eds.). Understanding teacher development *[Η εξέλιξη των εκπαιδευτικών]* (pp. 175-192). Athens: Patakis.
Hatzipanagiotou, P. (2001). Teachers' training. Issues regarding organization, planning and evaluation *[Η επιμόρφωση των εκπαιδευτικών: Ζητήματα Οργάνωσης, Σχεδιασμού και Αξιολόγησης.]*. Athens: Dardanos.
Heneman, G. H., & Milanowski, T. A., (2003). Continuing Assessment of Teacher Reactions to a Standard-Based Teacher Evaluation System. *Journal of Personnel Evaluation in Education*, 17(2), 173-195.
Hargreaves, A, & Fullan, M. (Eds.) (1995). Understanding teacher development [*Η εξέλιξη των εκπαιδευτικών*]. Athens: Patakis.
Hutchings, P. (1996). The Peer Collaboration and Review of Teaching. *The Professional Evaluation of Teaching*, American Council of Learned Societies, occasional paper no. 33. Retrieved April 5th, 2008, from: http://www.acls.org/op33.htm#Hutchings.
Kassotakis, M. (2008). Evaluation of educational work: Reflection and questioning *[Αξιολόγηση του εκπαιδευτικού έργου: σκέψεις και προβληματισμοί.]*. Lecture in Conference organized by the School Consultants of second region of Athens, «Evaluation in teaching practice» [«Η Αξιολόγηση στη Διδακτική Πράξη»], February 23, 2008, Athens College – Psychiko College.
Katanou, T. A. (2004). Teacher Training in Regional Teacher In-service Training Centres [*Η επιμόρφωση των εκπαιδευτικών στα Περιφερειακά Εκπαιδευτικά Κέντρα*]. Thesaloniki: Kyriakidis.
Kazamias, A. & Kassotakis, M. (Eds.) (1995). Greek Education: Perspectives for reconstruction and modernization *[Ελληνική Εκπαίδευση: Προοπτικές ανασυγκρότησης και εκσυγχρονισμού]*. Athens: Sirios.
Keig, L. (2000). Formative Peer Review of Teaching: Attitudes of Faculty at Liberal Arts Colleges Toward Colleague Assessment. *Journal of Personnel Evaluation in Education*, 14(1), 67-68.
Killen, R. (1995). Improving Teaching Through Reflective Partnerships. In: E. Neal, L. Richlin, (Eds), *To Improve the Academy: Resources for Faculty, Instructional, and Organizational Development*. (pp. 136-142). Oklahoma: New Forum Press. Retrieved April 5th, 2008, from ERIC (ED 392386): http://www.eric.ed.gov/.
Licklider, B. L. (1995). The Effects of Peer Coaching Cycles on Teacher Use of a Complex Teaching Skill and Teachers' Sense of Efficacy. *Journal of Personnel Evaluation in Education*, 9, 55-68.
Lignos, D. (2006). Reflections and findings about teachers training [Σκέψεις και διαπιστώσεις για την επιμόρφωση των εκπαιδευτικών.]. *Virtual School, The sciences of Education Online*, 3(3). Retrieved April 5th, 2008, from: http://www.auth.gr/virtualschool/3.3/Praxis/LignosTrainingEducators.html.
Mavroyiorgos, G. (1998). Should care a lot about teachers [Τους εκπαιδευτικούς και τα μάτια σας.]. Modern Education *[Σύγχρονη Εκπαίδευση]*, 100, 41-45.
North Carolina State University (2003). *Observation for Formative (Developmental) Purposes*. Retrieved April 5th, 2008, from: http://www.ncsu.edu/provost/peer_review/formativeobserve.htm.
OECD (1996). *Reviews of National policies for Education – Greece*. Paris: OECD.

OECD (2001). *Knowledge and Skills for Life. – First Results from PISA 2000*. Paris: OECD.
OECD (2004). *Learning for Tomorrow's World. First Results from PISA 2003*. Paris: OECD.
OECD (2007). *PISA 2006. Science Competencies for Tomorrow's World Volume 1 – Analysis.* Paris: OECD.
Oklahoma Teacher Enhancement Program [OTEP] (2008). *Oklahoma Teacher Evaluation and Support System*. Retrieved April 5th, 2008, from: http://www.okhighered.org/OTEP/resources.shtml.
OLME [Greek Federation of State School Teachers of Secondary Education] (2003). General assembly of the presidents of ELME of Greece decision (9-26-2003) *[Απόφαση της Γ.Σ. των προέδρων των ΕΛΜΕ της χώρας (26-9-2003)]*. Retrieved April 5th, 2008, from: http://www.olme.gr/.
Papanaoum, Z. (2003). *Teachers profession (Το επάγγελμα του εκπαιδευτικού)*. Athens: Dardanos.
Papaprokopiou, N. (2002). Interactions between academic community and educational institutions. The role of supervisor professor [Αλληλεπιδράσεις μεταξύ ακαδημαϊκής κοινότητας και εκπαιδευτικών θεσμών. Ο ρόλος του επόπτη καθηγητή]. In: G. Bagakis (Ed.). *Teacher as researcher [Ο εκπαιδευτικός ως ερευνητής]* (pp. 98-107). Athens: Metaichmio.
Peiperl, M. A. (1999). Conditions for the success of peer evaluation. *The International Journal of Human Resource Management*, 10(3), 429-458.
Pennsylvania Department of Education (2007). *Charter Annual Report*. Retrieved April 5th, 2008, from: http://www.pde.state.pa.us/.
Shinkfield, A. (1994). Principal and Peer Evaluation of Teachers for Professional Develpment. *Journal of Personnel Evaluation in Education*, 8, 251-266.
Slater, C. L. & Simmons, D. L. (2001) The design and implementation of a Peer Coaching program. *American Secondary Education*, 29(3), 67-76.
Stylianidou, F., Bagakis, G., & Stamovlasis, D. (2004). *Attracting, Developing and Retaining Effective Teachers. Country Background report for Greece*. Retrieved April 5th, 2008, from: http://www.oecd.org/document/46/0,3343,en_2649_201185_37586286_1_1_1_1,00.html.
The University of Texas at Austin (2005). *Preparing for Peer Observation. A Guidebook* (Prepared by The Center for Teaching Effectiveness). Retrieved April 5th, 2008, from: www.utexas.edu/academic/cte/PeerObserve.html.
TIMSS (1996). *Science Achievement in the Middle School Years: IEA'S Third International Mathematics and Science Study (TIMSS)*. Retrieved April 5th, 2008, from: http://timss.bc.edu/timss1995i/SciencB.html.
Xochellis, P. & Papanaoum, Z. (2000). Teacher in service training: Greek experiences 1997-2000 *[Η ενδοσχολική επιμόρφωση των εκπαιδευτικών: ελληνικές εμπειρίες 1997-2000]*. Thesaloniki: Action.
Zouganeli, K. (2007). Mechanisms for the support and feedback of education: Training, Educational Research and Evaluation *[Μηχανισμοί Υποστήριξης και Ανατροφοδότησης της Εκπαίδευσης: Επιμόρφωση, Εκπαιδευτική Έρευνα και Αξιολόγηση]*. Lecture in Conference organized by the *Education Research Centre of Greece*: «Quality of Educational work: From system recording to intervention planning» [«Η Ποιότητα του Εκπαιδευτικού Έργου: Από την Αποτύπωση του Συστήματος στο Σχεδιασμό Παρεμβάσεων»]. Athens, November 15-16, 2007.

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(C.21)

Secondary Teachers' Attitudes to Full-Year Acceleration

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Abstract

There is much research evidence in support of the academic benefits of acceleration, and while there is some evidence of the social and emotional benefits, the quantitative data is not as robust in this area. The use of acceleration for gifted students, however, is not common, and an analysis of the literature suggests that it is the **perceptions** of teachers, rather than the evidence of the results of published studies, which have caused the hesitation to utilize acceleration as a strategy for gifted students. This study (N=455), sought to identify various groups of secondary teachers' perceptions towards full year acceleration of gifted students at junior secondary level (age 13/14). The findings confirm that the strategy is rarely used in NZ, although there was a high level of willingness on the part of teachers to utilize it in future provision for gifted students.

Introduction

Acceleration, as a strategy for gifted students, has been practised since Plato, Socrates and Aristotle. Traditionally, the expectation was that student performance would determine the placement level and the time taken to complete schooling. By the early twentieth century in many Western developed countries however, mandatory school attendance had led to increased enrolment, which in turn led to more rigid age-grade placement structure (Daurio, 1979; Pressey, 1949). This concept of retaining gifted students with their chronological peers is a relatively new initiative, having been introduced in the last 150 years. "Social placement" has become the norm, mainly as a method to control the movement of increased numbers of students through the schooling system. The popularity and the practice of acceleration has ebbed and flowed in the United States over the last 150 years. In the United Kingdom, Australia and New Zealand, the practice of planned programs of acceleration in educational settings has barely begun.

Acceleration was defined by Townsend (1996) as a 'vertical' extension of the curriculum as opposed to 'horizontal' extension, which is commonly called enrichment. He found that "in spite of the overwhelming evidence of the positive effects of acceleration, it remains relatively unused in educating gifted children in New Zealand" (p. 361). Acceleration is in many ways a misnomer; as it implies a speeding up or for some, a sense of hurry. Southern and Jones (1991) argued that:

> Saying that a student has been accelerated, we seem to imply that some process has been employed to speed that student along. The term 'accelerate' in everyday usage means after all, to speed up. In the real world of schools however, this is rarely the case. Quite often, acceleration is the administrative recognition of a student's current academic performance. When a student skips a grade, it is because the school realizes that the student has mastered all the knowledge and skills to be taught at the current placement… In practice, the student is rarely 'sped along' (p. 18)

Gifted Education in New Zealand – A Tower of Babel

From term one, 2005, a change to the National Administration Guidelines (NAGS) made it mandatory for New Zealand schools to attend to the needs of "gifted and talented" students. A major barrier to many implementations has been the multiple and contested definitions in gifted education in New Zealand. In the United States and Australia, the term "moderately gifted" is used to describe a student who has an IQ of 130 plus, with 'exceptionally/extremely gifted' scoring 150 plus (Gross, 2004). In New Zealand, IQ scores are now not readily available and the debate as to what constitutes "gifted and talented" continues.

In 2003, the Ministry of Education, in response to a recommendation made in the report from the Working Party on Gifted Education (2001), commissioned research to discover how schools provided

for their gifted students and to determine the efficacy of their programs. The report by Riley, Bevan-Brown, Bicknell, Carroll-Lind and Kearney (2004) found that less than half (47%) of the responding schools reported that they had a school-based definition for gifted students. Even those schools with definitions, described behaviours and procedures rather than a definition of Gifted and Talented, in terms of achievement (Riley et al., 2004). Their research found no literature of frequently utilized acceleration strategies in New Zealand. The various acceleration options **could** include: full year acceleration; subject acceleration; curriculum compacting/telescoping; advanced placement; concurrent enrolment: early entrance to secondary or university. (In New Zealand, children legally cannot start school until their 5th birthday, so accelerated entry to first year of schooling is not permitted.) "Accelerate classes" in New Zealand may refer to 'whole class' streaming or in many cases, a class where much enrichment occurs. There may, or may not be a vertical extension of the curriculum available in these classes.

Teachers in this current study also reported the use of "advanced learning classes", "enrichment classes" and "academy" classes. The confusion, similar to a Tower of Babel that results from the naming of these classes, serves to hamper exchange of information on what exactly is offered to gifted students in New Zealand secondary schools.

Riley et al's. study showed that at best, New Zealand secondary schools generally limit their use of acceleration to single subjects. This limitation in vertical acceleration, according to a claim made by teachers in this current study, results in students' pathways being compromised as the choice of available subjects becomes too narrow in the final years of schooling. Dual enrolment with tertiary courses is a possibility for some, but financial and other realities preclude that option for many students who have been accelerated in single subjects. Moreover, the cost and geographical location of tertiary courses limit their accessibility. Teachers, therefore, have tended to perceive acceleration, in general, as a short-term strategy with no useful long-term gain for the student. The current study therefore focused on teachers' attitudes to **full year** acceleration in order to find a common understanding about our beliefs and practices.

Meta analyses by Kulik and Kulik (1984), and Rogers (1991) reported many academic benefits of acceleration for gifted students. Kulik and Kulik (1984) found the median effect size was .8; considering Hattie's (1992) report on effect sizes, a result of this magnitude was significant and translates to approximately one full year or more, above the scores of bright non-accelerated students. In re-considering their findings, Kulik (2004) was moved to explain its significance in a personal statement. "In a review of approximately 100 different meta-analyses of research findings in education, Chen-Lin Kulik and I were not able to find any educational treatment that consistently yielded a higher effect size than this one" (p. 20).

Rogers (1991), in her "best evidence synthesis", found that grade-skipping (full year acceleration) was found to have an academic effect size of .78. The socialization effect size for grade skipping was found to be .46, which equates to almost half a year of positive growth. It is important to note that while the effects on social outcomes was less than on achievement outcomes, the effect-size is still quite substantially positive, thus arguing against the common claim that the effects of acceleration of social outcomes is negative.

Kent (1992), applied meta-analysis procedures on 23 research studies which reported social and emotional outcomes of acceleration of gifted elementary students. Her results showed the negative effects were minimal and overall the effects were positive, although small; the mean effect size for all the social and emotional variables in her research was .13. Southern (electronic download), described the effect as "neutral", in that the studies find virtually no effect, positive or negative, on the social and emotional development of accelerated students.

It would seem however that Roger's (1991) findings of .46 for socialization effects were considerably greater than "neutral". Roger's "socialization" outcomes included: Social maturity scores; teacher ratings of social skills; participation in extra-curricular activities and leadership roles

held. Kent identified "relationships" with an effect size of .23, and "participation" with a very small effect size of .05, as her focus on social development. The differences in the selection of focus areas might explain the reason Kent's overall effect size for social factors was lower than Roger's findings.

Methods

The three groups of participants in this current study completed the same "Attitudes to Full Year Acceleration Survey", which was adapted from the 22 item scale reported by Southern, Jones and Fiscus (1989). An attempt was made to survey schools in each socio-economic (decile) rating and to represent each geographical region in the North Island, New Zealand. Six schools from within the greater Auckland area and four schools from other geographical regions within the North Island agreed to take part in the survey. The four schools outside Auckland were selected first by geographical area, then by decile rating. The six Auckland schools were selected randomly from within each decile rating.

The researcher contacted principals, or their nominated representatives, for inclusion in the survey; four Auckland schools did not reply to initial telephone enquiries and follow-up emails. The researcher then selected 4 further schools, who agreed to participate. Secondary teachers from this stratified sample of 10 schools made up the first group.

The researcher delivered the surveys and Participant Information Sheets, in person, to each school, which then nominated a method of distribution to teaching staff. Completed surveys were deposited into a sealed box, which was then collected by the researcher. As per permission granted by the University of Auckland Human Participants Ethics Committee, the delivery and collection method employed, ensured no third party had access to the completed surveys. Travel costs were the reason for not including South Island schools in the survey.

To evaluate whether the views about acceleration developed in the classroom, or were present in pre-service teacher education students, the second and third groups of participants were Faculty of Education students at the University of Auckland. One group consisted of students enrolled as secondary student teachers, and the other group consisted of students enrolled in a general education course, many of whom were qualifying as teachers to work overseas.

Instrumentation

The questionnaire requested demographic information (gender, age group, ethnicity), and years of teaching experience. All respondents were asked if they had any experience of **full year** (or more) acceleration. A further question asked if respondents had experience of any other acceleration strategies (e.g., subject acceleration, early entrance, curriculum compacting/ telescoping, advanced placement, and concurrent enrolment were offered). Details were requested if respondents answered in the affirmative to either question.

A 22 item scale on 'Attitudes to Full Year Acceleration' was adapted from Southern, Jones and Fiscus (1989). Southern et al. (1989) developed their questionnaire from issues raised in literature reviews as **objections** to acceleration as a strategy for gifted students. The stem statements considered the potentially negative effects across four aspects: academic adjustment; social development; emotional adjustment, and inhibitions in the development of leadership. Participants were asked the extent to which they disagreed or agreed (on a 5-point Likert scale) with these 22 statements on the effects of full year acceleration.

Townsend and Patrick (1993) also used the same scale to determine attitudes to acceleration in primary and student primary teachers at the Auckland College of Education. Townsend and Patrick added a global item with reverse scoring to determine the potential harmful effect of **not** accelerating gifted primary children. This question seemed to cause confusion in the responses of the first four schools surveyed in the current study, therefore the researcher changed the wording in that item from "harmful" to "harmless" in the remainder of the surveys, thus allowing all items to be scored in the same way.

All statements were negatively worded: disagreement with the statements equated to favourable attitudes to full year acceleration. Finally, an open section gave the opportunity for any other comments to be added. This was well utilised and some of the qualitative data gathered are quoted throughout this report.

Results

The response rate of 39% (N=455) is an under-representation of the true return rate of this anonymous survey. The response rate for teachers was calculated using the total number of teaching staff as given in the latest Education Review Office (ERO) report for each school. No allowance has been made for teachers who were off-campus at the time of the survey. The response rate was higher from the medium to smaller sized schools, than from the larger schools. The 191 tertiary students were surveyed, following a general lecture, in March 2007 and the response rate was calculated using the total enrolled for each course.

None of the groups were provided with information on gifted education prior to the survey. Across the sample, respondents included teachers (58%), students in an education course (13%), and student teachers (29%).

There were slightly more females in the sample to the national norms for secondary teachers (64% vs. 57%) and slightly fewer males (33% to 43%). The age distributions were similar (< 30 19% vs. 13%, 31-40 23% vs. 20%, 41-50 20% vs. 30%, 51-60 30% vs 29%, > 60 7% vs. 7%). No data were available to the researcher on the ethnicity of secondary teachers nationwide; however the percentage of each ethnicity was compared with the latest census data.

The percentage of NZ European was similar (78% vs. 79%), but there were fewer teachers who identified as Maori (5% vs 15%) or Pacific Islanders (1% vs 7%) and it is likely the percentages in the sample would increase if more than one ethnicity was allowed (as is the case in the census). The survey also showed the respondents represent a wealth of teaching experience (22% <5 years, 25% 6-10 years, 6% 11-15 years, 10% 16-20 years, 12% 21-25 years, and 26% > 25 years).

Teachers were asked if they had any experience of full year (or more) acceleration. Approximately two thirds (68%) of teachers reported having no experience of the strategy, and of the 32 % who had experience of the strategy, most explained that it was experience of students who had been accelerated at their primary schools.

Of the student teachers, 83% reported no experience of full year acceleration. Information was sought on teachers' experience of other strategies, including subject acceleration; early entrance; curriculum compacting/ telescoping; advanced placement; concurrent enrolment. 47% reported no experience of other accelerative strategies; 53% reported experience of other accelerative strategies with the majority citing subject acceleration Concurrent enrolment with tertiary while still at school was an option reported on favourably by almost all respondents who had experience of that strategy.

One purpose of this study was to compare these findings with Southern et al. (1989) and Townsend and Patrick (1993). As all of the sample sizes are quite large (N=554; N=292 and N=455, for each of the three groups respectively) it is likely that the sample size is sufficiently powerful to detect meaningful differences. A factor analysis of the data identified four clusters of the questions. Further examination of the questions identified them as concerning: Q1,2,4,5 and 21 referred to academic issues; Q6,8,and 9 referred to social concerns; Q12,13,14,15,16,17,18 and 19 referred to emotional concerns and Q10 and 11 to leadership concerns. Q 3, 7, 20 and 22 did not identify with any of the clusters and therefore were eliminated from the analysis as outlying items.

Table 1 shows the means of the questions in groups of four factors across the three groups of the study (secondary teachers; education students and student teachers). A score of 1 equates to 'strong disagreement' with each **negatively** worded stem statement; 2 shows 'disagreement'; 3 depicts

'unsure'; 4 shows 'agreement' and 5 equates to 'strong agreement'. **The lower the score, the more in favour of acceleration.** In the academic factor, the means for the teachers were considerably lower than the student teachers; with the education undergraduates proving to be the highest of the three groups in terms of concerns about academic issues of acceleration.

This result was mirrored in the other factors of social, emotional and leadership issues. In general, the teacher group had fewest concerns, with the exception being Q11 on leadership skills. On this question, the student teachers were adamant that accelerated students would not miss out on leadership skills. The other groups agreed, but not quite so strongly.

Table 1: Items, means and standard deviations for the total group, and the three groups separately.

			Teacher		Ed.St		Student Teachers	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Academic								
1. Accelerating a gifted student places too high a level of academic demand on the student.	2.40	0.98	2.31	0.89	2.80	1.22	2.40	0.98
2. A high level of academic demand will later lead to diminished performance.	2.25	0.83	2.23	0.82	2.48	0.94	2.20	0.79
4. Acceleration is unnecessary because other less gifted same-age peers tend to catch up.	2.24	0.88	2.18	0.82	2.61	1.05	2.18	0.88
5. Accelerated students will not do as well in the new classes because of increased academic competition.	2.21	0.82	2.13	0.78	2.47	0.90	2.23	0.85
21. The chronological age is a more important consideration than the level of academic achievement when planning educational programmes for gifted students.	2.50	.02	2.42	.04	2.75	1.10	2.54	0.92
Social								
6. Accelerated students will miss important social interactions.	2.92	1.11	2.89	1.09	3.02	1.26	2.93	1.07
8. Accelerated students will have fewer friends than if they remain in classes with their same-age peers.	2.65	1.03	2.56	1.00	2.65	1.16	2.82	1.01
9. Accelerated students will not socialize well with other students.	2.43	0.90	2.40	0.87	2.41	1.07	2.48	0.87
Emotional								
12. Accelerated students will tend to be involved in fewer extra-curricular activities.	2.43	1.04	2.33	1.02	2.77	1.19	2.47	0.95
13. Accelerated students will tend to become conceited or arrogant.	2.52	0.97	2.47	0.99	2.85	1.05	2.45	0.86
14. Accelerated students will not be as happy as gifted children who remain with their same-age peers.	2.53	0.91	2.46	0.93	2.79	0.99	2.53	0.81
15. Accelerated students will be less apt to be happy in later life than if they had remained with their same-age peers.	2.38	0.84	2.34	0.82	2.73	0.94	2.30	0.79
16. Adults who were accelerated during their schooling tend to be less satisfied with their jobs.	2.46	0.80	2.47	0.77	2.47	0.89	2.42	0.82
17. Students who have been accelerated tend to become more rebellious.	2.27	0.80	2.20	0.77	2.59	0.92	2.27	0.79
18. Accelerated students will become more emotionally unstable	2.35	0.79	2.28	0.75	2.56	0.83	2.40	0.86
19. Accelerated students tend to be less reliable than gifted students who remain in classes with their same age peers.	2.22	0.80	2.16	0.80	2.38	0.92	2.24	0.74
Leadership								
10. Accelerated students will not have leadership experiences.	2.25	0.93	2.22	0.92	2.39	1.05	2.24	0.88
11. Students who are accelerated will not learn leadership skills.	2.12	0.82	2.09	0.79	2.28	0.97	1.12	0.79

There was a high estimate of reliability for the 22 item scale used in this study (Cronbach alpha = .92) and there were no differences in the reliability of each of the three groups. These compare similarly with the alphas from the Southern et al. (1989) study which was .94 and with the Townsend and Patrick (1993) study which was .91.

Cronbach's alpha, in terms of the four factors in this current study were: Academic, .76; Social, .78; Emotional, .87 and Leadership, .84.

A multivariate analysis of variance was used to investigate the effects of role (teacher, education student, student teacher,) sex, and ethnicity across the four factors (academic, social, emotional,

leadership). The overall Multivariate F-ratios were statistically significant (p<.01) for Sex and Ethnicity, but not for any of the interaction terms (Table 2). Although males were more inclined to claim academic benefits for acceleration the differences in effect-size is small (F = 6.23, df=1,405, p=.012, ES=.05). There were differences in ethnicity, specifically 'Other' for academic (F = 13.84, df=1,405, p=<.001, ES=.44) and emotional (F = 7.89, df=1,405, p=.005, ES=.41)). Teachers who identified as **not** New Zealand European, Maori or Pacific Islander, claimed greater academic and emotional benefits from acceleration.

Table 2: MANOVA for the four acceleration factors by Role, Gender, and Ethnicity (two groups).

Effect	Wilks Lambda	F	df	p
Role	0.96	2.09	8, 804	0.035
Gender	0.96	3.70	4, 402	0.006
Ethnicity	0.96	4.58	4, 402	0.001
Role * Gender	0.97	1.44	8, 804	0.174
Role * Ethnicity	0.96	1.92	8, 804	0.054
Gender *	0.99	0.94	4, 402	0.438

An analysis of variance (ANOVA) was used to test for statistical differences between the groups of the study, namely the teachers, the student teachers and the education students. It was also used to test for statistical differences between this study and those of Southern et al. (1989) and Townsend and Patrick (1993). There were no significant differences in the results between the three groups of the current study; however, there were some differences in comparison with the two other studies, as shown in Table 3.

The studies of Southern et al.(1989) and Townsend and Patrick (1993) showed greater concern with potential negative social and leadership consequences of acceleration. As the Southern et al. study involved elementary teachers and the Townsend study was of primary teachers and student primary teachers, the respondents' concerns could be seen as pertaining to the younger age of their students.

Table 3: Comparison between the current study and previous studies, in terms of teachers' and students teachers' attitudes to full year acceleration.

		Tchrs.vs. Southern Tchrs.	Tchrs. vs. Townsend Tchrs	Students vs. Townsend Trainees
Academic	**Q1**	-.08	.07	-.20
	Q2	-.10	-.06	-.24
	Q4	-.23	.15	-.14
	Q5	-.13	.07	-.24
	Q21	.04	.31	.29
Social	**Q6**	-.65	-.40	-.28
	Q8	-.25	-.22	.11
	Q9	-.51	-.34	-.11
Emotional	**Q12**	-.24	-.24	-.03
	Q13	.02	.09	.12
	Q14	-.18	-.25	-.15
	Q15	-.25	-.24	-.23
	Q16	-.18	-.26	-.09
	Q17	-.09	-.09	-.20
	Q18	-.18	-.22	-.05
	Q19	-.13	-.28	-.15
Leadership	**Q10**	-.27	-.20	.16
	Q11	-.38	-.19	-1.41

Qualitative Results

The additional comments about acceleration from the teacher group were predominantly positive (positive outnumbered negative comments at a ratio of 2:1). The majority of negative comments related to enrichment being preferred over acceleration. Extension programs mentioned by teachers included: Introduction to philosophy; problem solving; creative writing; "academic training" as a module. In English, one respondent argued that the type of novel chosen for study and the extensions tasks given based on the novel, were appropriate enrichment for gifted students. The item means from the practitioner group show even greater enthusiasm for the full year acceleration than the student teachers or the education undergraduates. Among the undergraduates, the additional comments on acceleration were equally divided between positive and negative comments on acceleration

Academic Issues

Many respondents commented on the need for acceleration to be considered only in terms of the individual, not as a class. "Works if student is **really** gifted." For many teachers, including the 'almost gifted' in acceleration was more likely to lead to negative comments about acceleration. The necessity of making up class numbers in an "accelerate class" often meant that some students were included who were out of their depth academically in their final years at school. One teacher summed it up thus: Acceleration is one strategy to keep gifted students happy. Problem is that there are usually only 5-10 students who are truly gifted. For them it is important that they should be able to move ahead when ready. We tend to accelerate a whole class, even 2 whole classes. This leads in year 13 to students who are still year 12 and do not have the maturity, work habits or depth of understanding to work hard and really achieve. Bright students are often the ones who feature most in extra-curricula activities.

The introduction of the National Certificate of Educational Achievement (NCEA) has, according to some respondents, had a negative academic effect on the curriculum. One teacher of mathematics claimed: "In my subject area, the curriculum has been so watered down that we need to enrich or accelerate to keep many busy." Another teacher observed: "I've seen so much wasted talent as gifted students coast in ordinary classes." In the same vein, another commented: "Acceleration reduces the dumbing down of the present system".

One positive effect of NCEA has been greater opportunity for study at various levels and therefore secondary teachers have had experience with the academic success of their students in single subject acceleration. The curriculum can also be telescoped successfully as evidenced by the following teacher comment: "My experience of gifted students is that it's not just academic but also will do very well at a sport or music. I would like to see more students given the opportunity to do Level 1 and Level 2 NCEA concurrently if they're able."

A negative outcome of single subject acceleration is the compromise reached in final years of schooling when subject choices narrow and options of a pathway forward are limited. "Subject acceleration ...the problem is whether this then continues; if it doesn't, what's the point?" summed up one respondent to explain the issue of students literally running out of subjects to take; sometimes having to resort to re-sitting subjects in which they have already passed. Difficulties with timetabling were often mentioned in conjunction with a multi level option for gifted students. As one teacher observed: Presents problems with placing students in groups once they progress into senior school. Sometimes their options do not fit with what is available and sometimes there is little left that they wish to study. These problems are exacerbated in smaller schools.

Another explained: "The result is too often an unnecessary repetition of the curriculum." The futility in practice for some single subject acceleration was shown by the comment: "I disagree with the practice of accelerating a student, then making them repeat the same course with their peer group – which I have seen happen." Similarly a student teacher reported:

> At my high school we got the option of sitting geography, science and maths early – we were only allowed to progress if we got over 70% in the exam. This was ridiculous. I did 5th Form [year 11] maths twice having passed the first time (65%).

One student teacher commented on another practice at her former school: "Exams other than the required exams for our year that some of us were encouraged to sit. They were extremely challenging

exams and we felt overloaded. We also did not understand the benefit of sitting these extra exams and I found it unhelpful."

The results of this study mirror previous research in that the academic advantages of acceleration are evident to most practitioners: "Acceleration should be encouraged at all levels, as teachers are more likely to meet their learning demands", announced one teacher respondent. Strongest comments came from those who had had personal rather than just professional experience of acceleration. Examples being: "My second son, now 36, was accelerated from Form 4 [year 10] to Form 6 [year 12]. If he had not been, he would NOT have completed bursary. He had no problem making friends in the new class." Another respondent wrote: "One of my nephews fitted this category and was accelerated a full year, left school at the end of year 12 and went on to earn a conjoint degree - B.Comm/B.Bus. Studies. He is innovative in the computer field at 23 years of age. To have missed this challenge would have bored him." Finally this heartfelt comment from a teacher: "I wish I had been accelerated instead of being bored witless!!"

Leadership Issues

As previously stated, the respondents in this study were not concerned with acceleration leading to possible loss of leadership opportunities. One student teacher wrote: I was put up a year and I thank God for it every day... I still managed to get an ASB scholarship and be Head Girl and Student Rep. [Board of Governors]. It all depends on the individual and the school.

Many respondents commented that consideration of the individual nature of the student was paramount in this and all other aspects of acceleration. For example: "Some students can do many things because they are well organised and motivated; in this case things like leadership, extra activities can also be done." Another teacher commented: "I was accelerated at primary school level - 2 years. But was Head Girl." It would appear that although other studies focussing on acceleration of younger students show concern about leadership issues, this is not the case in the New Zealand secondary sector.

Social and Emotional Issues

Some of the respondents in this study had concerns that full year acceleration would result in social and/or emotional difficulties for their students. A minority of respondents commented that acceleration as a group or small cluster, solved the problem of social isolation of the gifted individual: "Will not miss important social interactions if acceleration is done in a group." The issue of "speed up" was noted by the following teacher comments," I feel sometimes it is just unnecessary and wonder what the rush is," and "Exams such as NCEA [National Certificate of Educational Achievement], take a lot of the joy out of learning, so why rush it?"

A concern frequently expressed by teachers philosophically opposed to acceleration is that if the gifted students are accelerated, their age-group peers feel 'left behind'. Two comments by teachers illustrate the point: "Important to think of how the students who are not accelerated feel; on what basis is choice of students to be accelerated made?" Also: "I believe there is no need for acceleration – it is unfair to accelerate one or two students when G&T [Gifted & Talented] is vast."

The teachers argued that it was vital that any acceleration program is well resourced. "Needs careful monitoring and extra support e.g. mentoring. All my accelerated students have coped well, seemed happy and have had no noticeable adverse social effects," is evidence of appropriate resources minimising potential negative aspects. On the other hand, another teacher stated: "Students [were] given extra work to do and taken out of certain class periods – usually just to get them working at a different level. Largely unsuccessful as it didn't come with extra teacher supervision."

Some teachers were adamant in their refusal to consider acceleration, as evidenced by the comment: "I totally disagree with upstreaming (a level) of secondary students. They are better off and happier with their peers." An education student in this study claimed:

> Accelerated students I have come across are less social with others their own age as they don't know how to relate and have less in common. Also they will not have many friends at school and don't do any non-academic extra-curricular activities – sport. They also feel they are above those who are the same age or a year younger, very arrogant and put down those who watch T.V., play games, etc. They feel those activities are below them and for children only.

A student teacher declared that accelerated students "tend to be little arrogant so and so's: often with pushy middle class parents." Another student teacher reported on one outcome of teacher negativity: A student had concurrent enrolment (within school). Although this student was bright, the teacher of the higher level class was impatient and did not like helping her with knowledge he thought she should have already gained. The teachers of the two subjects (levels) did not talk to each other concerning the student, her progress and the assumptions each teacher had made. The student did well in the lower level course, but felt that the teacher from the higher level class had given up on her.

Several respondents commented on bullying of gifted students. For some, acceleration was seen as positive; a way of removing students from their bullying age-peers. Other respondents felt that acceleration might exacerbate the situation. As one teacher explained: I think it depends at what age the acceleration is done and the nature of the experiences/ social interactions that the accelerated student has subsequent to the process. Does their peer group or their cohort they are moving to accept or ostracize them? Are they outgoing or introverted etc. etc? Lots of factors determine the "success" of acceleration.

Another respondent noted the positive side: "I have worked with several cases and students who are accelerated tend to interact well with their new peers. Most G&T pupils tend to be very socially aware and are good at sports and team work."

One teacher in the study commented on the possible social and emotional effects of non-acceleration: For some gifted students acceleration is a valid approach. Too often in education, lack of maturity and social development is used as an excuse for not accelerating gifted students. Acceleration can help some students from turning off, wasting potential and engaging in anti-social behaviour.

Another commented: "A bored gifted student is harmful to peers regardless of age and can demotivate them. More inclined to rebel if not challenged." A final comment from a teacher is offered on this aspect: Acceleration means a student will (likely) remain engaged, interested and challenged at school. They become problematic when they are not taught at their own level, and may achieve little in comparison to their less able peer group. The drawbacks are worth it.

For some, however, the drawbacks are **not** worth it. One teacher admitted: As a student I was put forward <u>two</u> years myself. (University at 16 etc. etc.) While the academic side was no problem, my adolescence was, I think, particularly difficult due to social issues that resulted from interacting with peers two years older.

A student teacher also reflected: "I was accelerated in some subjects. I really don't know what I think about it now. Probably negative - academic achievement was prized over other skills and I suffered for this in adult life." One teacher with experience overseas commented: I have taught many students who were accelerated through English GCSE exams up to three years yearly. For all four accelerated students I know, life at university was the problem. Too young to socialise with 18 year olds aged only 16, graduating uni aged only 19. Essentially facing difficulties of taking on adult responsibilities too young.

Finally, the following teacher comment is offered to explain why despite the evidence of the research, some teachers remain concerned about the long-term social and emotional effects of acceleration.

A very gifted girl I taught had been accelerated a full year. Academically she topped the class. Socially, her life was absolutely miserable. I met her by chance 15 years later. She had had a really rough time – had been to uni early, did well initially then failed badly. Was then diagnosed as bi-polar. Had tried self-harming – I saw terrible scars on her arms. - and suicide (hinted at this). I remembered the sad and lonely, but very bright child at 11 and wondered about all this. Who can really say? Did acceleration go with this? At 13 it is a very strong "social" time.

Discussion

The heart-felt comment in this last teacher quote will cause most practitioners to reflect deeply; and such claims are often used to argue against acceleration. The first rule in education (and elsewhere) is 'do no harm', and thus it is not uncommon for teachers to invoke single case studies, then to deny acceleration for all gifted students (no matter whether they did or did not result from acceleration). A University of Chicago Dean was quoted in Cornell, Callaghan, Bassin and Ramsey

(1991): "I have not seen a single scholar who had serious psychological problems of whom I felt that they would not have occurred if he had remained at home another year or two (p. 87).

The majority of the respondents in this study concur with that view; and thus it would seem prudent to develop a comprehensive set of criteria to be considered before students are selected for acceleration. Assouline, Colangelo, Lupkowski-Shoplik and Lipscomb(1999), developed the Iowa Acceleration Scale as a tool for gathering information and making objective decisions on acceleration of elementary students. There is no similar tool to assist secondary teachers. It would appear that more research is needed to develop selection measures and for dependable monitoring of accelerated secondary students to maximize the potential of acceleration and minimize the risk factors. In addition, an on-going program of support should be implemented to minimize any negative consequences of the strategy. Robinson (2004) claimed: "Although the absence of anticipated harmful effects of acceleration on affective development is a redundant finding of research in this field, the fears don't go away" (p. 59).

It is acknowledged that full year acceleration is but one strategy, and some of the respondents indicated that the needs of the **individual** student should dictate which strategies would be most effective: One teacher respondent claimed: "Acceleration as you seem to define it by moving a student up a year is a lazy way of achieving acceleration." While full year acceleration is administratively simple and cost effective to implement (Davis & Rimm, 1989), if full back-up in terms of mentoring and supportive, trained and qualified teachers is put in place, the strategy is certainly not "lazy". As Southern and Jones (2004) pointed out, planning and collaboration among all stakeholders are vital to the success of acceleration programs.

Muratori, Colangelo and Assouline (2003), observed that "acceleration practices are more difficult for parents and educators to accept because they "disrupt" the flow and expectations that we have about age, grade, and sequence" (p. 219). Elkind was usually considered to be against acceleration because in *The Hurried Child* (1981) he claimed that acceleration would place unwarranted stress on students when they were too immature to react positively to acceleration. Later, he changed his mind, suggesting that matching the curriculum to a student's abilities is not 'acceleration', but developmentally appropriate teaching (Elkind, 1988). Once acceleration is interpreted as an accommodation of the educational system to the needs and abilities of the student, acceleration may become less controversial to some teachers.

The majority of the negative teacher comments were not against acceleration per se, but indicated a preference for enrichment for gifted students rather than acceleration. This study did not set out to explore an either/or debate of the relative merits of these two programs, as it is may be that a combination of **appropriate** acceleration and **good** enrichment is preferable for catering for gifted students (Townsend, 2004). It is noted that there are some teachers who are philosophically opposed to any gifted programs - based on perceptions of fairness. Sapon-Shevin (1987), for example, was concerned that gifted programs could be seen as status symbols and the program itself becomes the reward. She pointed out that as long as the best education happens in the gifted and talented program and the less than the best education happens in regular classrooms, gifted education is viewed as a prize.

The teachers in the current study cited essential prerequisites to accelerations as good resources, including qualified, supportive teachers. Feldhusen, Proctor and Black (1986) reported that many teachers struggle to individualise a program sufficiently to meet the needs of gifted and talented students. They may feel intellectually threatened and be resistant to receiving an accelerated student into their class. Gross (2004), shared reports from parents about teachers who downplayed their children's advanced abilities, refusing to provide advanced learning opportunities. The teachers directly stated that their intention was to reduce the amount of difference existing among students in a classroom. Teachers may unconsciously try to prove that their beliefs are correct; the resulting negativity is not a conducive learning environment for the student. Gross (2004) quoted a teacher of a five year old speaking to a parent: "You leave him to me…It's my duty to pluck the tall poppies" (p. 171).

The positive result of this current study is at odds with the reported, often quoted 'early ripe, early rot' negative belief of acceleration, which has resulted in the strategy being withheld as an option from gifted students overseas. Heinbokel (1997) quotes a school magazine in Germany, in answer to parents' question on acceleration: Your daughter would be torn out of her class and would get new

teachers....she would probably get called names such as "swot" and "too clever by half" by some of her classmates. The downward trend in her achievement might begin right after grade-skipping and would be destructive to your daughter's future ability to learn and her enjoyment of life (p. 61).

A study by Hoogeveen, Hell and Verhoeven (2005) found that Dutch secondary teachers had a slightly more positive attitude of acceleration in **primary** students. The teachers in the study (=334) taught first grade of secondary school; as acceleration in the Netherlands generally takes place in primary, this is the first cohort of teachers not directly involved with the decision. Some of the teachers in this study received detailed written information on acceleration and attended an information meeting prior to being surveyed, others did not. The majority (77%) considered acceleration at primary school to be a useful option "sometimes"; as opposed to "often", "always" or "never".

The qualitative results of this current study confirm that there are many negative outcomes for gifted students who are **not** accelerated. Another comment from a teacher stated: "I feel boredom is more of a problem to gifted students. Extending the mind is exciting and exhilarating...". If gifted students feel bored when retained with their age-peers, other negative feelings can impact. Gross (2004) argued that loneliness and rejection were more likely to be experienced when students were **not** accelerated and Freydenberg (1993) claimed that the development of appropriate coping skills is critical when, "…young people suffer loneliness and rejection and where they do not have access to like-minded peers" (p. 22). For some students, acceleration may hold little appeal, whereas for others it may reduce the boredom evident in many classrooms and it can also open up avenues of interaction with similar-ability peers. According to Silverman (1993): "When gifted children are asked what they most desire, the answer is often 'a friend'. The children's experience of school is completely colored by the presence or absence of relationships with peers" (p. 72).

Some respondents were concerned that single subject acceleration did not seem to benefit the students in the long term and schools sometimes insisted on students re-sitting subjects in which they had already received good passes. It is difficult to see an advantage to a gifted (or any other) student re-sitting a level 1 subject in which they have already passed. Equally questionable is the uptake of new subjects in year 13 (7^{th} form), for a student who has been accelerated in single subjects. For some of the student teachers, this was considered an educationally redundant exercise. Winstanley (2004) warned: "With schools increasingly expected to promote themselves, children can be made to jump through hoops for the glory of the school rather than for their own development" (p. 89).

Summary

If research underpins practice, why is full year acceleration rarely offered as an option to gifted students in New Zealand and indeed around the world? The acceleration literature is reasonably systematic in providing evidence for the academic benefits of acceleration for gifted students, yet this research does not seem to inform practice in terms of providing for the needs of gifted students. Researchers have posited that only the beliefs and attitudes of teachers have stopped the strategy being adopted. This study utilised a scale, with minor adaptation, (Southern, Jones & Fiscus, 1989) to determine the attitudes to full year acceleration by New Zealand secondary teachers and undergraduates, training to be teachers. The sample of teachers in this study is a reasonably representative slice of the profession in terms of gender balance, age spread, ethnicity, and experience in teaching. The surprising result of the study was the predominant agreement for the strategy of full year acceleration of gifted students. There was no statistically significant difference in the means between the sample groups. Given the general positive agreement of the participants of this study towards the various dimensions of acceleration, it would seem that most have already seen sufficient evidence of the success of some types of accelerative practices, or the failure of non-accelerative strategies, to give their endorsement to full year acceleration as an option in catering to the needs of gifted students.

There is still some concern that negative social and emotional outcomes might eventuate for a minority of students; although the claims were that this could be minimised by careful selection and monitoring of accelerands. It certainly seems, as Colangelo, Assouline and Gross (2004) argued, that acceleration is not the answer in every case. They advised a selection process that included motivation and emotional development. "We're not saying it should be a quick decision... but we have reason to believe that when the decision is carefully made, the student will do just fine." Cornell et al. (1991)

made the interesting observation: "…it is no longer even useful to debate whether acceleration **does** or **does not** have an adverse effect on affective development. Instead, research would more profitably focus on determining for whom acceleration might be desirable, and for whom it might be detrimental" (p. 96).

The results of this study indicate that New Zealand secondary teachers, student secondary teachers and undergraduate education students, are generally in agreement with full year acceleration as a strategy for gifted students. The message from this study of present and future secondary practitioners seems to be to proceed, albeit with caution.

References

Assouline, S., Colangelo, N., Lupkowski-Shoplik, A., & Lipscomb, J. (1999). *Iowa acceleration scale*. Scottsdale, AZ: Gifted Psychology Press.

Colangelo, N., Assouline, S., & Gross, M. U. M. (Eds.). (2004). *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration* (Vol. 1,2). Iowa City, IA: Belin-Belin Center.

Colangelo, N., & Assouline, S. G. (2004). Whole-grade acceleration. In N. Colangelo, S. Assouline & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration*. Iowa City, IA: Belin-Belin Center.

Cornell, D. G., Callaghan, C. M., Bassin, L. E., & Ramsey, S. G. (1991). Affective development in accelerated students. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 74-110). New York: Teachers College Press.

Daurio, S. P. (1979). Educational enrichment versus acceleration: A review of the literature. In W. C. George, S. J. Cohn & J. C. Stanley (Eds.), *Educating the gifted: Acceleration and enrichment* (pp. 13-63). Baltimore: Johns Hopkins University Press.

Davis, G. A., & Rimm, S. B. (1989). *Education of the gifted and talented* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Elkind, D. (1981). *Hurried child: Growing up too fast too soon*. Reading, Mass.: Addison-Wesley.

Elkind, D. (1988). Mental acceleration. *Journal for the Education of the Gifted, 11*(4), 19-31.

Feldhusen, J. F., Proctor, T. B., & Black, K. N. (1986). Guidelines for grade advancement of precocious children. *Roeper Review, 9*(1), 25-27.

Freydenberg, E. (1993). The coping strategies used by capable adolescents. *Australian Journal of Guidance and Counselling, 3*(1), 15-23.

Gross, M. U. M. (2004). *Exceptionally gifted children*. London: Routledge.

Hattie, J. (1992). Measuring the effects of schooling. *Australian Journal of Education, 36*(1), 5-13.

Heinbokel, A. (1997). Acceleration through grade skipping in Germany. *High Ability Studies, 8*(1), 61-77.

Hoogeveen, L., van Hell, J., & Verhoeven, L. (2005). Teacher attitudes toward academic acceleration and accelerated students in the Netherlands. *Journal for the Education of the Gifted, 29*(1), 30-63.

Kent, S. D. (1992). The effects of acceleration on social and emotional development of gifted elementary students:A meta-analysis [Electronic Version]. *Dissertation Abstracts International*, 54, 419-A.

Kulik, J. A. (2004). Meta-analytic studies of acceleration. In N. Colangelo, S. Assouline & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration* (pp. 13-22). Iowa City, IA: Belin-Belin Center.

Kulik, J. A., & Kulik, C. C. (1984). Synthesis of research on effects on acceleration instruction. *Educational Leadership, 42*(2), 84-89.

Ministry of Education. (2001). *Working party on gifted education.Report to the Minister of Education*. Wellington.

Pressey, S. L. (1949). Educational acceleration:Appraisal of basic problems. *Bureau of Educational Research Monographs, 31*, 2.

Riley, T., Bevan-Brown, J., Bicknell, B., Carroll-Lind, J., & Kearney, A. (2004). *The extent, nature and effectiveness of planned approaches in New Zealand schools for providing for gifted and talented students.* . Retrieved. from http://www.mined.govt.nz/goto/gifted.

Robinson, N. M. (2004). Effects of academic acceleration on the social and emotional status of gifted students. In N. Colangelo, S. Assouline & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration* (pp. 59-67). Iowa City, IA: Belin-Belin Center.

Rogers, K. B. (1991). A best-evidence synthesis of research on types of accelerative programs for gifted students. [Electronic Version]. *Dissertation Abstracts International*, 52, 796-A.

Rogers, K. B. (2004). The academic effects of acceleration. In N. Colangelo, S. Assouline & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration* (pp. 47-57). Iowa City, IA: Belin-Belin Center.

Sapon-Shevin, M. (1987). Giftedness as a social construct. *Teachers College Record, 89*, 39-53.

Silverman, L. K. (1993). *Counseling the gifted and talented*. Denver, CO: Love.

Southern, W. T. Acceleration for gifted students: An interview with W.Thomas Southern [Electronic Version]. *Center for Talent Development*. Retrieved 9/7/2007.

Southern, W. T., & Jones, E. D. (1991). Academic acceleration:Background and issues. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 1-28). London: Teachers College Press.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989). Practioner objections to the academic acceleration of gifted children. *Gifted Child Quarterly, 33*(1), 29-35.

Southern, W. T., & Jones, E. J. (2004). Types of acceleration:Dimensions and issues. In N. Colangelo, S. Assouline & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's students: The Templeton national report on acceleration* (pp. 5-12). Iowa City, IA: Belin-Belin Center.

Townsend, M. A. R. (1996). Enrichment and acceleration: Lateral and vertical perspectives in provisions for gifted and talented children. In D. Mc Alpine & R. Moltzen (Eds.), *Gifted and talented : New Zealand perspectives* (pp. 361-375). Palmerston North: ERDC Press, Massey University.

Townsend, M. (2004). Acceleration and enrichment:A union rather than a choice. In D. McAlpine & R. Moltzen (Eds.), *Gifted and talented:New Zealand perspectives* (pp. 289-307). Palmerston North: Manuka Grove Press.

Townsend, M. A. R., & Patrick, H. (1993). Academic and psychosocial apprehensions of teachers and teacher trainees toward the educational acceleration of gifted children. *New Zealand Journal of Educational Studies, 28*(1), 29-41.

Winstanley, C. (2004). *Too clever by half:A fair deal for gifted children*. Stoke on Trent: Trenham Books.

About the Author

Janna Wardman was born and raised in Argyll, Scotland. She married her childhood sweetheart and moved to Ireland, where their 3 children were born. The young family migrated to New Zealand in 1979. Janna taught in New Zealand secondary schools for almost 20 years. After completing an M.Ed. at the University of Melbourne, she was invited by a previous principal to start up a programme for Gifted and Talented students. Janna is currently in her third year of a Ph.D. at the University of Auckland, where her thesis is on full-year acceleration of gifted students.

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Melda Yildiz, Power of Social Interaction Technologies in the Curriculum: Liberating Education from a Textbook Format: The research questions the role of Web 2.0 technologies in designing effective instruction into K16 curriculum. The goal was to explore creative strategies and activities that teacher candidates developed integrating new media into the curriculum with limited resources and equipment; to promote media literacies through media production in teacher education; and to describe candidates' reactions and experiences with new technologies. The study is based on the qualitative research conducted while teaching interdisciplinary technology courses and investigated over one hundred teacher candidates. Methodology included analysis of media surveys, process papers, questionnaires, electronic journals, interviews, and content analysis of media projects. The study used three theoretical framework: educational media (Barnes & Tynan, 2007), (Buckingham, 2003), media literacy (Hobbs, 2006), and multiliteracies (Kress, 2001).

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Religious Education and Information Technology: Problems and Challenges

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Abstract

Unexpected advancements of information technology (IT) brings about a number of pleasant and unpleasant developments especially in social, cultural and political arenas. It has also incurred much influence on educational domain in general and religious education, in particular. With the advancements in IT, the velocity of information production has expanded too, at the global level. These expansions lead to the delegitimating of knowledge, equating of information with knowledge or predominance of information on knowledge. This advancement also caused epistemological challenges for the religious education process that will be discussed in the first part of the article. On the other side, growth of internet has created a condition that is being called as rhizomatic space. The second section will cover rhizomatic space that possesses a new methodological characteristic and create problem for religious education. IT at the same time generates a particular space that is being called as hypertext space, which weakens the place of text in the educational process. This textual development also presents troubles for the religious education especially in the domain of religious fundamentalist societies. In fact, the present article has made an attempt to study epistemological, methodological and contextual problems and challenges of IT for religious education processes.

Introduction

With the advancements in IT, the velocity of information production has expanded too, at the global level. These expansions lead to the delegitimating of knowledge and equating of information with knowledge. This advancement caused epistemological challenges for the religious education process. On the other side, growth of internet has created a condition that is being called as rhizomatic space that possesses a new methodological characteristic and creates some problems for religious education. IT at the same time generates a particular space that is being called as hyper-textual space, which weakens the place of text in the educational process. This development also presents troubles for the religious education especially in the domain of religious fundamentalist societies. The present article has made an attempt to study epistemological, methodological and contextual problems and challenges of IT for traditional religious education processes.

Keywords: Legitimacy, equating. rhizomatic space, hypertext, knowledge, information, traditional religious education, challenges.

Religious education and delegitimating of knowledge

Legitimacy knowledge in the computerized and digitalized society has confronted with fundamental challenges and even educational philosophers are anxious as how to regain the lost legitimacy of knowledge. Emphasizing on the issue Lyotard thus says:

> *Cybernetics has come to dominate society and economics since World War II…The major question is how knowledge gets legitimated itself (Lyotard, 1992).*

To him, accessing the legitimate knowledge, one must pay attention to what he calls as "performativity" (Lyotard, 1992). Knowledge in the cybernetic space brings its legitimacy through performativity and as such, it must avoid meta-narratives and pay attention to little narratives (Lyotard, 1993). Little narratives is based on the principle of "might make right "(Lyotard, 1991) that anyone could create truth and meaning himself

According to the performativity, knowledge, is considered as a tool and is being produced to put up for sale. Such knowledge however cannot be based on religious consideration because that may be apriori, metaphysical and non-applicable. With this reason, Lyotard equates knowledge with information and then information with "phrase regimes" (Lyotard 1992) and similarly, Foucault, with the emphasis on what he remembers as "regimes of truth" (Foucault, 1989) opposes every kind of apriori knowledge. They have also opposed the metaphysical principles of religion and meta-narratives, with the reason of these being totalitarian and hegemonic that can not be employed in 'phrase regimes' and 'regimes of truth'.

However, advancements in the information technology, in the last 50 years, have deep impacts on the quality and essence of knowledge. Knowledge in the enlightenment or modern times was simply based on rational and spiritual principles, where aim of acquiring knowledge was for human salvation and, moral and spiritual guidance. But, with the above progress and re-conceptualization of knowledge, rational and spiritual growth gave their place to the needs of work and market or in other word, performativity. The performativity that leads to the delegitimating of knowledge and dominance of information on knowledge is considered as a challenge for the traditional religious education based on rational, spiritual and eternal principles. Lanham thus says:

> *We are awash in information, oceans of it, to the point that it is hardly a scarce commodity, as it once was. The internet is vast ocean of shared information. What in this ocean is worthy of attention (Lanham, 2002).*

In this vast ocean, we are confronted with new waves of information that are liable to be produced and accessible to man. But access to real knowledge and understanding has taken little into account. Information is neutral, explicit, external, perceptual (Chisholm, 1989), whereas, knowledge is a conceptual, implicit and internal matter (Stenmark, 1989). Knowledge in Emerson's view (1834) is more important than information. To him, "knowledge is the same as' gleam of light', which flashes across the mind from within…" (Cavell, 2003).

Arcillas (2001) warns that spirituality and morality are weakening due to information dominance:

> *...We aim to make accountants, attorneys, engineers, but not make able, earnest, great-hearted man. But education should be commensurate with the object of life and be a moral one (Arcilla, 2001).*

Another epistemological outcome of IT is domination of the quantitative epistemology on learning and educational processes. Quantitative information, as such, identified as the only authoritative form of scientific analysis and the result of this epistemology is externalization of knowledge. This externalization of knowledge minimizes the ratio of obligation of the knower to whatever he/she knew.

> *Lyotard believes the definition of knowledge equal to information, which itself arises from information revolution, ruins the legitimacy of knowledge. This problem of legitimacy has two aspects. One is the externalized knowledge, which does not have internal transformation for knower; second, externalized knowledge also establishes power for political systems* (Lyotard, 1993).

The logic of information is hegemony and dominance, in a way that every thing decays to the level of information (Lyotard, 1992) and causes the denial of role and place of knowledge in religious education precess.Information is an explicit (Polyani, 1992) thing that every one possesses (Foskett, 1982), whereas religion is a system of beliefs, attitudes based on intuition, thought, rationality (Johnson, 2006) and a kind of internal obligation. The religious education process also contains evaluative, conceptual and interpretative (Grimmitt, 2000) as well as, spiritual aspect (Yob, 1989), aimed at strengthening spiritual growth, creating religious discipline (Laurent, 1996) and finally, growth of reasonable and rational judgment about religious matters (Wanak, 1992).

Therefore, it can be said that role of knowledge in the religious education is vital although, we also need information especially when our aims are to transfer information about religion (Hudson, 1973) or discussion about inter-religious issue (Wanak, 1992). However, religious education does not merely aim to impart religious information to the students because there are people who have abundance of religious information but have no obligation and undertaking to the religious and moral principles and they cannot be called religiously educated (Spender, 1998). Obligation to the religious belief can alone have roots in religious knowledge (McLaughlin, 1994) because religious knowledge is subjective, implicit, intuitive, internal, conceptual and equivalent to understanding.

Hirst (1979) believes that knowledge and rationality, in moral and religious education, can lead to consistency in human behavior (Feinberg, 2002), but information is as a tool that provides ground for conditioning, imitation and socialization. Emphasis on knowledge in the religious education can pay attention to understanding and rationality rather than conditioning, imitation and socialization (Carr, 2000).

Religious education in rhizomatic Line (space)

Continuous access to the images, ideas and information through internet, and velocity in information transfer at the minimum possible time has consequences for understanding ideologies and religious beliefs. The real outcome of the internet -as a consequence of information technology- is creation of rhizomaticline, and changes in some of the methodological considerations of religious education. In fact, "internet itself is a rhizomatic space" (Barret, 1996).

The main features of fundamental and traditional education systems are that they are based on hierarchical and linear relations, especially between teachers and students. This relationship is broken in rhizomatic space. Bouge (1989) says:

> *A rhizome is the antithesis of a root-tree structure, or 'arborescence'. Arborescence is hierarchical, stratified totalities which impose limited and regulated connections between their components. Rhizomes, by contrast, are non-hierarchical, horizontal multiplicities which cannot be subsumed within a unified structure, whose components form random, unregulated networks in which any element may be connected with any other element (Bogue, 1989).*

Three basic principles of religious education that encounter with challenge in rhizomatic space are representation, hierarchy and religious discipline. Representation (whether philosophic or religious representation) points to the fact that reality or truth is apriori.According to Plato (427-347), Aristotle (400-340), Descartes (1569-1650) and other contemporary philosophers, there exists reality or truth in the world that must be discovered and identified.

Deleuze(1994) contrasts this idea as "Cartesian idea or dogmatic image" (Deleuze, 1994). In representation, knowledge can be based on realistic aspects, which lead to the improvement of the idea of "metaphysics of presence and realistic picture of the world" (Hirst & White, 1998). The picture we present of the reality is the product of the realities that we found. The world is found not made. Craver and Ozmon (2003) believe that transcendentalism is equal to dualism and dualism (dualism in subject-object) can be known as representationalism. ́According to representation, there are fixed, unique and universal realities or truth so that one can analyze and evaluate good or bad deeds, right and wrong .Bruce (1963) also believes that "Religion is a type of diagram of reality. The metaphors of the diagram express our conceptions of ultimate realities" (Bruce, 1963) that should be represented.

With the denial of representation- which is based on tree-arborescence model, Deleuze (1995) points to "philosophy of becoming" (Deleuze, 1995).In Semetsky's view (2003) "rhizome is against representation model or tree-arborescence model of learning and knowledge" (Semetsky, 2003).

According to rhizomatic space, we can figure out a new epistemology, in which the path not defined, the event did not happen, concepts not met, remain as future rhizomatic connections. There is no predefined space, because; "all spaces are nomadic and smooth "(Deleuze, 1994). The smooth space is neither linear and logical nor sequential path. In Owens's view (2000) it is a "zigzag path" (Lanham, 2002). As the image representing itself, thought does not end in knowledge, but it is a complex process of knowing. Concepts, for Deleuze, are not limited to the concepts 'of ', which are defined solely with reference to some external object. Instead, they are artistic creations, like sounds in music and colors in painting, or as cinematic images – they are images 'in' thought (Semetsky, 2003).

The denial of representation and recognition leads to weakening of religious process. Deleuze (1994) identifies recognition as "thoughts without image" and Dewey (1980) emphasizes on "thought without recognition" (Dewey, 1980), although, real human life shows that religious education is no possibility without this fundamental principle. Whatever emerges from rhizomatic space are the outcome of split between learning process and the idea of recognition. Here, learner puts emphasis on learning without representation, recognition or reproduction what Parekh calls as "superior dimensions like system of meanings" (Parekh, 2000). Thus, learning without recognition and representation means an unknown and aimless route because one of the aims of religious education is the guidance towards truths and realities that are apriori, meta-narrative- the realities or truth that need to be represented.

Another principle of religious education is 'hierarchy' that encounters challenges with the expansion of rhizomatic space. Number of traditional education systems especially in the religious and fundamentalist societies put emphasis on hierarchy where student (receiver), teacher (sender) and, referent are three elements linked to each other, according to the earlier defined rules. In religious education, the teachers play fundamental role in imparting learning and training process. They acquire the subjects or contents from religious sources and metaphysical narratives and then transfer them to

the students. As such, teachers are considered as authoritative basis of religious information and knowledge.

This authority brings hierarchical line between teacher and students, which is based mainly on the subordination of large groups to an elite religious authority often professing the bestowal of divine, or in Weber's view, is based on the "divine authority of a charismatic figure" (Weber, 1964).

Such hierarchy strengthens to control the information flow through a teacher or religious elite. Religious hierarchies are based on elites that control the flow of information (Bachrach & Baratz, 1970). Most of the channels of communication within religious fundamentalist communities are vertical, since the main source of information is the religious dicta funneled from the elite to the subordinates (Spigelman, 2000). Under the influence of growing internet and rhizomatic space, and weakening vertical and hierarchical communications between peoples and religious elites, religious elites are afraid of losing control over the information flows. They believe that the Internet with circulating rhizomatic lines not only poses a threat to the community's culture but also challenges their legitimacy. Rhizomatic space, according to Deleuze and Guattari:

> *Has neither beginning nor end, but always a milieu from which it grows and which it over spills. It pertains to a map that is always detachable, connectable, reversible, modifiable, and has multiple entry- ways and exits (Deleuze & Guattari, 1987).*

Deleuze doesn't believe in the role of authoritative source and control of students' knowledge through models (teachers). He says:

> *We learn nothing from those who say: 'Do as I do'. Our only teachers are those who tell us to 'do with me', and are able to emit signs to be developed in heterogeneity rather than propose gestures for us to reproduce…Those who insist on saying, do as I do, as if establishing identity a priori, reinforce the dogmatic tree-like image of thought (Deleuze, 1994).*

Therefore, to speak about hierarchical relations, control of student's behavior and modeling in religious educational, they are not acceptable in rhizomatic space.

Discipline is another principle of education and religious education systems put much emphasis on religious discipline. These disciplines also come from religious texts and its interpretations (Barzila, 2003) or from authoritative role model, rules, learning and teaching process and family (Spigelman, 2000). A rhizomatic space by expanding the spectrum of new interpretations can minimize the direct pressure of a religious text on students in order to impose religious discipline. Despite the effects of religious disciplines in schools or communities, rhizomatic space as a compound of various elements like texts, sound, images and open communication between above elements (Beeson, 2002) break the traditional discipline dominating the texts and strengthen the ground for critique of boundaries between texts and authors (Wills, 1999). Constant religious narratives, systematic behaviors, exclusive methodology of religious education are meaningless in the rhizomatic space. According to Deleuze:

> *Order is ruled by dogmatic political philosophy based on 'universality, method, question and answer, judgment, a court of reason, a pure "right "of thought…The exercise of thought…conforms to…the dominant meanings and to the requirements of the established order' (Deleuze, 1987).*

In rhizomatic space, therefore, one must not expect a teacher to deliver predefined orders, disciplines and rules ascertaining from the religious texts. Deleuze denies such order and discipline as it emphasizes on imitating and modeling. For discipline, a person is being asked to follow straight route that is logical and rational what Rees (2000) remembers as "ballistic approach" (Rees, 2000). Religious education principles like hierarchy, discipline, and representation are firmed on ballistic approach and do not give free movement without limitation on the learner. By this reason, one of the ways utilized in rhizomatic space to dominate such disciplines, is writing rather reading the texts by others (authors). The role of readers or writer becomes most vital than the role of authors. "One way of identity creation is writing by students. By analyzing their writing, the identity of students can be understood" (Amorim, 2005). Emphasis on writing and role of writer, in reality, is to cross the definitions and limitation brought by authors in their writings. And that is why, all types of phenomenological and transcendental ideas about the world in rhizomatic space are incorrect and meaningless (Gregoriou, 2004).

Religious education in hyper-textual space

Hypertext has changed most of the aspects of our lives and works. This new style has manifested presentation of changing information in reading as well as research and understanding methods. Landow(1997) believes that we must leave the systems , regimes of truth or philosophies that put emphasis on the ideas such as center, margin, hierarchy and linear communication as well as stress on the systems that are firmed on multilinearity, links and networks [Landow, 1997]. Individuals like Peters (1996) have also pointed to the post structural quality of hypertext in his discussions on 'critical literacy'. He says "ideas like virtual-text have come across new forms that have deadlocked traditional research methods" [Peters and Lankshear, 1996]. Burbules and Callister (1996) believe that hypertext has post-structural aspect, exactly to this reason that hypertext is also a rhizomatic structure, a structure without centrality. "In hyper-textual space, form and content are separated from each other" [Burbules and Callister, 1996].

With increasing power and strength of information technology, new opportunities have created in educational process. Shifting in educational models from the teacher-based to learner-based, substitution hyper-textual space instead text –based learning, are outcomes of the advancement in information technology.

Hyper-textual learning has challenged the traditional assumptions about the role and place of teachers, authority and validity of texts, teaching methodologies and value of knowledge. Meantime, religious texts that enjoying higher authority and validity relying upon divine truths, metaphysics or meta-narrative, have influenced by hypertext more than any other texts**.** As such, Wills(1999) believes that hypertext distributes the information through horizontal communication and participation of people and as a result breaks the traditional hierarchical connection inside the texts and encounters the false and deceitful distance between texts or authors and reader to the fundamental criticism [Wills, 1999]. According to Landow (1992), hierarchical and vertical methods of reading a text or book in a hyper-textual space, lose its centrality [Landow 1992] and consequently, weakening of hierarchical, conservative and dualistic viewpoints about knowledge are some of the important traces of prevalence of hypertext space in learning and education process. From the point of view of Duncan (1977), hypertext minimizes distinction and detachment between authors and readers; and provides ground for diverse interpretations other than those of author and places the values of all interpretations and ideas on an equal and symmetrical level [Duncan, 1997], and instead of concentrating on forms of narrative text reading, it moves towards strengthening different sounds that provide ground for death of the author [Pagano, 1995]. Hypertext puts emphasis on the role of reader; whereas, traditional religious education process redoubling attention to the viewpoints of author and try to prevent the emergence of relativism-individualism in the interpretations of religious texts.

None of the texts can claim to have centrality and priority in hyper-textual space and all of them enjoy relativity [Burbules and Callister, 1996]. The religious texts influence the addressee directly and strengthen the reader's commitments to the messages and hidden meaning of the texts. However, hypertext weakens direct and face to face (in presence of teacher, text and student) learning processes that are usually suitable to control and influence upon students as well as to transfer and induce particular messages by religious elites or teachers.

According to Duncan (1977), elimination of clear and decisive distinction between authors and readers weaken the idea of 'education as transfer of knowledge' that had enjoyed eminent position for years especially in traditional religious education [Duncan, 1977]. However, critics of hypertext emphasize on the fact that the hypertext hinders reader from deep knowledge and understanding of text and keeps him at the surface of text or encourages him towards individualistic and relativistic interpretations of a text [Whalley, 1990]. Reaching to deep understanding of the text, as has been the actual view of the author, is considered as one of the aims of the traditional religious education however this aim is also unascertained unless we give principle role to the author not to the reader. Similarly, critics of hypertexts believe that movement in hyper-textual space means that students could place their own point of views once encountering with a text, in a way that they define it if desire so

[Landow, 1992] and this individual meaning making is a subject that is meaningless in traditional religious text-based education.

The fact that in hyper-textual space, everybody make their own meaning [Whalley, 1990]; confirm this logical conclusion that we encounter to creative and relativistic interpretations in a way that it is impossible to omit any such interpretation and viewpoint in hypertext space. Individualistic knowledge and interpretations is the thing that has no importance and place in the textual-based religious education, because in traditional religious education, based on authority and centrality of religious texts [Barbules and Callister, 1996], readers (teachers or students) cannot escape from the power or intention and purpose of author or take up meaning that they selected themselves.

In religious education, teacher tries to bring close relationship between readers (students) and intention and purpose of the authors. Because, a religious text is based on a collection of recommendations, obligations and teachings that have roots in meta-narratives, and these recommendations are not changeable and fluid [Roy, 2003]. We have already pointed, contrary to what has been identified in hypertext to the death of author [Birkerts, 1994] or fading away distinction between author and reader, author possess real role in traditional religious education process, because religious text is neither participative nor liable to be interpreted to the deconstructive style, rather it is a superior speech that has presented to the reader beyond all participative process.

By weakening idea of teacher as transferor of knowledge and emphasis on meaning making through reader (student) as well as emphasis on participative role of students in text or meaning production; hypertext tries to place students at par with teachers [Landow, 1992], hence, it means weakening of the place of teacher in education and learning process; while teacher is an interpreter of text as well as transferor of meaning in education. There exists abundance of texts that must be interpreted or transferred merely through teachers because it is neither possible to interpret and define those texts through students nor all of the texts are liable to be interpreted. Apart from imparting and transferring knowledge, teachers are also role model for students in religious education due to their higher information and knowledge however this role and place is meaningless in hyper-textual space.

Other specialty of a hyper-textual space is to provide a possibility for manifestation of conflictive and distinctive ideas [Gerald, 1992]. Resulting from such a possibility, is strengthening distinction, differences and oppositeness of people's viewpoints towards everything including religion and similarly strengthening heterogeneity, incompatibility and in other words strengthening divergence in the behavior of students; in a way that possibility of behavioral guidance of students toward similar and congenial aims would be less. Strengthening equal and compatible aspects in the behavior of students or to identifying movement towards mental and behavioral convergence are considered one of the aims of traditional religious education process. Convergent religious education process is also due to the presence of constant texts and predefined meaning on one side, and lack of relativistic and individualistic interpretative capability of much of the religious texts, meaninglessness of individual meaning making rule and similarly collective nature of religion, on the other side. Any disturbance in the above rule means creating challenges to the text-based religious education because mental and behavioral convergence in religious and moral educations is the main features of religious education process.

Activities in hyper-textual learning space are different from the learning based on predefined, coded and limited texts or different from movement in striated space. Striated space is a rational and pre-determined space, which has been named by Parker Rees (2000) as a "ballistic approach" [Rees, 2000]. Religious education principles like epistemic and behavioral discipline, representation and hierarchy, largely manifest ballistic approach and do not give possibility to free and unlimited movements to people under education process.

On the other side, hypertext puts emphasis on writing instead of reading. Emphasizing on writing, means de-territorializing and movement toward uncertain and multi-dimensional directions in order to

create identity and meaning through learners [Rees, 2000]. Whereas, in religious education, reading enjoys much importance as readers show more commitment to the text and meaning in such process.

However, it seems that hypertexts creates some challenges for the fundamental principles of traditional religious education process like "undertaking to meaning and hidden messages in religious texts" [Chickering, 1991], "teaching for commitment" [Mclaughlin, 1994], "emphasis on homogeneity in thought and behavior" [Antone, 2003], "transfer of information and religious knowledge" [Bates, 2005], "model role of teachers" [Gilmore.1997]. Furthermore, hypertexts, by strengthening the process of "delegitimating knowledge" [Lyotard, 1992] and weakening the role of religious meta-narratives and as a result, negation of religious representation, in reality challenge the legitimization of that part of educational information and knowledge that are firmed on meta-narratives including religious meta-narrative. Similarly, emphasis of hyper-textual space on writing instead of merely reading that itself lead to creation of fluid identity through the students [Rees, 2000], strengthening the process of "becoming" [Semtesky, 2003] and negation of ordered and dogmatic behaviors [Deleuze, 1987] and consequently fading away the predefined religious identities and behaviors are considered some other challenges of hyper textual learning space for traditional religious education process.

Conclusion:

By studying problems and challenges incurred by information technology in the religious educational process, we have come to the point that these challenges and problem are useful for correcting shortcomings especially in the traditional and fundamentalist societies. Today, religious education in the above societies is confronted with problems in the field of principles, methods and contents that could be cleared away with the outcome of IT and as well as enjoyment of new spaces created by it in the religious educational. It seems that positive view about consequences of IT may also create some problems by negating some principles and aims, without which religious education process would be meaningless. To explain and analyze the nature of these challenges and problems lay out by IT, especially for educational system in religious societies is the main responsibility of educational expert and planners.

References:

Amorim, A and Ryan, Ch (2005)" Deleuze, 'Action Research and Rhizomatic Growth', Educational *Action Research*.Vol.13.No.4.P.581.

Arcilla, R. V. (2001) 'The Emerson Nobody Wants to Buy', *Philosophy of Education*. New York.

Bacharach, P and Baratz, M.S. (1970) *Power and Poverty: Theory and Practice*, Oxford University Press. New York: P.121.

Barnes, P. (2001) 'What is Wrong with Phenomenological Approach to Religious Education', *Journal of Religious Education*, Vol.96.No.4. P.68.

Barrett, N, (1996) *the State of the Cybernation*, Kogan Page, London.

Barzilai, G. (2003*) Communities and Law: Politics and Culture of Legal Identities*, Ann Harbor: University of Michigan Press.

Beeson, I. (2002) *Exquisite Variety: Computer as Mirror to Community, Interacting with Computers*, New York.

Birkerts, S (1994) *The Gutenberg Elegies: The Fate of Reading in the electronic Age*, New York.

Bogue, R. (1989) *Deleuze and Guattari*, London, Routledge.

Bolter, J. (1993) *Hypertext and the Classical Commentary*, the University of Arizona Press. Tucson and London.

Bruce, C. W (1963) *Informed Sociology*, Random House. New York.

Carr, D. (2000) Rival Conceptions of Spiritual Education' *Journal of Philosophy of Education*, No.30.P.143.

Cavell, G. (2003) *Emerson Transcendental Etudes*, Stanford University Press.

Chisholm, R. (1989), *Theory of Knowledge*, 3d Edition, Englewood Cliffs, NJ: Prentice-Hall.

Craver, S.M. and Ozmon, H. A. (2003) *Philosophical Foundations of Education*, Macmillan. New York.

Deleuze, G. (1995) *Negotiations 1972-1990*, Trans. M.Jougin.Columbia University Press. New York.

Deleuze, G. (1994) *Difference and Repetition*, Trans. P. Patton. Columbia University Press, New York.

Deleuze, G. (1987) *Dialogues*, Trans. H. Tomilnson & G. Burchell, Columbia University Press. New York.
Deleuze, G and Guattari, F (1987) *A Thousand Plateaus: Capitalism and Schizophrenia*, Trans. Brian Massumi, Minneapolis.University of Minnesota Press.
Dewey, J. (1934) *A Common Faith*, New Haven. Yale University Press.
Feinberg, W. (2003) *Critical Reflection and Religious Education: How Deep?* Illinois University Press.
Foskett, C. (1982) *the Subject Approach to Information*, Linnet Books, Shoe String Press, Inc., Hamden, Connecticut.
Foucault, M. (1996) *What Is an Author, Language, Counter-Memory*. New York.
Foucault, M. (1989) 'How Much Does it Cost to Tell Truth?' In *Foucault Live: Interviews 1966-84*, (ed.) S. Lotringer. Trans. J. Johnson. New York.PP.62-82.
Gerald, G. (1992) *Beyond the Culture Wars: How Teaching the Conflicts Can Revitalize American Education*, New York and London.
Gregoriou, Z (2004) 'Commencing the Rhizome: Towards a Minor Philosophy of Education', *Educational Philosophy and Theory*, Vol.36.No.3.London.P.67.
Grimmitt, H. (2000) *Pedagogies of Religious Education*, Birmingham University Press.
Hirst, P& White, P (1998) Philosophy of Education (Discourse or Moral Action?). Vol.lll, Routledge. London.PP.69-71
Hudson, W. (1973) 'Is religious education possible?' *New Essays in Philosophy of Education*, London.
Johnson, G. (2006) 'Getting a Rational Grip on Religion', *Scientific American,* New York.
Joyce, M. (1988) 'Siren Shapes: Exploratory and Constructive Hypertext', *Academic Computing*, London.
Landow, G. (1992) *Hypertext: The convergence of Contemporary Critical Theory and Technology*, John Hopkins University Press. Baltimore.
Lanham, A. (2002) *the Electronic Word: Democracy, Technology, and the Art*, University of Chicago Press.
Laurent, A. (1996) *Common Five: Leading Lives of commitment in a Complex World*, Beacon Press. New York.
Lyotard, J. (1993) *Political writings*, trans. Bill Readings and Kevin Paul Geiman, Minneapolis University Press, New York.
Lyotard, J .f. (1992) *Postmodern Conditions: A report on Knowledge*, University of Minnesota Press, New York.
Lyotard, J.F. (1991) *Reading*, New York.
McLaughlin, T. (1994) 'Parental Rights and The Religious Up bring of Children, *Journal of Philosophy of Education*.No.18.P.84.
Moulthrop, S. (1994) *Rhizome and Resistance: Hypertext and the Dream of a New Culture, in Hyper/Text/Theory*, John Hopkins Press. Baltimore.
Nielsen, J. (1990) *Hypertext and Hypermedia, Academic Press*, Copenhagen, Denmark.
Parekh, B (2000) *Rethinking Multiculturalism: Cultural Diversity and Political Theory*, Cambridge: Harvard University Press.
Polyani, M. (1992) *the Tacit Dimension. Garden City*, NY: Anchor Books. New York.
Popkewitze, T. (1991) *A Political Sociology of Educational Reform*, Teacher College Press. New York.
Poster, M. (1995) *the Second Media Age*. Polity Press. Oxford.
Rees, P. (2000) 'Time to relax a Little: Making time for the interplay of minds in Education', *Education* 3-13.March, 28(1).
Roy, C. (2003) *Teacher in Nomadic Space: Deleuze and Curriculum*, New York.
Semetsky, I. (2003) 'Deleuze New Image of Thought, or Dewey Revisited', *Educational Philosophy and Theory*, Vol.35.No.1.P.17.
Spender, J.C. (1998) Pluralist Epistemology and the Knowledge-Based Theory of the Firm Organization.Vol.5.No.2.PP.233-235.
Spigelman, S. (2000) *Islam and Internet: The Correlation between Islamic Religion and Internet Diffusion*, Harvard, New York.

Staninger, S.W. (1994) 'Hypertext Technology: Educational Consequences', *Journal of Educational Technology*, Vol.July/Aug.PP: 142-45.
Stenmark, D. (2001) the Relationship between Information and Knowledge, in Proceeding of IRIS 24, Ulvik. Norway.
Wanak, L.C. (2002) 'Theological Curriculum change for the local 21-century context', *Journal of Asian EvangelicalTheology*.Vol.10.PP.121-126 Yob, I. (1989) The Possibility of Spirituality. Berkeley, University of California Press.
Weber, M. (1964) *the Sociology of Religion*, Beacon Press. Boston.
Whalley, P. (1990) 'Models of Hypertext Structure and Learning' *Designing Hypermedia for Learning*, New York.
Wills, D. (1999) 'the Nature of Hypertext: Background and Implication for Librarians', *the Journal of Academic Librarianship*, Vol.25.No.2.P.132.

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-*Methods and Approaches of Moral Education*, Jungel Publisher, 2005; and
-*Explanation of Deductive Approach in Philosophy of Education*, Amirkabir Publisher.

(C.24)

Suzan Duygu Eristi, Teaching Art in a Multicultural Performance by Using ICT: The study focuses on the use of technological approaches to encourage students into the various intelligences and learning of art contents through interactive learning and the development of cultural awareness of students. The aim of the research is clarifying the student behaviours through technological approaches by the use of interactive technologies in art lesson. The research process includes improving the artistic performance of students through art and technology instruction. To improve the performance, they are expected to use interactive technologies involving different art techniques from different cultures. Technology supported instruction will be designed by the help of video conference system between two school for interactive art education. The sample consists of sixth and seventh graders in two different schools which are Cagda¦ Primary School/ Turkey and W.H. Day Elementary School. The investigation focuses on the following research questions: Does the interactive art education provide students an understanding of different cultures art components? To what extent does interactive art education influence teaching students' different cultures art components? How does the use of the technological approaches support instructional opportunities that lead to the development of art contents and cultural awareness of students? How does the use of the interactive technologies support art education and promote artistic awareness of students? Can interactive art education be used effectively to teach students to value art and culture? The data will be gathered from observation and video recordings of students, and interviews.

(C.25)

Terrance A. Thomas, ATS and ACE: University/ School Partners for GATE: The Academic Talent Search (ATS) and the Accelerated College Entrance (ACE) programs at Sacramento State University are blurring the boundaries between public school and university curricula. The Talent Search model based on the work of Dr. Stanley provides access for middle school students to fast paced and challenging curriculum. In the ACE program, university departments "adopt" advanced high school classes, earning credits for students' university level work. The ATS and ACE programs are models of university/school partnerships, which provide advanced educational options to GATE and high achievers. In this presentation participants will discuss partnership formation and curriculum modification approaches.

(C.26)

Perfectionism of the gifted religious child in Israel:

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Abstract

Perfectionism among gifted children is double-edged: on the one hand, being a perfectionist enables the gifted child to attain high achievements in many areas as long as enough effort is invested for a long enough time. On the other hand, when important elements vital for normal development such as maintaining social and familial relationships are ignored, while favoring professional acceleration, the result is an unbalanced personality. A well balanced child must simultaneously develop her or his cognitive, as well as emotional, fine- and gross motor, social, and familial abilities in order to grow up to a rounded, fully capable human being. There is a huge amount of literature discussing perfectionism of gifted boys and girls, as well as adolescents and adults of both genders. There is some research about perfectionism among Israeli children, but none of this work includes a large minority of the Israeli populations: State-religious and Ultra-Orthodox Jews. I shall hereby add to this literature by presenting case studies of perfectionism among these two religious communities, and how this phenomenon has been treated if at all. Some of the children described have high cognitive abilities; others are more artistic, gifted I creative areas.

Introduction

Perfectionism among gifted children is double-edged: on the one hand, being a perfectionist enables the gifted child to attain high achievements in many areas as long as enough effort is invested for a long enough time. On the other hand, when important elements vital for normal development – such as maintaining social and familial relationships are ignored, while favoring educational acceleration, the result is an unbalanced personality. A well balanced child must simultaneously develop her or his cognitive, as well as emotional, fine- and gross motor, social, and familial abilities in order to grow up to a rounded, fully capable human being.

When studying the issue of perfectionism among the gifted two main subjects must first be discussed. 1. Is perfectionism a typical characteristic of the gifted? 2. Is perfectionism always negative or a clear division can be made between positive and negative, neurotic, paralyzing perfectionism?

Unfortunately, in the field of gifted education, there are still many prejudices and half-truths that are accepted as facts, sometimes without any scientific base. One of the most common beliefs about gifted children is that they suffer from social maladjustment, that they are outsiders, with very few – if any – friends, and that this social isolation is a result of their giftedness. Since Terman had started his monumental research at the beginning of the 20th century, these "truths" have been proved prejudices time and again (Burks, Jensen, & Terman, 1930; Janos, 1987; Oden, 1968; Sears, 1977, 1984; Sears, & Barbee, 1975; Terman, 1925, 1954; Terman, & Cox, 1926; Terman, & Oden, 1935, 1947, 1959).

There is a huge amount of literature discussing perfectionism of gifted boys and girls, as well as adolescents and adults of both genders. There is some research about perfectionism among Israeli children, but none of this work includes a large minority of the Israeli populations: State-religious and Ultra-Orthodox Jews. I shall hereby add to this literature by presenting case studies of perfectionism among these two religious communities, and how this phenomenon has been treated – if at all. Some of the children described have high cognitive abilities; others are more artistic, gifted I creative areas.

Perfectionism as a gifted trait, or is perfectionism a typical characteristic of the gifted?

Hollingworth (1926), whose work with gifted children has become classic both regarding psychological and educational aspects, had perceived perfectionism as a common characteristic of the highly gifted. Three quarters of a century later, in the "Characteristics of Giftedness Scale" list by Silverman (2007), designed for parents to facilitate identification of their gifted children, "perfectionism" is one of the 25 most common characteristics of the gifted. According to Webb (1994), in high ability children, perhaps 15-20% may be hindered significantly by perfectionism at some point in their academic careers, and even later in life. He believed that high expectations of self and others lead, among other negative traits, to intolerance and perfectionism, which in its turn might

contribute to depression. Siegle and Schuler (2000) considered perfectionism to be an influential character trait of gifted students.

Burns (1980b) and Pacht (1984) defined perfectionism as a uni-dimensional trait that was problematic and undesirable. However, nowadays there is a scientific consensus that perfectionism is multi-dimentional in its character, and it can be divided into two main kinds.

On the different kinds of perfectionism

Horney (1991) argues, that the view of perfectionism as "the need to attain the highest degree of excellence" (p. 196) is just superficial, while the deeper roots of it lie in psychic experience and include also the component of controlling life.

Adler (1956), on the other hand, saw the striving for perfection as a normal and innate aspect of human development in the claim that "the striving for perfection is innate in the sense that it is a part of life, a striving, an urge, a something that without which life would be unthinkable" (p. 104).

I. "Good" versus "bad" perfectionism

Normal or adaptive perfectionism as contrasted with "neurotic" or "maladaptive″ perfectionism have been concepts already mentioned throughout a number of early writings in the clinical psychology literature (Adler, 1956; Burns, 1980a, 1980b; Hamachek, 1978; Hollender, 1965; Pacht, 1984).

Based on this literature, Hamachek (1978) had defined perfectionism as "a clinical mystery"; there are two types of perfectionism: the normal and the neurotic. In Hamachek's view, normal perfectionism is not pathological; it is desirable, as it is an aspect of the need for achievement. The striving for perfection motivates the normal perfectionist to adopt a flexible approach for materializing her or his purpose. Perfectionism is thus a desirable personality trait, for the developing of high standards.

While Hamachek's used the term: "normal perfectionism", his followers have made further distinctions between the two main kinds of perfectionism. Here is a short list of their definitions.

II. Terms used for describing "positive" and "negative" perfectionism

Neurotic perfectionists are those “unable to feel satisfaction because in their own eyes they never seem to do things well enough to warrant that feeling” (Roedell, 1984). Blatt (1995), Hamachek (1978), **H**awkins (2005) and Sumi & Kanda (2002) also use the term "neurotic perfectionism". Parker & Adkins (1994) and Blatt (1995) also use the distinction between normal and neurotic perfectionism

Perfectionism is a double-edged characteristic. One needs to be a perfectionist in order to reach a high level of creative work. On the other hand – perfectionism is perceived as “unhealthy” when interfering with normal activities and causing psychological problems.According to Rice, Ashby, & Slaney (1998), "neurotic perfectionists or those with maladaptive evaluation concerns would be expected to experience ongoing and negative self-referent feelings" (p. 305). Ashby, Rahotep, & Martin (2005), Bieling, Israeli, & Antony (2004), Dunkley et al. (2000) and Frost et al. (1993) also use the term adaptive versus maladaptive perfectionism for describing what in clinical terms would be defined as healthy versus unhealthy.

In terms of functioning, there are also a few distinctions between "positive" and "negative" perfectionism. Ablard & Parker (1997) use the term: "dysfunctional perfectionism" in the context of learning- versus achievement learning goals (e.g. Dweck, 1991, 1999). Ablard & Parker (1997) found, that children of performance goal parents were significantly more likely to exhibit dysfunctional perfectionism than children of learning goal parents, reporting a combination of high concern about mistakes, doubts about actions, parental expectations, and parental criticism. Parents' achievement goals can help predict which students might be at risk for adjustment problems and future underachievement. Ghaly (2008) who has studied characteristics of parents of maladaptive perfectionists has found them critical and demanding with unreasonably high standards and expectations of their children, while parents of adaptive perfectionists have been characterized as having high standards, but also being supportive and encouraging.

The term "paralyzing perfectionism" refers to highly able individuals, who either avoid challenging task in order not achieve less than perfect products (e.g. Adderholt-Elliot, 1989; Lipinsky, n.d.; Willings, 1992). Some of them adopt procrastination due to their belief that their tasks can always be improved and thus more time is needed in order to complete them (Flett et al., 1992, Speirs & Neumeister, 2004). Flett et al. (1992) have found that there is a tight connection between procrastination and perfectionism. According to them, there is a Correlation between socially prescribed perfectionism, correlated closely with both generalized procrastination and academic procrastination, especially among males. The mediating variable involved in these correlations was fear of failure, highly connected to all the perfectionism dimensions. The results suggest that procrastination stems, in part, from the anticipation of social disapproval from individuals with perfectionistic standards for others.

Perfectionism and religiosity: A general view

Potential connections between perfectionism and religiosity have been discussed in the scientific literature since the early 80ies (e.g. Barrow & Moore, 1983; Bergin et al, 1988; Burns, 1980b; Degin et al, 1985; Heise & Steitz, 1991; Mebane & Ridley, 1988; Pacht, 1984; Richards, Smith, & Davis, 1989; Rickner & Tan, 1994; Timpe, 1989). It was accepted as common knowledge that such positive correlations would be found not only among believers of one of the monotheistic religions, but also in others' such as Buddhism that calls for high standards of behavior, much above those adopted by non-believers or by believers who are still as a lower stage of spiritual growth.

Ashby & Huffman (1999) have challenged these beliefs by examining the measures of religious orientation and multidimensional perfectionism among 242 undergraduate students. They found that though being more religious had a higher correlation to an adaptive dimension of perfectionism (personal standards); no such correlation was detected with maladaptive perfectionism. This finding is an important contribution to the field of perfectionism and religion, but as it did not specify the religion or religions of the participants we cannot conclude whether the results are valid only for Christians, mainly for Christians, or for any religious sub-population.

Connections, relations and correlations between perfectionism and self-esteem, self-efficacy and general well-being of the gifted

Hart et al. (1998) have found that the relationship between perfectionism and self-efficacy is not simple. While The Burns Perfectionism Scale (BPS) and the Multidimensional Perfectionism Scale (MPS) were not able to discriminate high and low perfectionism scorers on self-efficacy among the 271 college students examined, the three subscales of the MPS did. Higher levels of Self-Oriented and Other-Oriented Perfectionism were associated with low self-efficacy, while higher levels of Socially-Prescribed Perfectionism were associated with high self-efficacy.

Vulnerability of the perfectionist child and adolescent

I. A special case of vulnerability: Perfectionism and Obsessive Compulsive Disorder

The most studied disorder connected to perfectionism has been obsessive compulsive disorder (e.g. Frost et al., 1990; Miller, 1996; Sorotzkin, 1998, 1999).

II. In the general population

Freud (1961/1907) had first proposed a relationship between obsessive-compulsive symptoms and religious practices in the turn of the 20th century calling obsessional neurosis an 'individual religion' and religion 'a universal obsessional neurosis'.

Halgin and Leahy (1989) described perfectionists "as individuals afflicted by an ego-dystonic and compulsive drive to achieve unattainable goals" (p. 222), linking what they termed "insatiable perfectionism" as a common factor in the suicides of university students.

It has been found that religion might play a role in obsessive-compulsive disorder among many populations. Sica, Novara, & Sanavio (2001) have studies this role among Italian Catholics; Zohar et al. (2005) have conducted research among Israeli Jews, and Tek & Ulug (2001) have searched how important was the influence of religion in the genesis of some cases of obsessive-compulsive disorder

in Turkey. Large differences in occurrence of OCD have been detected between clinical populations belonging to different religions. While in the US the rate of patients with religious obsessions has been found to be 10% (Eisen et al., 1999), in England it has been but 5% (Dowson, 1977), in India 11% (Akhtar et al., 1975), and 7% in Singapore (Chia, 1996). Among Muslim and Jewish populations the rates have been much higher: 60% in Egypt (Okasha et al., 1994), 50% in Saudi Arabia (Mahgoub & Abdel-Hafeiz, 1991), 50% Israel (Greenberg, 1984), and 40% in Bahrain (Shooka et al., 1998). In the light of these findings the issue of the occurrence of OCD among mental patients in Turkey, a country between the East and the West, is indeed interesting.

III. In the Ultra-Orthodox population

Bonchek (2008) has worked with clinical cases where connections between mental disorders and practicing Jewish Orthodox ceremonies have been the core of the disorder: mostly Obsessive Compulsive Disorder.

As have been noted, the frequency of OCD in the Israeli religious population is quite high (Greenberg, 1984, 1987). Some of the reasons for this phenomenon have been widely discussed by Sorotzkin (1999), who has also been the first and only Rabbi and psychologist studying perfectionism in the Ultra-Orthodox congregation in the US (Sorotzkin, 1998). Let us see the unique components of growing up in an Ultra-Orthodox family that might push the young talented boy or girl towards perfectionism.

From vulnerability to high risk: The perfectionist and his family

I. The double-edgedness trait of perfectionism

Silverman (2000) argues that the problem regarding perfectionism is our attitude toward it rather than in its characteristics. While perfectionism can lead to unrealistic goals and feelings of frustration and low self-esteem or even depression, in some students it can also have positive effects. Crain (2005) believes that when there is a lack of unconditional parental love and acceptance, the individual is at high risk of developing perfectionism in order to gain them, and this perfectionism may turn into depression.

Unlike in some other religions, and in contrast with Catholics, for example, an observant Jew is asked by the Lord to have a full life in accordance with the strict rules applied in all areas of everyday behavior. The obligation, to "have a life" rather than avoid the temptations of the banal, tiresome tasks resulting from the tedious tasks of life is, is, in fact, a Talmudic command.

II. Implications of the double-edgedness trait of perfectionism on the Orthodox Jew

Chapters 17-26 in the book of Leviticus are dedicated mainly to dietary and sexual restrictions that must be kept strictly, namely, they include a long list of things forbidden by the Jewish law. However, in chapter 18 there is a command: "You are to perform My judgments and keep My statutes, *to live in accord with them*; I am the LORD your God" (Leviticus 18:4, italics are mine – H.D.). The Talmudic interpretation for the phrase: "to live in accord with them", cited by Rabbi Yehuda and Shmuel is "he should live fulfilling his obligations rather than die when doing that" (**Yoma, 85:2**). That means, a Jew is not allowed to do anything he is ordered to an extent when it is dangerous for him. He must take care of his physical – and not just his spiritual – well being. For example: an Orthodox Jew must get married, and until fathering at least one son and one daughter he has to go on trying to make his wife conceive. In addition, even when he has fulfilled the minimal quota of one son and one daughter, or when his wife is not able to get pregnant he must have sex with her, as it is his religious obligation to satisfy her.

However, conflicts occur when family life, satisfying one's woman and providing for one's children become serious problems for the young Jewish man. Let us see this young man on the way to perfectionism few years before he must oblige to the "rules of life" explicitly describes in the Jewish law.

The influence of parenting in the Ultra-Orthodox Israeli family on their children's potential perfectionism

I. family and culture risk-factors for perfectionism

It has been found that differences in the quality of parent-child relations might contribute to the development of perfectionism (Hamachek, 1978; Sorotzkin,

1998). There are two main differences between parents of adaptive and maladaptive perfectionist: 1. Parents of maladaptive perfectionists are never satisfied with their children's achievements and emphasize their academic accomplishment rather than their mental well being (Hamachek, 1978); 2. Parents of adaptive perfectionists, though having high standards are also supportive and encouraging (Sorotzkin, 1998). Speirs Neumeister (2006) found that "exposure to parental perfectionism and an authoritarian parenting style led to the perception of stringent expectations, self-worth tied to achievement, and a fear of disappointing others, which collectively influenced the development of socially prescribed perfectionism".

Being raised in a religious family in Israel makes it very hard to avoid being exposed to parental perfectionism, whether it concern the world of Torah learning – mainly applied to boys, or learning to be a "perfect super-woman" – when girls are concerned. For boys, there is no option of "taking it easy" or giving up the drive to excel. "Being the best" is the ultimate achievement, it influences the prospects of getting better matches not only for oneself but got one's siblings as well.

II. Double-messages and their contribution to the development of perfectionism among religious children

The values, norms, life philosophy and life style of the Ultra-Orthodox family encourage intellectual achievements among boys. The society to which those families belong to is closed, with built-in values and ideology, and quite rigid borders.

Sorotzkin (1985) has summarized the role of shame and guilt in the developing of perfectionism. According to him, when there is almost no room for creativity, invention, originality, sometimes the only way to excel is to do the old, boring things again and again, each time trying to be better than previously. For example: learn more Talmud pages; learn more interpretations of Jewish law, learn by heart, etc. Thus, the message a young boy gets from the age of 3, when he first starts going to the Cheder, the religious kindergarten where knowledge of reading and writing is also taught, is quite confusing. On the one hand the little boy is rewarded by his teachers and parents for learning fast or excelling beyond what has been expected by him. On the other, he must not be proud of such achievements, never speak of them, and "Let another man praise thee, and not thine own mouth; a stranger, and not thine own lips" (The Bible, Book of Proverbs, 27:2). As a result, and when there is no limit to the capacity of learning offered to him, neither are there distinct points when this boys can be openly happy with his achievement, there is high risk of developing an internal non-stopping urge to learn more, to gain better understanding, to make a new record in a race when there is only one competitor. In this race there is no winner: the perfectionist is never satisfied, never happy.

III. The value of good virtues

An Ultra-Orthodox child is taught very early not be jealous of others, nor wish to have someone else's gifts, property of virtues. Such good virtues are highly appreciated in this close congregation, but they can also be a cause of competition among children regarding questions such as: "who is more humble?" who is more modest than one's peers or siblings?" in other words – who is the "perfect" child who hides his virtues better than everybody else?

Sorotzkin (1999) has given us a clue for treating perfectionism among children from this background. His advice might be applied to prevent the phenomenon of perfectionism, stems from competition among much younger talented and gifted children. While the line between the legitimate wish to be good, and maladaptive perfectionism might be unclear, using the Halacha, the Jewish law, in order to draw it has proved helpful by Sorotzkin (ibid.). The only way to fight against perfectionism, especially at the young age, is to explain the child as soon as he can understand that being a good Jew means balancing between these poles. Having a life, while learning the Holy Scriptures and taking care of everyday errands. Not being too proud when succeeding in an important task, but acknowledging each achievement even when it is not perfect. When the child is gifted he can

understand this concept at quite a young age. No matter what role we play in the child's life: parents, teachers, counselors – the high intellectual level of the child enables us to use his high ability for the sake of bettering his mental health.

IV. Does being a "good" Jew mean striving for the highest standards?

Many researchers emphasize the conceptualization of perfectionists as having excessively high standards (e.g. Frost et al., 1990; Hewitt & Flett, 1991; Terry-Short et al, 1995). Being an Orthodox Jew means that one should try as hard as possible to observe all 365 commands included in the Jewish law: some are hard to observe, many are hard to understand. In addition, as most of those commands are about everyday life, e.g. foods, clothing, interpersonal and sexual relations. Educating a Jewish child to be an Orthodox adult thus includes a process of painting a rigid, uncompromising view point regarding everything connected to everyday life. An Orthodox Jew might easily become meticulous, e.g. look obsessively after bugs in many kinds of vegetables; try to find the best possible food for special occasions, such as family celebrations or religious holidays. [more examples]

V. The gender aspect of perfectionism among Jewish Religious children and adolescents

Baker (1996) has found that high ability females are more perfectionist than average males and females. It was also found, that among 9th graders the percentage of perfectionist girls was higher than that of perfectionist boys (Bellamy, 1993). However, in a research examining gender differences in the perfectionism level among gifted middle school students (Siegle & Schuler, 2000), although gifted and talented girls expressed more concern than males about organization, and their concern about making mistakes increased from grade 6 to 8, no gender differences were found in the level of unhealthy perfectionism.

Perfectionism is being perceived, in many cases, as negative – especially among females. As an example we can discuss Barbra Streisand, the great Jewish actress and singer (Moriel, 1997). In spite of her great achievements, "[...] Hollywood loves to snub her" (ibid). Streisand believes that "the criticism is indicative of sexism". Indeed, literature about the perfectionist female assures that while being a male perfectionist is not easy, being a female perfectionist can be a social disaster (e.g. Reis, 2002; Schweitzer, & Hamilton, 2002).

Heise and Steitz (1991) have focused on the connections between perfectionism and the maltreatment of women and children. According to them, an unrealistic expectation of perfection results in dysfunctional and self-destructive communication and behavioral patterns. These patterns manifest themselves in the oppression of women and children, in a problematic attitude toward emotions, and in double-bind messages that interfere with the healthy development of the individual. However, their conclusions are relevant only for Christians, as they had referred only to what they called: "Christian therapists". Let us see if – and to what extent – the gender aspect influences the development of maladaptive behavior among young Orthodox females, and to what extent it might influence their mental health.

In Israel, like in many Western countries, sex discrimination persists mainly on the basis of religion and culture, and most often it is even protected (Stopler, 2005), in spite of its a well developed juridical system that protects females from sexual harassment, gender-related discrimination and even applied affirmative action to encourage female participate in many public areas. However, Israel is also a highly traditional society, with a large percentage of Arabs – most of which are traditional regarding the attitude to women, as well as Orthodox, Ultra-Orthodox and traditional Jews. In addition, the policy of compulsory army service has also an influence on the inequality of women in Israel (e.g. Adelman, 2003; Dar & Kimhi, 2004; Robbins & Ben-Eliezer, 2000).

Being born to an Ultra-Orthodox Israeli family is a disadvantaged position not only due to these general, societal reasons, but because of the main different roles of males and females in this sub-population. While a boy is judged almost solely by his intellectual achievements, a girl is prevented from learning the Talmud, which is the main subject in the Yeshiva, the higher institution for learning. While a boy can start studying the Alphabet at 3 and accelerate his studies as much as his talent allows, a girl will not start learning before the age of 6. A 5-year old boy can lean as much as 8 hours a day, while his 9-year old sister will learn just 4-hour a day. In addition, while a boy will be rewarded

for his fast and deep learning, a girl will be rewarded, in most cases, only for her good behavior, willingness to help others, and being humble, rather than making her vast knowledge a known fact. A boy is praised for being diligent, a girl – for hiding her giftedness, her curiosity, and wish to excel (David, 2008).

The gifted Ultra-Orthodox girl, who has practically no areas to excel, is in danger of being perfectionist regarding her school work (El'or, 1992). When there are no real challenges, no reward for intellectual effort, the gifted girl is at high risk of trying to have the perfect typed paper, the blameless painting, the most polite way of speaking. When there is no real challenge the danger of being a perfectionist over dull, worthless assignments is not only dangerous for one's mental health; it is also pathetic.

Conclusion

In this work I have tried to draw the very first lines in identifying the components of perfectionism among Ultra-Orthodox children, as well as give some advice for treating them. Mental health and its treatment in this sub-society are still considered a shameful subject, and as such too many children and adolescents do not get appropriate treatment when the first signs of perfectionism appear. In addition, there is a lack of high quality professionals who are either Ultra-Orthodox or at least are aware of the special needs of this sub-population. As a result, many individuals who seek help either of their medical experts or of their spiritual leaders do not get what they need due to lack of knowledge and experience either in Judaism or in psychology.

Until this situation changes, it is the duty of all educators who have any influence of children and adolescents to be aware of the risks of perfectionism, especially among high ability children and adolescents, and to be able to evaluate as soon as possible whether it is within their power to help this child or adolescent or to refer him or her to get proper treatment.

References

Akhtar, S., Wig, N.N., Varma, V.K., Pershad, D., Verma, S.K. (1975). A phenomenological analysis of symptoms in obsessive-compulsive neurosis. *British Journal of Psychiatry, 127*, 342-348.

Ablard, K.E., & Parker, W.D. (1997). Parents' achievement goals and perfectionism in their academically talented children. *Journal of Youth and Adolescence, 26*(6), 651-668. [ABLARD 1997.pdf]

Adderholt-Elliott, M. (1989). Perfectionism & underachievement. *Gifted Child Today*, 19-21.

Adelman, M. (2003). The Military, Militarism, and the Militarization of Domestic Violence. *Violence Against Women, 9*(9), 1118-1152.

Adler, A. (1956). Striving for superiority. In H. Ansbacher & R. R. Ansbacher (Eds.), *The individual psychology of Alfred Adler: A systematic presentation in selections from his writings*. New York: Basic Books.

Ashby, J.S., Rahotep, S.S. & Martin, J.L. (2005). Multidimensional perfectionism and Rogerian personality constructs. *Counseling, Education and Development* לא מצאתי את כתב העת

Baker, J.A. (1996). Everyday stressors of academically gifted adolescents. *Journal of Secondary Gifted Education, 7*, 356-368. לא מצאתי

Barrow, J.C., & Moore, C.A. (1983). Group interventions with perfectionistic thinking. *Personnel and Guidance Journal, 61*, 612-615.

Bergin, A.E., Stinchfield. R.D., Gaskin, T.A., Masters, & Sullivan, C.E. (1988). Religious life-styles and mental health: An exploratory study. Journal of Counseling Psychology, 35, 91-98.

Bellamy, J. (1993). Perfectionism in adolescents: A comparison of private and public school students. Unpublished master's thesis. University of Manitoba, Canada.

Bieling, P.J., Israeli, A.L. & Antony, M.M. (2004). Is perfectionism good, bad, or both? Examining models of the perfectionism construct. *Personality and Individual Differences,* 36(6), 1373-1385.

Bonchek, Avigdor (2008). Treating Religious OCD problems: The Case of Compulsive Tfilla: Theory & Practice: A Case Presentation. The Eighth Annual "Nefesh Israel" Conference, "Nefesh and Community", Jerusalem, 16th-18th January, 2008.

Burks, B.S., Jensen, D.W., & Terman, L.M. (1930). *Genetic studies of genius*, vol. 3: The promise of youth. Stanford, CA: Stanford University Press.

Burns, D.D. (1980a). *Feeling good: The new mood therapy*. New York: Signet.

Burns, D.D. (1980b). The perfectionists' script for self-defeat. *Psychology Today*, 34-52.

Chia, B.H. (1996). A Singapore study of obsessive compulsive disorder. Singapore *Medical Journal, 37(4*), 402-406.

Crain, W. (2005). *Theories of development: Concepts and applications* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Dar. Y. & Kimhi, S. (2004). Youth in the Military: Gendered Experiences in the Conscript Service in the Israeli Army. *Armed Forces & Society, 30*(3), 433-459.

David, H. (2008). The Gifted Teenage Girl in the Religious Family. The Eighth Annual "Nefesh Israel" Conference, "Nefesh and Community", Jerusalem, 16th-18th January, 2008.

Degin, L., Yeates, E., Greenwell, B., & Fiddler, L. (1985). Mormon women and depression: Are Latter-Day Saint women becoming casualties of perfectionism? (Transcript of KSL-TV documentary, Salt Lake City). Sunstone, 10, 19-27.

Dowson, J.H., 1977. The phenomenology of severe obsessive-compulsive neurosis. British Journal of Psychiatry, 131, 75-78.

Dunkley, D. M., Blankstein, K. R., Halsall, J., Williams, M., & Winkworth, G. (2000). The relation between perfectionism and distress: Hassles, coping, and perceived social support as mediators and moderators. *Journal of Counseling Psychology, 47*, 437-453. [Dunkley 2000.pdf]

עד פה: כל הפריטים נכנסו לטקסט!

Dweck, C.S. (1991). Self-theories and goals: Their role in motivation, personality, and development. In R. Dienstbier (Ed.), *Nebraska symposium on motivation: Vol 38. Perspectives on motivation* (pp. 199-235). Lincoln, NE: University of Nebraska Press.

Dweck, C.S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia, PA: Psychology Press.

Eisen, J.L., Goodman, W.K., Keller, M.B., Warshaw, M.G., DeMarco, L.M., Luce, D.D., Rasmussen, S.A. (1999). Patterns of remission and relapse in obsessive-compulsive disorder: A 2-year prospective study. *Journal of Clinical Psychiatry, 60,* 346-351.

El'or, T. (1992). *Educated and ignorant. The world of Ultra-Orthodox women.* Tel Aviv: Am Oved (Hebrew).

Flett, G.L., Blankstein, K.R., Hewitt, P.L & Koledin, S. (1992). Components of perfectionism and procrastination in college students. *Social Behavior and Personality, 20(2*), 85-94. [Flett'92_Perfectionism Procrastination.pdf]

Freud, S. (1961). Obsessive actions and religious practices. In: Strachey, J. (Ed.), The Standard Edition of the Complete Psychological Works of Sigmund Freud (original work published in 1907), Hogarth Press, London, pp. 117-127.

Frost, R.O., Marten, P.A., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research, 14*, 449-468. עולה כסף

Frost, R.O., Heimberg, R.G., Holt, C.S., Mattia, J.I., & Neubauer, A.L. (1993). A comparison of two measures of perfectionism. *Personality and Individual Differences, 14*, 119-126.

Ghaly, C. (2008). Depression and Perfectionism. *Journal of Psychology, 2*. [Ghaly 2008 Depression and Perfectionism.pdf]

Greenberg, D. (1984). Are religious compulsions religious or compulsive: A phenomenological study. *American Journal of Psychotherapy, 38*(4), 524-532.

Greenberg, D., Witztum, E., Pisante, J. (1987). Scrupulosity: Religious attitudes and clinical presentations. *British Journal of Medical Psychology*, *60,* 29-37.

Halgin, R.P., & Leahy, P.M. (1989). Understanding and treating perfectionistic college students. *Journal of Counseling and Development, 68*, 222-225. [Halgin.PDF]

Hamachek, D. E. (1978). Psychodynamics of normal and neurotic perfectionism. Psychology, 15, 27-33.

Hawkins, C.C. (2005). A clarification of multidimensionality and perfectionist typology with the Frost Multidimensional Perfectionism Scale Paper to be presented at the annual AARE Conference, Parramatta, Sydney, 27 November – 1 December 2005. [Hawkins 2005.pdf]

Heise, R.G., & Steitz, J.A. (1991). Religious perfectionism versus spiritual growth. Counseling and Values, 36, 11-23. [Heise & Steitz 1991 RELIGIOUS PERFECTIONISM.doc]

Hewitt, P.L., & Flett, G.L. (1991). Perfection in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology, 60*, 456-470. [Hewitt Flett 1991.pdf]

Hollender, M.H. (1965). Perfectionism. *Comprehensive Psychiatry, 6*, 94-103. עולה כסף

Hollingworth, L. (1926). *Gifted children*. New York: Macmillan.

Horney, K. (1991). Neurosis and human growth: The struggle towards self-realization. New York: Norton. (Original work published 1950).

Janos, P. (1987). A fifty year follow-up of Terman's youngest college students and IQ-matched age mates. *Gifted Child Quarterly*, 31 (2), 55-58. מתחיל רק מ-1989

The Book of Leviticus. New American Standard Bible. להשלים

Lipinsky, Y. (). *Perfectionism and giftedness.* Columbiana Co. Educational Service Center 9p-p. 45-56). [Lipinsky Guidance_perfectionism.doc]

Mahgoub, O.M., Abdel-Hafeiz, H.B. (1991). Pattern of obsessive-compulsive disorder in eastern Saudi Arabia. *British Journal of Psychiatry, 158*, 840-842.

Mebane, D.L., & Ridley. C.R. (1988). The role-sending of perfectionism: Overcoming counterfeit spirituality. Journal of Psychology and Theology, 16, 332-339.

Miller, S.B. (1996). *Shame in context*. Hillsdale, NJ: The Analytic Press.

Oden, M.H. (1968). The fulfillment of promise: 40-year follow-up of the Terman gifted group. *Genetic Psychology Monographs, 77*(1), 3-93. אין

Okasha, A., Saad, A., Khalil, A.H., el Dawla, A.S., Yehia, N. (1994). Phenomenology of obsessive-compulsive disorder: A transcultural study. *Comprehensive Psychiatry, 35*(3), 191-197.

Pacht, A. (1984). Reflections on perfection. *American Psychologist, 39*, 386-390. [PACHT 1984.pdf]

Parker, W.D., & Adkins, K.K. (1995). Perfectionism and the gifted. *Roeper Review*, *17*, 173-176. רק מ-1998

The book of Proverbs, King James Version and American Standard Version.

Rice, K. G., Ashby, J. S., & Slaney, R. B. (1998). Self-esteem as a mediator between perfectionism and depression: A structural equations analysis. *Journal of Counseling Psychology, 45*, 304–314. [RICE ASHBY 1998.PDF]

Richards, P.S., Smith, F.A., & Davis, L.F. (1989). Healthy and unhealthy forms of religiousness manifested in psychotherapy clients: An empirical investigation. Journal of Research in Personality, 23, 506-524.

Rickner, R. G., & Tan, S. Y. (1994). Psychopathology, guilt, perfectionism, and family of origin functioning among protestant clergy. Journal of Psychology and Theology, 22, 29-38.

Reis, S.M. (2002). Social and emotional issues faced by gifted girls in elementary and secondary school. SENG Newsletter, 2(3), 1-5. [Reis_SocialAndEmotionalIssuesFacedByGiftedGirls.pdf]

Robbins, J., & Ben-Eliezer, U. (2000). New role or "New Times"? Gender Inequality and Militarism in Israel's Nation-in-Arms. Social Politics: International Studies in Gender, State & Society, 7(3), 309-342.

Roedell, W. (1984). Vulnerabilities of highly gifted children. *Roeper Review*, 6 (3), 127-130.

Sears, P.S. & Barbee, A.H. (1975). Career and life satisfaction among Terman's gifted women. In J. Stanley, W. George & Solano (Eds.) *The gifted and creative: A fifty-year perspective*. Baltimore, MD: Johns Hopkins University Press.

Sears, R.R. (1984). The Terman gifted children study. In S.A. Mednick, M. Hanway, & K.M. Finello (Eds.) *Handbook of longitudinal research volume 1: Birth and childhood cohorts*. New York: Praeger.

Sears, R.R. (1977). Sources of life satisfaction of the Terman gifted men. *American Psychologist*, 32, 119-128. [SEARS 1977.pdf]

Shooka, A., al-Haddad, M.K., Raees, A. (1998). OCD in Bahrain: A phenomenological profile. *International Journal of Social Psychiatry, 44*(2), 147-154.

Sica, C., Novara, C., & Sanavio, E. (2001). Religiousness and obsessive–compulsive cognitions and symptoms in an Italian population. Behaviour Research and Therapy 40, 813–823. [SICA 2001.pdf]

Siegle, D., & Schuler, P.A. (2000). Perfectionism Differences in Gifted Middle School Students. *Roeper Review, 23*(1), 39-44. [Siegle Schuler 2000.pdf]

Silverman, L.K. (2000). *Counseling the gifted and talented*. Denver: Love Publishing Company.

Silverman, L.K. (2007). Characteristics of Giftedness Scale. Available at: http://www.gifteddevelopment.com/PDF_files/characscale.pdf (accessed on 15 June 2008).

Sorotzkin, Benzion (1985). The Quest for Perfection: Avoiding guilt or avoiding shame. *Psychotherapy*, 22, 564-571. [Avoiding guilt or avoiding shame 1985.doc]

Sorotzkin, Benzion (1998). Understanding and Treating Perfectionism in Religious Adolescents. *Psychotherapy*, 35, 87-95. [SOROTZKIN 1998.doc]

Sorotzkin, Benzion (1999). The Pursuit of Perfection: Vice or Virtue in Judaism? *Journal of Psychology and Judaism*, 23(4), 179-195. [SOROTZKIN The Pursuit of Perfection 1999.doc]

Speirs Neumeister, K.L. (2004). Factors influencing the development of perfectionism in gifted college students. *Gifted Child Quarterly, 48*(4), 259-274. [Speirs Neumeister.pdf]

Speirs Neumeister, K.L. & Finch, H. (2006). Perfectionism in High-Ability Students: Relational Precursors and Influences on Achievement Motivation. Gifted Child Quarterly, 50(3), 238-251. [Speirs Neumeister & Finch 2006.doc]

Stopler, G. (2005). Gender construction and the limits of liberal equality. *Texas Journal of Women and the Law*, 15(43) Available at: http://law.bepress.com/cgi/viewcontent.cgi?article=2386&context=expresso.The Berkeley Electronic Press [STOPLER 2005.pdf]

Sumi, K. & Kanda, K. (2002). Relationship between neurotic perfectionism, depression, anxiety, and psychosomatic symptoms: a prospective study among Japanese men. *Personality and Individual Differences, 32(5),* 817-826. [שלחתי מייל לעצמי עם כתובת כתב העת

Terman, L.M. (1925). Mental and physical traits of a thousand gifted children. *Genetic studies of genius,* vols. 1 & 2. Stanford: Stanford UP.

Terman, L.M. (1954). Scientists and non-scientists in a group of 800 gifted men. *Psychological Monographs*, 68 (7), 1-44.

Terman, L. M., & Cox, C. M. (1926). *Genetic studies of genius: The early mental traits of 300 geniuses, Vol. 2.* Stanford, CA: Stanford University Press.

Terman, L.M. & Oden, M.H. (1935). The promise of youth. *Genetic studies of genius*, vol. 3. Stanford: Stanford UP.

Terman, L.M. & Oden, M.H. (1947). *Genetic studies of genius. vol. 4: The Gifted Child Grows Up: Twenty-five years' follow-up of a superior group*. Stanford UP, Stanford CA.

Terman, L.M. & Oden, M.H. (1959). The gifted group at mid-life. *Genetic studies of genius,* vol. 5, Stanford: Stanford UP.

Terry-Short, L.A., Owens, R.G., Slade, P.D., & Dewey, M.E. (1995). Positive and negative perfectionism. Personality and Individual Differences, 18, 663-*668.* שלחתי מייל לעצמי עם כתובת כתב העת

Timpe, R. L. (1989). Ritualization and ritualisms in religious development: A psychosocial perspective. *Journal of Psychology and Theology, 11*, 311-317.

Willings, D. (1992). Burnout among Teachers of the Gifted and Gifted Adults. *Gifted Education International, 8*(2), 107-113.

Zohar, A.H., Goldman, E., Calamary, R. & Mashiah, M. (2005). Religiosity and obsessive-compulsive behavior in Israeli Jews. *Behaviour Research and Therapy, 43*(7), 857-868.

About the Author

Hanna David received her Ph.D. in Educational Psychology from Ludwig Maximilians Universität, München. She has published six books and over 50 articles in literature, psychology, sociology, gender studies and mathematics education. Hanna teaches at the Ben Gurion Universityat Eilat and the Sakhnin Teachers' College, and works as private councelor for families with gifted children.

(C.27)

André Giordan; Monique Binda, Modes of learning: how to change the education to the gifted people?: Methods and concepts are never acquired through direct or an active transmission from a teacher to a learner. The traditional methods for transmitting knowledge, the TIC programmes, the various active pedagogical innovations fall short of expectations. The didactic ration, i.e. the amount of knowledge acquired as compared to the time spent, is very poor, sometimes inexistent. So today, new models on learning have been promoted. The learner's system does not work like a recording system. It has a specific mode of explanation - called conceptions- which determinates the way it decodes information and constructs knowledge. It's the only instrument, he has at disposal. Learning depends on these prior thinking notions and on the desire of the learner. It is also through them that the learner interprets information spread by the teacher or the media. If teaching does not consider this fact, if teaching does not work on the learners conceptions, the sitting notions hold their own and the conveyed knowledge is evaded, transformed or stay isolated from the familiar knowledge. Now this model is largely corroborate. Learning appears a highly interactive process which works in a conflicting way and in an integrative and paradoxical modes between what the learner has in his mind and what he can find and understand through his conceptions on his educative environment. Known under allosteric learning model, this change on learning ideas have some consequences on teaching, specially for the gifted pupils. The teacher or better the team of teachers- has to suggest a complex and heuristic environment that may interfere with the learner conceptions. The most important parameters of this educational environment will be presented in a network and illustrated.

First Step into Gifted & Talented Education: An Orientation Model for Gifted and Talented Children in Türkiye

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Abstract

It is a common fact that gifted and talented children in Türkiye face many problems in social and emotional life; starting from early ages. Most of them restrain themselves or are forced into isolation by peers. School is the first isolating environment for them although it stands as a socialization place at first look. In Türkiye, provision for gifted and talented children is held in special organizations distinct from schools they attend regularly. In the eye of the gifted child, these Centers appear to require another serious self-effort in any kind of communication and self-expression. As a result, they hide themselves as individuals; which directly affects observation and identification of potential gifts and talents. That is why Ankara Science and Arts Center carries out an Orientation Programme for the newcomer gifted and talented. The programme aims for gathering qualified data about individual, social, and psychological characteristics of gifted and talented children with 'we, not me' vision and mission. It is dominated by a holistic approach with individual-based implementations. This study clarifies the components of Orientation Programme for gifted and talented children in Ankara Science and Arts Center through a sample implementation, "Treasure Hunt", inspired by the well-known game. The implementation is evaluated according to aims and objectives of Orientation Programme as the first step into the gifted and talented education system in Türkiye. Oral presentation format will require materials and photos of the implementation.

Keywords: Social emotional problems, gifted & talented, holistic approach, orientation, implementation.

Meeting Social and Emotional Needs of the Gifted

Social and emotional aspects of giftedness have been a significant field of research to explore and devise efficient strategies for diagnosis, guidance, and educational provision for gifted and talented individuals. It is a fact that social and emotional problems of gifted individuals, arousing in childhood, "may take the form of particular vulnerabilities" (Lovecky, 1992) for them and the others in their lives. Reflecting into social contexts they are in as behavioural dilemmas, it is very common for gifted children to be perceived by others (family, teachers, peers, etc) negatively. Thus, as Van Tassel-Baska & Stambaugh (2006) point out, past and present research in gifted education emphasizes on the attention for social and emotional side of gifted learners.

Since gifted and talented individuals are considered to be the future turning points of their nations and the world, it is crucial to provide an education system incorporating a qualified holistic approach; pertaining to not only educational means but also their individual special needs; since, "functioning in one area requires functioning in others" (Lovecky, 1992). For gifted and talented children to achieve their potential, this special provision should be maintained with analytical intervention strategies mainly at school and other educational services for gifted; starting from recognizing social and emotional aspects of giftedness.

Gifted Children in School Context

In school context, gifted children's affective needs within school are as important as their academic needs (McCann, 2005). However, these needs can not be served for as good as it requires; as a result, gifted children have various problems with their school peers, teachers, and also with parents on subjects related to school. What are these problems in particular?

Referring to significant previous studies on social and emotional aspects of giftedness, Lovecky enumerates five social and emotional traits of giftedness as divergent thinking ability, excitability, sensitivity, perceptiveness, and entelechy (1992). Most of the time, it is likely that these traits reflect

into social contexts of gifted children as negative behavioural problems. On the other hand, gifted children are in need of a personal fulfilment like their peers at school; they need to be able to:

- be aware of themselves and of how they affect others;
- understand and manage their emotions;
- comfort themselves;
- motivate themselves; and
- make thoughtful, constructive decisions (Smutny, Walker & Meckstroth, 1997, p.166).

Without reaching these goals, with the strong effect of social and emotional traits of giftedness remarked above, gifted children must survive troubles such as:

- Stress;
- Sensitivity;
- Control against independence;
- Perfectionism;
- Underachievement; and
- Lack of motivation (Smutny et al. 1997).

After the safe and sound atmosphere at home, school is the first isolating setting for gifted children, although it stands as a socialization place at first look. They find that age peers do not share their interests, play by different rules, and appear to engage in pastimes, such as teasing, that many gifted children find puzzling and painful (Lovecky, 1992). Being not an alternative to school setting, but serving for gifted children to achieve their self-actualization with personal fulfilment, together with other gifted children, organizations for gifted and talented children can come forward via their orientation programmes.

Orientation for Gifted and Talented in Science and Arts Centers* in Türkiye

Introduced after the home setting, school context conceals the key factors involved in gifted children's social development. Because of the mentioned reasons preventing the socialization of gifted children, it is important for them to relate to other gifted children in early ages, while self-concept is being formed (Silverman, 2003).

It is apparent that all over the world, gifted children are subject to such social and emotional problems. In Türkiye, Science and Arts Centers serving for gifted education, apply Orientation Programme with a holistic approach which aims for solving social and emotional problems of gifted children. The programme aims for gathering qualified data about individual, social, and psychological characteristics of gifted and talented children with "we, not me" vision and mission. It is dominated by a holistic approach with individual-based implementations. Relating this holistic approach to the gifted education system, one main objective of gifted education system in Türkiye is to nurture individuals in various talent areas, while enhancing cognitive, social and emotional aspects of their capabilities.

Gifted and talented children in Türkiye attend Science and Arts Centers in their time off school. Like school setting, there are certain social milieus they must be in direct contact; home, school, playground, adult world, etc. At that point, Orientation Programme in Science and Arts Centers caters for meeting their needs for survival in these various social contexts. Gradually, the Center turns into a place where they actualize themselves with a sound self-esteem. This gradual social – emotional progress in gifted children develops in that way:

In the eye of the gifted child, who is confused about this new environment, the Center appears to demand another severe self-effort in any kind of communication and self-expression. As a result, they hide themselves as individuals that it directly affects observation and identification of potential gifts and talents.

After the initial identification process, children are first introduced to Center through Orientation Programme. The programme aims for collecting qualified data about individual, social and psychological characteristics of gifted children with corresponding implementations. In these activities, children are grouped for gathering anecdotes of social and affective characteristics, abilities and interests. All implementations are planned as for establishing a 'we, not me' perspective. All teachers in Center, regardless of their academic branch, participate in all kind of implementations as members in child groups.

The social-educational activities include applications assessing academic readiness, practices for fostering self-esteem and socialization, screening tests, inventories, cognitive and physical exercises based on multiple intelligences, with emphasis on drama and games.

Without having a strict curriculum, in light of the aims and objectives of Orientation Programme, Center teachers plan for a two-month period -can be less or more, dependant on realization of programme aims- covering group meetings of children and teachers. Any activities planned by teachers are collected in a database, and enriched every year.

A teacher acts as a guiding leader during a meeting with children; aiming for positive intervention in group dynamics. The reason is, while improving their adaptation to this new Science and Arts Center: BİLSEM, in Turkish (Abbreviated from Bilim ve Sanat Merkezi) atmosphere, gifted children must experience the "give-and-take of interactions *with others of equal ability*, where they can find acceptance and understanding, the keys to the development of successful social skills and positive self concept" (Roedell, 1989, p.26).

Sample Implementation in Orientation: Treasure Hunt

The activities within Orientation Programme are critical for gifted and talented children not to restrain but to actualize their self. One of these activities is *Treasure Hunt*, inspired by the well-known game. As it is known, it is a strategy game played in groups. So it is apt to be transformed into an educational activity in line with aims and objectives of Orientation Programme. The implementation steps are summarized here:

Treasure Hunt

Implementation Plan

Aims:

All the academic, directing and assisting stuff of the Center aim for:

1. Familiarizing gifted and talented children with the Center and Center context;
2. Testing academic readiness and perception skills; and
3. Constructing and improving group dynamics.

Objectives:

Newcomer gifted and talented children at the Center will be able to:

1. a) get acquainted with physical structure of the Center;
   b) identify themselves through "we, not me" perspective;
2. a) realize and justify their potential abilities in each branch;
   b) derive answers for questions by creative thinking skills;
3. a) identify themselves as a group member;
   b) express themselves in a group.

Methods and Techniques:

Group work, brainstorming, question-answer, cognitive and kinaesthetic drills, Multiple Intelligences Theory, different learning styles, on-site learning, enchanted learning

Context and Materials:

All physical units in Ankara Science and Arts Center, with the materials inside: Science Lab, Computer and Technology Lab, Maths Room, Social Sciences Room, Music Room, Visual Arts

Studio, Language Arts Room, Management Rooms, Research and Development Unit, Multi-Purpose Hall, Paper-pencil, envelopes, chocolate bars (for winners), directive notes prepared by teachers

Time:
40 minutes (dependant on group dynamics)

Implementation Steps:
Preparation
Before the implementation, all teachers prepare questions to assess academic readiness. At the same time, directives for moving to upper stages are written on paper notes and hidden in each room. Sample directives and readiness questions for a game group, translated into English from Turkish (Turkish version is rhymed like riddles):

Directive 1 (Starting instruction): *It is on the left at the entrance, find it by hopscotch; walking around the room, ask "Where is the clue?" . If you do not walk around, you can not find the clue.* (It clues for Social Sciences Room).

Question asked by teacher in Social Sciences Room: *Which person to which country? Put the people magnets on the countries they live and tell their nationality and country names. Remember: There are 16 magnets!*

Directive 2 (Teacher hands it in or children must find it somewhere in the room, after they answer the question): *Walk as a human-robot and say the unit names you pass behind loudly* (While moving from Social Sciences Room to Science Lab). Children are randomly grouped and are paid special attention not to form homogeneous groups (in terms of gender, age, etc.). Groups are composed of 4-6 children. Except one leader (teacher) all teachers move into their rooms.

Application
Leader explains the content of the game (rules, time, and group responsibilities); distributes paper, pencil, and envelopes including the first instruction of each group and starts the game. Groups work independently, and must arrange for their own time and pace. Each instruction for each group is different. Each group starts from a different room. With the first instruction, groups analyze the clues and try to find the intended room. In the room they arrive, one of the teachers is ready for asking a question in his/her subject. These questions require them using specific information or abilities on a subject area like Social Sciences or Maths, etc. Only after answering or doing with a question handed in a room *successfully*, they win the next directive note to pass into another room in the Center. The game continues in that way, and ends with the instruction of teacher leading the game.

The group passing all the stages in all units of the Center in time, wins the game.

Evaluation

It is crucial that children must answer correctly or do the required task in questions successfully, and *hunt* for the next instruction note as a part of whole treasure. This imitation conveys that the Center, as a whole with its units, residents, and visitors, is a kind of treasure waiting to be discovered by these newcomer gifted and talented children. Individually and in groups, they are welcomed in the Center for a real adventure into self and in-group interactions.

Through this perspective, with game-over, *the hunters* are asked for their individual evaluations for the game. They are encouraged for a detailed evaluation in terms of their interpersonal and intrapersonal feelings. As a circle, hands in hands, all children close their eyes to visualize instants from the game, and then they share their feelings and opinions about it.

As for observational purposes, teachers have the chance of observing children while they are answering questions, setting up their group dynamics, moving in groups as active/inactive members, expressing themselves in different styles, and holding hands with more trust to each other and the Center teachers, at the evaluation phase.

Before ending that day's meeting, each member of the circle says these lines aloud as a motto (Translated into English from Turkish version):

BİLSEM Motto:
I love people so much,
I always trust myself and trust them.
What is fear, I don't even know,
And everybody trusts me.

This motto is accepted as a common end-of-meeting utterance during Orientation Programme, which reminds all members of the Center about their existence as an individual in this context. It is strongly believed and observed to enhance a positive state of belonging and self-esteem in Turkish gifted and talented children.

Conclusion

Since meeting social and emotional needs of gifted and talented children is a vital requirement within the provision for their educational needs not only in schools but also in separate organizations, Science and Arts Centers in Türkiye follow an Orientation Programme for commencing these implementations through group games. Transformed into an edifying group game, *Treasure Hunt*, offers an energetic, interactive, and motivational atmosphere to meet the novice members of the Center.

Not only regular observation but also oral and written feedback from children proves that implementations like *Treasure Hunt* facilitate the self-actualization of gifted and talented children, motivate them for being in social and emotional contact with their peers, relieve them to let somebody in their sensitive world. Furthermore, quiet, hesitating, and introvert children begin relaxing themselves for contact. It is a major fact that before fostering giftedness in these children, encouragement, intense interest, prolonged effort, the feeling of not being alone, and the joy of achieving should be initiated (Cropley, 1994). In that way, they realize that they can establish healthy connections within various social contexts, they gain problem solving skills required for self-actualization, and they are perceived and accepted positively by others.

By means of such an internal and holistic approach, a more straightforward and observable process of provision for gifted and talented children contributes for nurturing their gifts and talents by meeting their social and emotional needs at the same time. With a view on the issue from Eyre, being not a homogeneous group, provision for gifted and talented children must respond to their individual needs, and be sufficiently flexible to take account of particular ages and contexts (2001). The approach followed in Orientation Programme appears to be the right choice as a threshold for future implementations in Ankara Science and Arts Center.

To conclude all, this study is expected to catch the attention of facilitators and teachers in the area by reminding these lines from Smutny et al. (1997): "How children feel about themselves is far more important than what they know: "I can" is more significant than IQ." (p.165).

References

Cropley, A.J. (1994). Creative Intelligence: A Concept of True Giftedness. *High Ability Studies,* Volume *5,* ıssue 1. pages 6-24 [online]
http://www.informaworld.com/smpp/content~content=a739502757~db=all~order=page

Eyre, D. (2001). Chapter 1: An effective primary school for the gifted and talented. In D. Eyre & L. McClure (Eds.). *Curriculum Provision for the Gifted and Talented in the Primary School,English, Maths, Science and ICT*. (1-27). New York: David Fulton Publishers.

Lovecky, D. V. (1992). Exploring Social and Emotional Aspects of Giftedness in Children. *In Roeper Review. 15(1) 18-25.* [online]
http://www.gt-cybersource.org/ArticlePrintable.aspx?rid=11359

McCann, M. (2005). International perspectives on giftedness: Experimental and cultural observations of IQ and creativity with implications for curriculum and policy design. *International Education Journal,* Volume *6* Number 2. 125-135.

Roedell, W. C. (1989). Early development of gifted children. In J. VanTassel-Baska & P. Olszewski-Kubilius (Eds.). *Patterns of influence on gifted learners: The home, the self, and the school*. (13-28). New York: Teachers College Press.

Silverman, L. K. (2003, November). Developmental Phases of Social Development. From the Gifted Development Center website, www.gifteddevelopment.com. [online] http://www.sengifted.org/articles_social/Silverman_DevelopmentalPhasesOfSocialDevelopment.pdf

Smutny, J. F., Walker, S. Y. & Meckstroth, E. A. (1997). *Teaching Young Gifted Children in the Regular Classroom. Identifying, Nurturing, and Challenging Ages 4-9.* Minneapolis: Free Spirit Publshing Inc.

Van Tassel-Baska, J. & Stambaugh, T. (2006). *Comprehensive Curriculum for Gifted Learners* (Third edition). Allyn & Bacon/Longman Publishers: Boston.

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Onur AGAOĞLU graduated from Gazi University in Ankara. He started his career as a teacher of Computer and Technology. After four years' experience in primary and high schools, he gained the Certificate for Gifted and Talented Children's Education from the Ministry of Turkish National Education, in 2006. Then, he has joined the Ankara Science and Arts Center as a teacher for gifted and talented children. He is the Assistant Director of Ankara Science and Arts Center since 2007. Currently, he is preparing for taking his Masters degree in Ankara University. He is interested inthe Planning and Economics of Education. He made a number of studies related to the screening and identification of the gifted and talented students in the Turkish societies. He is a member of World Council for Gifted and Talented Children. He is strongly involved in a number of international activities and projects.

Fatma CAN graduated as a Teacher of English, from Middle East Technical University, in Ankara, in 2002. She conducted her teaching career in primary and high schools while studying on Cognitive Sciences at the same university. After gaining The Certificate for Gifted and Talented Children's Education from the Ministry of Turkish National Education in 2006, she was hired to work at Ankara Science and Arts Center as a teacher for gifted and talented children. Her current focus is on studies especially on the linguistic aspect of giftedness with a cognitive perspective, and gifted children as the second language learners.

(C.30)

Formes du rapport au savoir et performances scolaires chez des lycéens haut potential
Different patterns in the attitude toward learning and school performance for high school gifted teenagers

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Abstract

So far research carried out on gifted teenagers' schooling (I.Q. score ≥ 130) has focused on the underachievement of some of these students. However, two-thirds of these adolescents are successful (Pourtois, Desmet & Leheut, 2005). Our purpose is to study the psychological process that can explain the variance in grade levels in this population. We hypothesize that the meaning given to knowledge and learning will have bigger or smaller self-implication effects on schooling. The sample for our study consisted of 84 gifted teenagers aged 13 to 18 (age average: 15.5; SD: 1.04) – from a high school with contrasted students' school status. 42 students are considered low grade or average low; 42 students are considered high grade or average high. These students wrote a "knowledge assessment text" (Charlot, Bautier & Rochex, 1992). We made a thematic (Bardin, 1977) and lexical (Alceste Software, Reinert, 2008) analysis of the data collected. It enabled us to define different attitudes toward knowledge related to the (lack of) implication in school and to whether they do well or not in school. The gifted students who do well in school take a more reflexive posture toward knowledge, school and themselves. They also value academic and school learning more than the underachievers for whom relational, affective and correlated to self-development learning are more meaningful.

Keywords: attitude toward learning; giftedness; high school teenagers; implication in school; school performances.

I - Introduction

A lot of research about gifted teenagers' schooling (I.Q. score ≥ 130) has mainly explored the lower achievement of some of these students. Most of the time, lower achievement is accounted for by the inadequacy of the traditional educational practice to the learning characteristics of the latter. Typically this practice is stiff and normative, the pace is "too slow" and the material too unchallenging, it could not match the intellectual appetite, the fast learning pace of gifted students (Davis & Rimm, 1998; Leu, 2001). Besides, the working of the school institution is often depicted as badly adapted to the socio-affective characteristics of these adolescents. Their attitude to authority figures and to stiff systems, their constant questioning of the validity of things, of teachers or of the school institution would not allow them to find their place in it (Webb, Meckstroth & Tolan, 1994).
Nevertheless, these works do not explain why two-thirds of these adolescents do well at school (Pourtois, Desmet & Leheut, 2005).

Therefore, our purpose is to investigate the psychological process that could account for the variance in the school experience of this population of students.

Without overlooking the specific demands of the school institution, it seems necessary to articulate these demands with what the students make of them: the meaning students give them and the learning motivations (Bautier & Rochex, 1998). The word involvement underscores the active implication of the student while taking into account the exterior demands, which are always reconstructed by the student. The perception of these two faces of self-involvement results from what meaning the student gives to the knowledge and to the learning process.

The notion of relation to knowledge includes "this relation of significance, hence of how an individual (or a group) valuates the learning process and its translation into knowledge" (Charlot, Bautier & Rochex, 1992, 29).

We are trying to identify what meaning gifted teenagers give to the learning process and to knowledge, by hypothesizing that giving this or that meaning to these two elements can either favour or hinder active implication in personal learning and appropriation of knowledge.

II – Methods

II.1 - Participants

We met 84 high school gifted teenagers aged 13 to 18 (averaging 15.5; SD: 1.04) from mixed record classes (that is to say with mainstream teenagers), with contrasted school status. With a view to make a comparative study, we distributed the students between two groups of equal sizes: one with low score or average low adolescents (with an average of all marks below or equal to 12 on the previous year; N=42) and the other group with high score or average high students over 12 in mark average; N=42).

Table 1: Description of the participants.

	Total (N=84)	Low score or average low students (N=42)	High score or average high students (N=42)
Average of all marks	**12.6**	**≤ à 12**	**> à 12**
Age	Average age: 15.5 SD: 1.04	Average age: 15.9 SD: 1.09	Average age: 15.1 SD: 0.84
Sex	Boys: 47.0 % Girls: 37.0%	**Boys: 66.7 %** Girls: 33.3 %	Boys: 42.5 % **Girls: 54.8 %**
Class	10th: 46.4 % 11th: 35.7 % 12th: 17.9 %	10th: 38.1 % 11th: 42.9 % 12th: 19.0 %	10th: 54.8 % 11th: 28.8 % 12th: 16.4 %
Socio-eco. background	Low: 8.3 % Middle: 32.1 % High: 41.7 % Very high: 17.9 %	Low: 9.5 % Middle: 42.9 % High: 28.6 % Very high: 19.0 %	Low: 7.1 % Middle: 21.4 % High: 54.8 % Very high: 16.7 %
Siblings	No siblings: 7.1 % Siblings : 92.9 %	No siblings: 7.1 % Siblings: 92.9 %	No siblings: 7.1 % Siblings: 92.9 %

The sample of the low score students counts more boys than girls. Therefore, this variable will be taken into account in the outcomes.

II.2 - Procedure

The gifted students were recruited through internet forums or through professionals working with this particular population (psychologists who had made psychological evaluations but no follow up work).

In each case, we collected the relevant and reliable indicators identifying the adolescent as a gifted student.

All the students were informed that participation in the study was voluntary and that their anonymity would be preserved. Information was sent out with an acceptance form to the students and to their parents.

II.2 – Method of data collection

Each adolescent had to write out "an assessment of knowledge" (Charlot and al., 1992) from the following questions: "*Since you were born, you have been learning a lot of things at home, at school and elsewhere: what have you learnt? With whom? What is important for you in all this? And now, what are your expectations?*" Thus, the student had to make choices and give opinions. Therefore, the "assessments of knowledge" do not reveal what the student had actually learnt but what to his eyes is meaningful enough and has enough value to be mentioned in his assessment paper.

II.3 - Data analysis methods

The collected textual data was submitted to "paper-and-pencil" analysis of the contents (Bardin, 1977) and to a lexicometric analysis (Alceste Software, Reinert, 2008). This methodology, based on the topography of the discourse criterion, provides an extremely rich exploratory approach to study the verbal data and supplies a less arbitrary description of the corpus by bringing out recurrent similar patterns and hidden symmetries.

III – Results obtained from the "paper-and-pencil" analysis

The examination of the assessments focuses on the following aspects: what had the students learnt, where and by whom was knowledge transmitted, what knowledge is considered important, what are their expectations and what explicit statements are made on knowledge, on school and on themselves as learners.

To prevent, as much as possible, the researcher's personal factor from interfering in the data analysis, the selected grid follows the main lines of the grid of analysis drawn up by Charlot (1999).

III.1 – What knowledge have they acquired?

The knowledge evoked by the students has been examined from two different angles. On the one hand, we count the ratio of students who referred to at least one item in the various categories of the grid; on the other hand, the percentage of statements from each category mentioned by the students. In this case, every occurrence is taken into account, including the cases when the students list similar types of knowledge, supposing these repetitions are evidence of marked interest.

Table 2: Knowledge mentioned according to the school status of gifted teenagers (% students and % occurrences).

Categories of knowledge	Low % students		High % students		Chi2 test	Low % occur.		High % occur.	
	Boys N=28	Girls N=14	Boys N=19	Girls N=13		Boys	Girls	Boys	Girls
Everyday life knowledge	25,0	50,0	36,8	47,8	N.S.	14,6	19,1	8,0	12,8
Basic knowledge	17,9	35,7	15,8	13,0	N.S.	5,8	9,3	2,7	2,0
Family tasks	3,6	7,1	0,0	8,6	N.S.	0,8	1,2	0,0	1,0
Specific expertise	3,6	14,3	10,5	13,0	N.S.	0,8	1,9	2,0	1,3
Leisure	3,6	21,4	10,5	17,4	N.S.	0,8	2,5	1,3	3,0
Sports	14,3	7,1	5,3	17,4	N.S.	2,7	0,6	0,7	2,3
Arts	10,7	7,1	5,3	21,7	N.S.	2,7	1,9	0,7	3,0
Academic knowledge/school learning activities	50,0	64,3	73,2	82,6	.049	21,9	21,0	46,0	21,4
Basic knowledge	10,7	21,4	10,5	30,4	N.S.	2,7	3,7	1,3	3,6
Generic phrases	35,7	21,4	42,1	43,5	N.S.	5,4	3,1	14,0	6,3
School subjects	17,9	28,6	36,8	17,4	N.S.	4,2	4,9	18,7	2,0
Skills	7,1	35,7	15,8	21,7	N.S.	2,3	3,1	4,7	3,6
Methodological knowledge	0,0	7,1	15,8	13,0	.048	0,0	1,2	2,0	1,0
Normative knowledge	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	0,3
Reflexive activities	7,1	7,1	10,5	21,7	N.S.	2,3	0,6	2,7	2,6
(Dis)taste for learning	7,2	14,3	10,5	13,0	N.S.	1,2	1,2	1,3	2,3
Society, ideology or politics	14,3	28,6	26,3	39,1	N.S.	13,5	4,9	16,7	13,5
Nothing	7,1	14,3	5,3	8,7	N.S.	1,5	4,3	0,7	0,7
Generic phrases (except academic knowledge)	57,1	57,1	36,8	47,8	N.S.	11,5	7,4	11,3	8,9

Relational and affective knowledge (RAK)	57,1	100,0	52,6	87,0	N.S.	20,8	31,5	14,0	30,9
Conformity	17,9	14,3	15,8	17,4	N.S.	3,1	1,9	2,7	1,6
Harmonious relationships	42,9	78,6	15,8	65,2	N.S.	10,8	14,8	3,3	13,8
Confrontational relationships	21,4	57,1	5,3	34,8	N.S.	3,8	9,3	2,7	9,2
Knowledge of life, of people	21,4	35,7	31,6	30,4	N.S.	3,1	4,9	5,3	5,9
Others	0,0	7,1	0,0	0,0	N.S.	0,0	0,6	0,0	0,0
Self-development (SD)	35,7	42,9	15,8	52,2	N.S.	15,0	11,7	4,0	11,5
Self-confidence	14,3	14,3	0,0	13,0	N.S.	1,5	1,2	0,0	1,6
Autonomy	10,7	21,4	0,0	13,0	N.S.	1,9	1,9	0,0	1,3
Surmounting difficulties	14,3	28,6	10,5	21,7	N.S.	3,1	4,9	3,3	4,6
Ripeness	3,6	7,1	0,0	21,7	N.S.	0,4	0,6	0,0	2,3
Personality	10,7	28,6	5,3	17,4	N.S.	6,9	3,1	0,7	1,3
Others	3,6	0,0	0,0	0,0	N.S.	1,2	0,0	0,0	0,0
RAK and SD	60,7	100,0	63,2	91,3	N.S.	35,8	43,2	18,0	42,4
Vocational training or jobs	7,1	0,0	0,0	4,3	N.S.	0,8	0,0	0,0	0,3

More than high achievers do, low achievers mention everyday life knowledge, namely basic knowledge ("*walking*", "*talking*"…) or relational, affective and connected with self-development knowledge ("*I have learnt friendship*") or they use tautological expressions ("*I have learnt a lot of things*").

Conversely, high achievers insist more on academic knowledge or school learning activities and specifically on methodological knowledge ("*I have learnt Essay-writing*") or reflexive activities ("*thinking*", "*considering*"). Many more high achievers quote knowledge referring to a category that we will call "society, ideology, politics" and they do so more significantly too ("*I have learnt that the early bird catches the worm*", "*Deserving people reach happiness*"). This knowledge could represent the reflexive side of the knowledge of the world, of life or of people which would be conveyed in more down-to-earth phrases by lower achievers who would tend to use such expressions as: "*I have learnt happiness*".

As a final remark, let us say that lower achievers more often express the feeling they haven't learnt anything ("*I haven't learnt anything at school*").

III.2 – Where did they acquire that knowledge and with whom?

The acquisition knowledge referred to in the "knowledge assessments" can be linked first, to places and secondly to various agents.

Table 3: Links between agents/places and knowledge gain (% students).

Links between agents/places and knowledge gain	**Low** % students		**High** % students		Chi^2 test
	Boys (N=28)	Girls (N=14)	Boys (N=19)	Girls (N=13)	
Agents/places not mentioned	**39,3**	**14,3**	5,3	0,0	.003
Every knowledge gain connected with a specific agent/place	25,0	78,6	**52,6**	**82,7**	.047
Every knowledge gain not connected with a specific agent/place	17,9	0,0	21,1	17,4	N.S.
Mixed	17,9	7,1	21,1	0,0	N.S.

In the majority of "assessments of knowledge" (83 %) at least one agent is linked with knowledge. Whereas many more assessments in the low achievers sample do not mention any agent linked with knowledge gain (31 % *versus* 2 % for high achievers).

Besides, in most texts (56 %) every acquisition of knowledge is connected with a specific agent (ex: "*I have learnt politeness and love with my family, I learnt multiplication tables at school*, *etc*."). This result underlines that specific meaning is given to every field of knowledge. Admittedly, each one would provide a specific type of knowledge. This trend is more typically characteristic of the discourse of the successful children.

Table 4: Agents/places mentioned according to the school status of gifted teenagers (% students).

Agents/places	**Low** % students		**High** % students		Chi^2 Test
	Boys (N=28)	Girls (N=14)	Boys (N=19)	Girls (N=13)	
School	46,4	78,6	**63,2**	**82,6**	N.S.
Place (*at school…*)	25,0	57,1	42,1	56,5	N.S.
Agent (*school taught me…*)	10,7	28,6	10,5	17,4	N.S.
Teachers, generic group (*with my teachers…*)	17,9	21,4	26,3	26,1	N.S.
One or many specific teacher(s)	0,0	7,1	0,0	8,7	N.S.
Peers	25,0	42,9	31,6	30,4	N.S.
Family	3,6	78,6	**57,9**	**87,0**	.025
Place	3,6	7,1	0,0	8,7	N.S.
Agent	**25,0**	**28,6**	10,5	8,7	N.S.
Generic group	3,6	42,9	**26,3**	**56,5**	N.S.
Father	3,6	7,1	15,8	8,7	N.S.
Mother	0,0	7,1	10,5	17,4	N.S.
Siblings	3,6	7,1	0,0	17,4	N.S.
Grandparents	3,6	21,4	5,3	8,7	N.S.
Others	64,3	0,0	0,0	0,0	N.S.
Others (life, books, *etc*.)	7,1	85,7	63,2	78,3	N.S.

If there are as many successful students as failing ones who refer to their peers or to such elements as sports or life as agents linked to knowledge, they more often mention school or their families.

Inside these two categories, the underachievers will, more often than high achievers, use expressions that explicitly name the knowledge-linked agents such as: "*my parents taught me…*", "*my father taught me…*" – that is to say, people (or places) that instill knowledge to the student – whereas the successful student will tend to say: "*at school, I learnt…*"; "*with my teachers, I learnt...*". Knowledge gain still refers to places or people but in this case "I" is the agent.

Once the main trends outlined, we calculated the percentage of pupils who had evoked such or such an acquisition of knowledge in each different place and also the number of occurrences of each

category of knowledge quoted in relation with each one of the places. Let us just present here a few results concerning the school sphere.

Table 5: Knowledge linked with the school sphere according to the school status of gifted teenagers (% students and % occurrences).

Categories of knowledge	Low % students		High % students		Chi^2 test	Low % occur.		High % occur.	
	Boys N=28	Girls N=14	Boys N=19	Girls N=13		Boys	Girls	Boys	Girls
Everyday life knowledge	7,1	7,1	0,0	13,0	N.S.	5,1	2,9	0,0	6,3
Academic knowledge/school learning activities	32,1	50,0	47,4	60,9	N.S.	76,9	41,2	76,9	60,9
Basic knowledge	14,3	14,3	0,0	21,7	N.S.	20,5	8,8	0,0	14,1
Generic phrases	17,9	35,7	36,8	43,5	N.S.	23,1	17,7	30,8	20,3
School subjects	7,1	14,3	15,8	8,7	N.S.	20,5	8,8	41,0	6,3
* only mentioned	0,0	7,1	5,3	8,7	N.S.	0,0	2,9	18,0	4,7
* actual content of a school subject	7,1	7,1	15,8	4,3	N.S.	20,5	5,9	23,1	1,6
Skills	3,6	7,1	5,3	4,3	N.S.	2,6	2,9	5,1	3,1
Methodological knowledge	0,0	0,0	0,0	8,7	N.S.	0,0	0,0	0,0	3,1
Reflexive activities	10,7	0,0	0,0	17,4	N.S.	10,3	0,0	0,0	9,4
Distaste for learning	2,4	7,1	0,0	0,0	N.S.	1,1	2,9	0,0	0,0
Taste for learning	0,0	0,0	2,1	4,3	N.S.	0,0	0,0	1,2	4,7
Society, ideology or politics	7,1	21,4	5,3	8,7	N.S.	7,7	20,6	7,7	4,7
Generic phrases (except academic knowledge)	7,1	7,1	10,5	8,7	N.S.	5,1	2,9	7,7	3,1
Relational and affective knowledge (RAK)	3,6	28,6	0,0	21,7	N.S.	2,6	20,6	0,0	20,3
Self-development (SD)	3,6	14,3	5,3	8,7	N.S.	2,6	11,8	5,1	4,7
RAK and SD	7,1	28,6	5,3	26,1	N.S.	5,1	32,4	5,1	25,0
Vocational training or jobs	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	0,1

Only low achievers will claim they learnt to hate some subjects at school whereas successful students claim that, at school, they gained a taste for learning.

The latter mentioned more school subjects ("*I learnt mathematics*") and only they quote methodological knowledge acquired in the school sphere.

III.3 – What types of knowledge are considered important?

In general, this question received a minimum of answers, sometimes even none. A few answers are so vague that they are close to a non-answer. This can be explained by the fact that students only mentioned, in their answers to the first question, knowledge that was meaningful to them.

Table 6: Knowledge considered important according to the school status of gifted teenagers (% students and % occurrences).

Categories of knowledge	Low % students		High % students		Chi^2 test	Low % occur.		High % occur.	
	Boys N=28	Girls N=14	Boys N=19	Girls N=13		Boys	Girls	Boys	Girls
Everyday life knowledge	0,0	21,4	5,3	13,0	N.S.	0,0	25,0	9,1	15,3

Academic knowledge/school learning activities	7,1	21,4	31,6	13,0	N.S.	33,3	17,9	31,8	25,4
Basic knowledge	0,0	7,1	0,0	8,7	N.S.	0,0	7,1	0,0	8,5
Generic phrases	3,6	14,3	15,8	4,3	N.S.	8,3	7,1	13,6	1,7
School subjects	0,0	7,1	0,0	4,3	N.S.	0,0	3,6	0,0	6,8
* only mentioned	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	5,1
* actual content of a school subject	0,0	7,1	5,3	4,3	N.S.	0,0	3,6	4,6	1,7
Skills	0,0	0,0	10,5	4,3	N.S.	0,0	0,0	9,1	3,4
Reflexive activities	3,6	0,0	0,0	13,0	N.S.	25,0	0,0	0,0	6,8
(Dis)taste for learning	0,0	0,0	5,3	0,0	N.S.	0,0	0,0	4,6	0,0
Society, ideology or politics	3,6	7,1	10,5	13,0	N.S.	8,3	3,6	18,2	15,3
Nothing	7,1	0,0	0,0	0,0	N.S.	16,7	0,0	0,0	0,0
Generic phrases (except academic knowledge)	7,1	21,4	10,5	4,3	N.S.	16,7	10,7	9,1	1,7
Relational and affective knowledge (RAK)	3,6	28,6	21,1	39,1	.033	16,7	35,7	18,2	27,1
Conformity	0,0	7,1	5,3	0,0	N.S.	0,0	3,6	4,6	0,0
Harmonious relationships	3,6	14,3	0,0	30,4	N.S.	16,7	17,9	0,0	22,0
Knowledge of life, of people	0,0	14,3	10,5	13,0	N.S.	0,0	10,7	9,1	5,1
Others	0,0	0,0	5,3	0,0	N.S.	0,0	0,0	4,6	0,0
Self-development (SD)	3,6	7,1	5,3	13,0	N.S.	8,3	7,1	4,6	15,3
Autonomy	3,6	0,0	5,3	4,3	N.S.	8,3	0,0	4,6	1,7
Surmounting difficulties	0,0	7,1	0,0	8,7	N.S.	0,0	7,1	0,0	6,8
Ripeness	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	1,7
Personality	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	1,7
Others	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	1,7
RAK and SD	7,1	34,1	20,2	49,1	.030	25,0	42,9	22,7	42,4
Higher education	0,0	0,0	5,3	0,0	N.S.	0,0	0,0	4,6	0,0

More high achievers insist on the acquisition of academic skills and on a certain taste for learning. Many more of them also mention at least one learning activity in the category "society, ideology or politics". In addition, they are the only ones to underscore that higher education is important. Let us note that here, high achievers quote more relational, affective and correlated to self-development learning than low achievers.

On the contrary, the latter are the only ones to declare that nothing is important. Also many more of them answer using generic phrases such as "*everything is important*", "*the important things were those I learnt in my family*" which reveals a rather dim rapport to knowledge.

III.4 – What are their expectations?

Table 7: Expectations mentioned according to the school status of gifted teenagers (% students and % occurrences).

Categories of knowledge	**Low**		**High**		**Chi² Test**	**Low**		**High**	
	Boys N=28	**Girls N=14**	**Boys N=19**	**Girls N=13**		**Boys**	**Girls**	**Boys**	**Girls**
Everyday life knowledge	7,1	21,4	15,8	8,7	N.S.	7,7	7,5	10,0	3,2
Academic knowledge/school learning activities	7,1	35,7	42,1	26,1	N.S.	7,7	37,5	36,7	27,4

Generic phrases	0,0	7,1	15,8	13,6	N.S.	0,0	2,5	5,0	4,8
School subjects	3,6	21,4	38,9	17,4	.041	2,6	32,5	30,0	16,1
* only mentioned	0,0	14,3	21,1	8,7	N.S.	0,0	27,5	15,0	4,8
* actual content of a school subject	3,6	7,1	26,3	17,4	.024	2,6	5,0	15,0	11,3
Skills	0,0	7,1	0,0	0,0	N.S.	0,0	2,5	0,0	0,0
Methodological knowledge	3,6	0,0	0,0	0,0	N.S.	2,6	0,0	0,0	0,0
Normative knowledge	3,6	0,0	0,0	0,0	N.S.	2,6	0,0	0,0	0,0
Reflexive activities	0,0	0,0	5,3	8,7	N.S.	0,0	0,0	1,7	4,8
Society, ideology or politics	14,3	7,1	15,8	4,3	N.S.	10,3	2,5	13,3	1,6
Nothing	7,1	0,0	0,0	0,0	N.S.	5,1	0,0	0,0	0,0
Generic phrases (except academic knowledge)	7,1	14,3	0,0	21,7	N.S.	5,1	5,0	0,0	16,1
Relational and affective knowledge (RAK)	21,4	28,6	10,5	26,1	N.S.	25,6	15,0	10,0	22,6
Harmonious relationships	10,7	14,3	10,5	13,0	N.S.	7,7	10,0	10,0	17,7
Knowledge of life, of people	14,3	14,3	0,0	8,7	N.S.	18,0	5,0	0,0	3,2
Others	0,0	0,0	0,0	4,3	N.S.	0,0	0,0	0,0	1,6
Self-development (SD)	7,1	21,4	15,8	17,4	N.S.	12,8	15,0	11,7	17,7
Autonomy	7,1	7,1	5,3	0,0	N.S.	7,7	7,5	3,3	0,0
Surmounting difficulties	0,0	7,1	5,3	13,0	N.S.	0,0	2,5	1,7	9,7
Ripeness	3,6	14,3	5,3	4,3	N.S.	2,6	5,0	1,7	1,6
Personality	3,6	0,0	5,3	8,7	N.S.	2,6	0,0	1,7	3,2
Having a lot of fun	0,0	0,0	5,3	4,3	N.S.	0,0	0,0	3,3	1,6
Being successful	0,0	7,1	0,0	0,0	N.S.	0,0	2,5	0,0	0,0
RAK and SD	30,3	40,5	23,2	39,2	N.S.	38,5	30,0	21,7	40,3
Vocational training or jobs	17,9	28,6	5,3	8,7	.060	12,8	10,0	3,3	4,8
Higher education	0,0	7,1	15,8	4,3	N.S.	0,0	2,5	5,0	1,6
To go on learning	7,1	0,0	15,8	13,0	N.S.	5,1	0,0	10,0	4,8
To acquire the adult life	3,6	7,1	0,0	0,0	N.S.	5,1	5,0	0,0	0,0

Many more successful students mention at least one academic or school learning activity in their assessment. In particular, they insist much more on statements related to the content of a school subject ("*I would like to learn the history of Japan*"), to reflexive activities or to generic phrases.

In this academic and school-centered category, the students facing difficulties are the only ones to mention at least one academic activity of the methodological or normative type ("*to work correctly*"). They may feel they have difficulties at this level (lacking the method and conformity required by educational institutions). Therefore, they are anxious to acquire the necessary know-how and skills to fit in the system.

Many more low achievers will mention vocational training or jobs, expressed in a very vague manner: "*Now, Il feel like learning a job*", together with statements in connection with other spheres of adult life: "*I want to find a flat*", "*to find a girl-friend who could become my wife*".

In the relational, affective and self-development-centered category, more low achievers insist on statements related to autonomy and success. Also, they are the only ones to say they have no expectations at all.

The high achievers make statements concerning higher education: "*Now I expect to be admitted in a "Grande Ecole*", "*Next, I will go to University*" and express a more general desire to learn: "*I expect to go on learning*", "*I will learn for ever and ever*".

III.5 – Comments on school, on knowledge and self-perception

Table 8: Comments mentioned according to the school status of gifted teenagers (% students).

Comments	**Low** % students		**High** % students		Chi2 Test
	Boys (N=28)	Girls (N=14)	Boys (N=19)	Girls (N=13)	
Comments on themselves	21,4	21,4	57,9	30,4	.035
Skills	14,3	7,1	36,8	21,7	.057
Lack of skills	3,6	7,1	15,8	4,3	N.S.
Others	3,6	7,1	5,3	8,7	N.S.
Comments on school	25,0	35,7	36,8	47,8	N.S.
Negative comments on school	21,4	21,4	26,3	21,7	N.S.
Positive comments on school	7,1	14,3	21,1	30,4	.046
Comments on knowledge	25,0	42,9	68,4	56,5	.004
Thirst to know	10,7	21,4	47,4	39,1	.004
Scholarly type of relation to knowledge	3,6	0,0	10,5	4,3	N.S.
Utilitarian type of relation to knowledge	3,6	0,0	5,3	4,3	N.S.
Hazy relation to knowledge	10,7	0,0	0,0	0,0	N.S.
Total	50,0	78,6	84,2	82,6	.016

Many more high achievers go beyond the limits of the questions and expound on themselves, on knowledge and on school which reveals a more significant reflexive posture.

Among the comments on self-perception, the most salient difference between our two samples concerns the perception they have of their own learning skills. Many more successful students will say they know quantities of things and are very cultured: "*It would be equally presumptuous to display all my knowledge in two pages. It proves hard to sum up all I have learnt watching the TV program "question for a champion"; quite modestly, I must admit I am very cultured*"; "*Since I was born, it seems to me, I have learnt everything that can be learnt"*. Some stress the skills that enabled them to gain such extensive knowledge, it is, in particular, an excellent memory: "*I have the ability to quickly remember anything I may read or hear which is extremely useful in my quest for absolute knowledge*" or a highly developed sense of observation: "*Thanks to my fairly developed sense of observation I have also learnt many things*".

Concerning opinions on school, many more high achievers report positive feelings toward the school sphere. "*Everything I learnt (at school) will be useful in the future. It is acquired and perfectly integrated. That must be why I have always liked middle school and high school*"; "*I have always had excellent teachers who each in their different own ways made me like their subjects*".

Finally, concerning the attitudes to knowledge, only the low achievers express themselves in terms which are evidence of a very hazy relation to knowledge. *"I don't know what I have learnt, I don't know what I expect*" whereas the successful insist more on their thirst for knowledge: "*I have real bulimia for knowledge*", "*I think I want to learn all that it is possible to learn in one life*".

IV - Main results of the lexicometric analysis (Alceste Software)

80 % of the ECU (Elemental Context Units) were submitted to the Hierarchical Decreasing Classification (HDC) from the Alceste Software. At the outcome, the discourse was divided into two different classes (or lexical worlds) almost the same in sizes.

Class I (47.8 % of the ECU) is significantly representative of the low and average low score students (Chi2=6.1). It consists of vocables related to relational and affective learning (*friends*, Chi2=20.87; *happiness*, Chi2=12.22; *jealousy*, Chi2=11.09; *etc*.) and to basic knowledge (*to walk*,

Chi2=4.39; *to speak*, Chi2=4.39; *etc*.). The vocabulary belonging to this class also refers to the lexical field of difficulties (*hard*, Chi2=6.61; *difficulty*, Chi2=4.39; *failure*, Chi2=4.39; *etc*.) and to the purely institutional features of the school system (*curriculum*, Chi2=4.39; *marks*, Chi2=4.39; *results*, Chi2=4.39; *etc*.). The most significant ECU of this class reveal the stress laid on learning about life, relationships with others and their difficulties: "*I have learnt about the difficulties of life, its sunny side and its dark side*" (Chi2 = 11); "*I have also learnt that friends are great help when they are true friends and that it is hard to be separated from them*" (Chi2=20).

Class II (52.2 % of the ECU), representative of high or average high score students (Chi2=6.1), holds more vocables referring to the school sphere (*teachers*, Chi2=16.58; *scholastic*, Chi2=12.24; *class*, Chi2=3.69; *etc*.), particularly to the subjects and learning contents themselves (*history*, Chi2=20.94; *languages*, Chi2=17.02; *physics*, Chi2=10.03; *etc*.), to the acquisition of general knowledge (*knowledge*, Chi2=43.74; *cultivation*, Chi2=39.30) and to the desire and pleasure to learn (*passion*, Chi2=11.23; *to interest*, Chi2=11.23; *to fascinate*, Chi2=7.43; *etc*.). Here are two ECU representative of this class: "*I have also acquired a number of scientific information by surfing on the net and by reading specialist magazines*", "*I could learn new words, the capitals of various countries and the names of the authors of the most famous books*".

We can find here the same lines already revealed by the analysis of contents; that is to say the high and average high score students are more interested in academic learning and it is learning about life, relationships to others that make more sense for the low and average-low score students.

V - Conclusion

Our purpose was to apprehend the various patterns of the attitudes toward knowledge and school for high school gifted students attending mixed standard classes.

The results obtained from our two analyses point out the diversity of the singular relation toward knowledge and school among these adolescents.

The high and average high score students reveal a "scholarly type of relation to knowledge" (Charlot and al., 1992) in which knowledge is meaningful and actually is instrumental in learning more about the world. Their production is evidence of a significant reflexive posture toward knowledge, school and themselves as learners. If low and average low score students are little school-centered, they have other fields of interest: when the learning process is concerned, their universe is centered on learning about daily-life, about relationships, emotional and self-development. In general, their relation to learning proves to be rather hazy, they stress this fact themselves: the knowledge gained, the agents and places linked to it, their expectations, *etc*. are not always clearly identified by the students themselves.

These variances may explain why these students eventually reach different degrees of attainment within the school sphere. Indeed, one can easily understand that the posture high achievers have adopted toward knowledge can facilitate commitment to school learning and the appropriation of knowledge.

This exploratory approach confirms the interest there is in taking into account the students' points of view through their representations to be able to apprehend their school experience.

References

Bardin, L. (1977). *L'analyse de contenu*. Paris: PUF.

Bautier, E., & Rochex, J.Y. (1998). *L'expérience scolaire des nouveaux lycéens. Démocratisation ou massification.* Paris: Colin.

Charlot, B. (1999). *Le rapport au savoir en milieu populaire. Une recherche dans les lycées professionnels de banlieue.* Paris: Anthropos.

Charlot, B., Bautier, E., & Rochex, J.Y. (1992). *Ecole et savoir dans les banlieues... et ailleurs*. Paris: Colin.

Davis, G., & Rimm, S. (1998). *Education of the gifted and talented* (4th ed.). Needham Heights, MA: Allyn & Bacon.

Leu, N. (2001). Enfants surdoués: un nouveau défi pour l'école? *Correspondance de l'enseignement primaire genevois,* 13, 4-6.

Pourtois, J.P., Desmet, H., & Leheut, M.F. (2005). La scolarité de l'enfant, de l'adolescent à haut potentiel. In G. Bergonnier-Dupuy (Ed.), *L'Enfant, acteur et/ou sujet au sein de la famille* (pp. 77-90). Ramonville St Agne: ERES.

Reinert, M. (2008). Mondes lexicaux stabilisés et analyse statistique de discours. JADT, *Actes des 9èmes Journées internationales d'Analyse statistique des données textuelles.* Lyon: PUL, 981-993.

Webb, J.T., Meckstroth, E.A., & Tolan, S.S. (1994). *Guiding the gifted Child: A practical Source for Parents and Teachers*. Scottsdale, Arizona: Gifted Psychology Press.

About the Author

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Teachers' Attitudes towards Gifted Education in Turkey

Şule GÜÇYETER

Abstract

This study investigated teachers' attitudes toward gifted education in Turkey. A related purpose was to examine whether any difference exists among attitudes of teachers of primary, secondary and high schools. 291 teachers completed a survey instrument which was developed based on Gagne and Nadeu's (1991) attitude scale "Opinions about the gifted and their education". After factor analysis six subgroups were created (Inappropriateness of regular classes; Special arrangements; Priority of normal and children with difficulties; Negative effect on society; social value and Ability grouping). The survey results indicated that 75.95 % teachers have positive attitude toward gifted education. Statistically significant mean difference scores were found according to gender and teachers schools types.

Introduction

Educationalists have been interested in studying the attitudes of regular education teachers, administers (principals) and parents toward gifted students and gifted education. Many studies have examined the attitudes of teachers toward gifted and gifted education; there wasn't a clear and definitive picture of teachers' attitudes toward gifted and gifted education (McCoach, Siegle, 2007).

Wallace (1989), investigated teachers (n=200) and administer (n=100) attitudes toward gifted education.The data indicated that administrators, teachers, and parents are positive in their attitudes toward gifted education. None of the groups were found to be significantly more positive or negative in their attitudes than the others. Members of all the groups who have children who have been identified as gifted are more positive in their attitudes toward gifted education than those whose children have not been identified. There is no indication, however, that the other demographic variables tested affect the attitudes of the groups. There are no relationships among the demographic variables, group membership, and attitudes toward gifted education.

Hunter(1990), examined the attitudes of regular classroom teachers (n=188), teachers of gifted (n=71) and school superintendents (n=85). He found that attitudes toward and talented education were positive. Another result of this study, there was a strong correlation between attitude toward gifted education and the number of course hours completed in gifted education. In another study Isaacs(1991), reported teachers(n=357) and principals(n=39) have positive attitude toward gifted education. Younger, less experienced Saudi educators (n=309) had more positive attitude toward gifted education (Alfahaid, 2002). In examination of southeastern Pennsylvania elementary classroom teachers attitudes, statistical analysis revealed a neutral attitude toward gifted education overall, with a neutral to very slightly positive attitude toward special services for gifted. Besides of these researches Cramond & Martin (1987) found that teachers tend to harbor more positive attitude toward gifted education and toward the gifted (cited in McCoach, Siegle, 2007). Furthermore Albawardi (1988) were found mixed attitudes toward educational programs for gifted.

Attitudes toward gifted educational service types have been changed. Hunter (1990) found that the "pullout model was recorded as superior to the "regular classroom model" by regular classroom teachers and teachers of the gifted and talented. Also superintendents preferred the "regular classroom model". Teachers attitudes toward acceleration and ability grouping were moderately negative Chipego, 2004). In other research indicated that teachers think the best way to meets the needs of gifted children is special classes.(Tirri, Tallent-runnels, Adams, Yuen & Lau, 2002).Lastly some principal preferred toward serving gifted students within the framework of the regular classroom(Isaacs,1991).

"Most attitude surveys confirm quite eloquently the lack of consensus about the need for, or priority of special education services for gifted and talented children" (Bégin & Gagné, 1994) Unfolding teachers attitude about gifted education is of importance not only for the quality of instruction in classrooms but also for the success of programs that are developed for gifted students in Turkey. "Without the support of regular education teachers and administers gifted educators are

virtually powerless to institute the curricular and instructional changes necessary to challenge and stimulate the nation's gifted students" (McCoach & Siegle, 2007).

Purpose

The present study attempted to investigate teachers' attitudes toward gifted education in Turkey. A related purpose was to examine whether any difference exists among attitudes of teachers of primary, secondary and high schools. How the regular education teachers currently feel about providing specialize services for gifted? Is there any difference in teachers' attitudes toward gifted education according to gender? Is there any difference in attitudes of teachers toward gifted education by school?

Researcher hypothesized that teachers' attitude of toward gifted education changes with gender and their schools.

Method

Sample

Researcher sent approximately 400 questionnaires to 22 schools, returned 291 questionnaires after one week. The sample was selected with convenience sample. As it can be seen in table 1; participants are 55.3% male and 43.7% female.

Table 1: Gender of participants.

		Frequency	Percent	Valid percent	Cumulative percent
	Male	161	55.3	56.3	56.3
	Female	125	43	43.7	100
	Total	286	98.3	100.0	
Missing	System	5	1.7		
Total		291	100.0		

34.4% of teachers are working in the primary school (teachers are regular classroom teachers) 19.2 of teachers are from secondary school and 46.4% of teachers are from high school (table 2).

Table 2: Teachers school type

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Primary school	100	34.4	34.4	34.4
	Secondary school	56	19.2	19.2	53.6
	High school	135	46.4	46.4	100
	Total	291	100.0	100.0	

Instrumentation

Researcher developed a quantitative questionnaire based on Gagné and Nadeu's (1991) attitude scale "Opinions about the gifted and their education" The questionnaire has 17 items and 13 items from Gagné and Nadeu's (1991).

Data Analysis and Results

To confirm the structure of the questionnaire, factor analysis was conducted. Based on the results of factor analysis we set 6 subgroups: Inappropriateness of regular classroom; Special arrangements; Priority of "normal children" and "children with difficulties"; Negative effect on society; Social value; Ability grouping.

The first subgroup, Inappropriateness of regular classroom, indicate that normal classroom affects negatively to the gifted children. Thus high mean score in this subgroup we can hypothesis that teachers have positive attitude toward gifted education. In this subgroup there are 4 items. Second subgroup Special arrangements, people think that normal school environment, curriculum inadequate

for the needs of gifted. Schools should arrange special educational arrangements for the gifted. High mean score indicate that teacher's positive attitude toward gifted education. This subgroup includes 3 items. Priority of "normal children" and "children with difficulties", teachers are being against prioritizing of gifted. They think normal children and children with difficulties are more important than gifted. Thus, high mean score in this group reflects negative attitude toward gifted education. This subgroup has 3 items.

The forth subgroup negative effect on society, teachers think gifted programs have negative effect on socity.Because providing special services for gifted create a discrimination against to the normal people. High mean scores indicate negative attitude toward gifted education. This subgroup has 3 items. Social value, teachers who believe that gifted and talented children are a valuable for the society. Sometimes people can see them a valuable asset thus gifted and talented children should be developed. High score in this subgroup is positive attitude toward gifted education. The last subgroup is ability grouping; teachers think a necessity for isolating gifted students from regular classroom. High mean score indicate positive attitude toward gifted education. This subgroup includes 2 items.

Table 3: Subgroups constituted for this study.

Inappropriateness of regular classroom (this items from Begin& Gagne 1995)
It is more damaging for a gifted child to waste time in class than to adapt skipping a grade
Gifted children are bored in school
The gifted waste their time in regular classes
The regular classroom program stifles the intellectual curiosity of gifted children
Special arrangements
The gifted need special attention in order to fully develop their talents (from Begin& Gagne 1995)
Our schools are already inadequate in meeting the needs of gifted
If we offer special educational services to the children with difficulties we should do the same for gifted
Priority of" normal children" and "children with difficulties"
Average children are the major resource of our society; so they should be focus of our attention(from Begin& Gagne 1995)
We have a greater moral responsibility to give special help with difficulties than to gifted children(from Begin& Gagne 1995)
Regular classroom programs are enriched by the teachers is enough for the gifted educational needs.
Negative effect on society(from Begin& Gagne 1995)
Special programs for gifted children have the drawback of creating elitism
Special educational services for the gifted are a mark of privilege
By offering special educational services to the gifted we prepare the future members of a dominant class
Social value(from Begin& Gagne 1995)
Gifted persons are a valuable resource for our society
In order to progress, a society must develop the talents of gifted individuals to a maximum
Ability grouping (from Begin& Gagne 1995)
Our schools should offer special educational services for the gifted
The best way to meet the needs of the gifted is to put them in special classes

Researcher constituted two main groups based on six subgroups. Main groups are Positive attitude group and Negative attitude group. Positive attitude group is include; Inappropriateness of regular classroom; Special arrangements; Social value; Ability grouping. Negative attitude group include Priority of "normal children" and "children with difficulties"; Negative effect on society subgroups.

Mean Scores

Subgroups mean scores was computed. Teachers attitude mean scores are above 3 and below 4 in Inappropriateness of regular classroom; Special arrangements; Social value; Ability grouping. These mean scores indicate high positive attitude toward gifted education (table 4).

Table 4: mean scores of the sub groups.

	Mean	Std. Deviation	N
Negativeatt	2.7824	.58344	291
Positiveatt	3.5755	.35778	291
inapregclss	3.1873	.60113	291
spcarrangement	3.6747	.46766	291
priorregst	2.8419	.68273	291
negeffonsoci	2.7228	.73259	291
socvalue	3.7955	.45895	291
abilitygroup	3.6443	.54910	291

Mean scores in Priority of "normal children" and "children with difficulties" and Negative effect on society are not high from the 3. We can hypothesize from this point, teachers who have negative attitude they are not certainly against the gifted educational services.

We examined teachers' attitude toward gifted education in a different way. First, we computed mean scores of Positive and Negative attitude scores. Second, researcher computed mean difference in Positive and Negative attitude groups. If the difference high the point of .001 we hypothesized teachers' attitude toward gifted education are more positive. We found 88.66% positive attitudes toward gifted education with using this way .We tested our hypothesis with Discriminant analysis. Discriminant analysis indicated that 75.95% of teachers have positive attitude toward gifted education and 24.05% of teachers are negative attitude toward gifted education.

Correlations

Statistically significant correlations were found among some subgroups.

Table 5: Correlations between sub groups.

Correlations

	negativeatt	positiveatt	inapregclss	spcarrangement	prioregst	negeffonsoci	socvalue	abilitygroup
negativeatt	1	-,033	-,025	-,031	,810**	,838**	-,004	-,031
positiveatt	-,033	1	,731**	,728**	-,072	,013	,637**	,653**
inapregclss	-,025	,731**	1	,408**	-,080	,035	,250**	,255**
spcarrangemen	-,031	,728**	,408**	1	-,039	-,013	,385**	,277**
prioregst	,810**	-,072	-,080	-,039	1	,359**	-,026	-,043
negeffonsoci	,838**	,013	,035	-,013	,359**	1	,019	-,009
socvalue	-,004	,637**	,250**	,385**	-,026	,019	1	,224**
abilitygroup	-,031	,653**	,255**	,277**	-,043	-,009	,224**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Teachers who have negative attitude toward educational services for gifted also they think society should give priority to the normal students and children with difficulties (r= .81 p<.05)

Teachers who think supporting special education for gifted has negative effect on the society at the same time they have negative attitude toward the gifted education(r=. 83, p< .05)

Teachers who have positive attitude toward gifted education similarly they believe that regular classes are not appropriate for the gifted children.(r= .731, p<.05)

Teachers who believe that schools should arrange special services for gifted at the same time they asserted regular classrooms are inappropriate for the gifted.(r = .408, p< .05)

Teachers who think special educational services are negative effect on society similarly they believe the priorities of the society are "normal students and children with difficulties" (r= .359, p<.05)

Teachers who think gifted people are social value at the same time they think regular classroom is in appropriateness for the gifted. (r= .250, p <. 05)

Teachers who believe gifted people are social value likely they think we should offer ability grouping. (r.224, p<. 05)

Teachers who think school should offer ability grouping for the gifted at the same time they believe that we should do special arrangement for the gifted(r= .277, p<.05).

T-Test results

Researcher conducted a t –test to determine whether there were significant differences in the two group's attitudes toward the gifted education according to the gender.

Table 6: Independent t-test

Independent Samples Test

	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
inapregclss	-2,004	284	**,046**
spcarrangement	-,840	284	,402
prioregst	-,536	284	,593
negeffonsoci	-3,860	284	**,000**
socvalue	,313	284	,755
abilitygroup	,212	284	,832

There was statistically significant difference in inappropriateness of regular classrooms subgroup which is in favor of male (*p*= .046). And there was statistically significant difference negative effect on society subgroup which is in favor of females (*p*= .000)

ANOVA Results

Researcher examined whether any difference in the primary, secondary, high school teachers' attitude toward gifted education with using one way ANOVA test. Statistically significant correlations were found some sub groups.

Results of ANOVA test in the .05 significance level there were statistically significant differences in attitudes to special arrangement among their schools(F=4,926; *p*< .05) ; in appropriateness of regular classroom (F= 6, 998; *p*< .05) and in social value (F=3.809, *p* < .05 and positive attitude (F= 6,239, *p* < .05) .

Researcher conducted Tukey test to understand which subgroups have statistically significant differences. According to teachers' schools, there was statistically significant difference in special arrangement subgroup. High school teachers mean score is higher than secondary school teachers. Inappropriateness subgroup scores there was significant difference between high school teachers and primary school teachers that scores favoring high school teachers. Social value scores were significantly difference between high school teachers and secondary school teachers that scores in favor of high school teachers. In positive attitude there were significantly high scores in favor of high school teachers than primary and secondary school teachers. In negative attitude there were no significance among primary, secondary and high school teachers

We can be concluded that high school teachers have the most positive attitude toward gifted education

Table 6: ANOVA results.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
prioregst	Between Groups	,276	2	,138	,294	,745
	Within Groups	134,897	288	,468		
	Total	135,173	290			
spcarrangement	Between Groups	2,098	2	1,049	4,926	,008
	Within Groups	61,328	288	,213		
	Total	63,426	290			
inapregclss	Between Groups	4,857	2	2,428	6,998	,001
	Within Groups	99,936	288	,347		
	Total	104,793	290			
negeffonsoci	Between Groups	,775	2	,388	,721	,487
	Within Groups	154,864	288	,538		
	Total	155,639	290			
socvalue	Between Groups	1,574	2	,787	3,809	,023
	Within Groups	59,510	288	,207		
	Total	61,084	290			
abilitygroup	Between Groups	,016	2	,008	,027	,973
	Within Groups	87,422	288	,304		
	Total	87,438	290			
negativeatt	Between Groups	,036	2	,018	,053	,949
	Within Groups	98,680	288	,343		
	Total	98,716	290			
positiveatt	Between Groups	1,542	2	,771	6,239	,002
	Within Groups	35,581	288	,124		
	Total	37,123	290			

Discussion

The major purpose of the present study was to explicate teachers attitude toward gifted education in Turkey and to examine whether any differences among attitudes of teachers of primary, secondary and high schools. Results suggest that teachers are more positive toward gifted education in Turkey(%75.95 of teachers have more positive attitude). However ministry of education hasn't a special educational policy for gifted and talented.

This study will be contributed from this point. If we develop programs for gifted we must investigate teachers', administers' and societies' attitude toward gifted and gifted education. Unfolding teachers' attitude about gifted education is of importance because after explicating teachers' attitude we will start to investigate approximate program types for Turkish gifted children and approximate teacher training program in gifted education. We have found high school teachers are the most positive attitude thus educationalists can start developing special programs from high schools. It is important because children start make a career decision in high school.

The present research is a pioneer study thus it can make a little contributions, for explicating teachers attitude toward gifted and gifted education. This study can be replicate with large, representative sample of universe Turkey. Future research should investigate principals' and societies'

attitudes toward gifted education. Likewise, researchers should examine and offer suitable teachers training program for gifted education.

References

Alfahaid, S.S.(2002). A study of gifted education in Saudi Arabia: Teachers' and administers' attitudes and the impact of the gifted identification training program. *Dissertation Abstracts* (AAT 3076924).

Begin, J., & Gagné, F. (1994). Predictors of attitudes toward gifted education: A review of the literature and a blueprint for future research. *Journal of the Gifted. 17*, 74-86.

Chipego, A. D., (2004). Factors associated with the attitudes of elementary level classroom teachers toward gifted education. *Dissertation Abstracts*.(UMI No: AAT 3120729.

Cramond, B., & Martin C. E. (1987). Inservice and preservice teachers' attitude toward the academically brilliant. *Gifted Child Quarterly*, *31*. 15-19.

Gagné, F. (1991). *Brief presentation of Gagné and Nadeu's Attitude Scale "Opinions about the gifted and their education".* Unpublished manuscript.

Hunter W.A. (1990). A study of attitudes of teachers and administers regarding gifted and talented education. In the state of Arkansas. *Dissertation Abstracts*. (AAT 9111219).

Isaac, M. A., (1991). Attitudes of day school principals and teachers toward gifted education. *Dissertation Abstracts*. (UMI No: AAT 9210507).

McCoach, D. B., & Siegle D. (2007). What predicts teachers' attitudes toward the gifted? *Gifted Child Quarterly*. *55*, 246-255.

Tirri K. A., Tallent-Runnels, M. K., Adams, A. M., Yuen, M., & Lau, P. S. Y. (2002). Cross cultural predictors of teachers' attitudes toward gifted education: Finland, Hong Kong, and the United Stated. *Journal for the Education of the gifted*. *26*, 112-131.

Wallace, R. M. (1988). The attitudes of and perceptions of faculty members of colleges of education of gifted children. *Dissertation Abstracts* .(AAT 8922003)

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(C.32)

Wei-Wen Lin, Stories of creative teachers in Taiwan: Adversities, transformation and creative teaching: Many teachers said that it's very hard to teach creatively, because they faced adversity and heavy loading of teaching duties. However, there were still many teachers who overcame their adversity and taught creatively to facilitate students' learning. The purpose of this research is to study how creative teachers transform their adversities and continued their creative teaching. Six school teachers (4 for elementary and 2 for junior high schools) were sampled as the interviewees in this study. They were all recognized by the nationwide creative teaching awards in Taiwan. The interview results showed that the strongest adversities of creative teachers were "the stressors from peer teachers", "limited resources" and "conflict between work and family." The power and strategies that creative teachers used to overcome the adversities were "commitment of students learning", "strong intrinsic motivation and passion to teaching", "seeking for help" and "creative problem solving." Especially, when teachers face the obstacles that peer teachers added, they used the "honor sharing" strategies to involve peer teachers. Those important supports of creative teachers were from "family members", "school administration" and "educational mentors." This exploratory study also found that both the "creative role model of parents and grandparents" and "experiences of adversities in the growth" play an important role in the transformation of adversities in creative teaching.

(C.33)

Successful Blended Learning Strategies for the Undergraduate Distance Engineering Degree Program

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Abstract

With the rapid advances in the information and communication technology, more and more students working part or full-time, and students seeking flexible, convenient and quality programs; distance education has continued to expand. The University of North Dakota (UND) has successfully developed the ABET (Accreditation Board for Engineering and Technology) accredited undergraduate distance engineering degree program (DEDP) offering a BS in chemical, civil, electrical and mechanical engineering. The main purpose of the DEDP program is to offer undergraduate engineering degrees to technical personnel who are full-time employees in industry or active military personnel. The current DEDP course delivery format includes streamed online lectures (with download or play options) available one hour after each class is taught on campus. There are periodic video conferencing, e-mail, phone-based office hours and on-campus intensive laboratory courses. This delivery format ensures that each distance program has essentially the same content as the on-campus program and the courses are taught synchronously with the on-campus version. Students access the streamed online courses through a Web browser using Real Player. Laboratory courses for the DEDP students are completed on the UND campus in a condensed format. For a one semester hour laboratory, a student will be on campus for three-five days in the summer, two credits for seven to nine days, and three credits for up to 14 days to complete. The success of the DEDP program has been the blended learning model. Blended learning is blending both traditional classroom instructions with online or e-learning. This paper will address in detail the successful implementation of blended learning for the ABET accredited undergraduate engineering degree programs using on line lectures and intensive on-campus condensed laboratories.

Introduction

By 2006, nearly 3.5 million students were participating in on-line learning at institutions of higher education in the United States [1]. The term blended learning is used to describe a solution that combines several delivery methods. Blended learning is a careful integration of on-line learning experiences along with face to face learning. Blended learning is distinguished from that of enhanced classroom or fully on line learning experiences. Fig. 1 shows a continuum of learning [2]. The real test of blended learning is the effective integration of two main components: traditional classroom face to face instructions and on line learning activities [3].

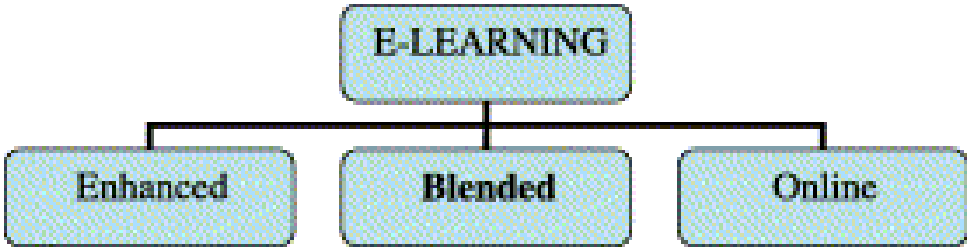

Figure 1: A Continuum of e-learning [2].

Blended learning strategies significantly differ from traditional face to face or fully internet based learning experiences. Young states that "hybrid (blended) courses and hybrid degree programs promise the best of both worlds, offering some of the convenience of all on-line courses/programs

without the complete loss of face to face contact [4]. The successful strategy will greatly depend on disciplines, developmental level and resources. Therefore no two blended learning module will be identical which introduces a great complexity in the implementation of blended learning.

The University of North Dakota (UND) has successfully developed the ABET (Accreditation Board for Engineering and Technology) accredited undergraduate distance engineering degree program (DEDP) offering a BS in chemical, civil, electrical and mechanical engineering. The main purpose of the DEDP program is to offer undergraduate engineering degrees to technical personnel who are full-time employees in industry or active military personnel. The current DEDP course delivery format includes streamed online lectures (with download or play options) available one hour after each class is taught on campus. There are periodic video conferencing, e-mail, phone-based office hours and on-campus intensive laboratory courses. This paper will address in details the successful blended learning strategies for the ABET accredited undergraduate engineering degree programs using on line lectures and intensive on-campus condensed laboratories.

Background

In 1989, the School of Engineering and Mines (SEM) of the University of North Dakota (UND) delivered its first distance engineering course via videotape through the administration of the Division of Continuing Education. SEM in cooperation with 3M Corporation, initiated a program whereby employees at 3M could earn degrees in chemical, electrical, or mechanical engineering through delayed class video tapes and on-campus intensive laboratory courses. In 1993, a consortium was formed to offer engineering degree programs to four companies, namely 3M, GE Plastics, DuPont and Hutchinson Technologies, and for the next eight years the program operated as the Corporate Engineering Degree Program (CEDP).

In 2001, the program was opened to individual students, and renamed as the Distance Engineering Degree Program (DEDP). The DEDP offers the only ABET (Accreditation Board for Engineering and Technology) accredited undergraduate distance engineering degree program in chemical, civil, electrical and mechanical engineering.

The main purpose of the Distance Degree Program is to offer undergraduate engineering degrees to technical personnel who are full time employees in industry or active military personnel. The program is designed to be substantially identical to that normally completed in the professional curriculum by students who are enrolled in the traditional programs on the Grand Forks UND campus. [To date (Fall 2006) the program has graduated 38 students; 10 in chemical engineering, 12 in electrical engineering, 14 in mechanical engineering and 2 in civil engineering.

The program enrollment has risen from 8 in the fall of 1989 to almost 300 (headcount of 175) in the fall of 2006 (26 female). The average age of DEDP students at UND is 34.9 years old. About 97% of these students are full-time working professionals and a majority of them receive tuition reimbursement from their companies if they receive a “C” or better grade in their courses. The other 3% are military personnel using tuition assistance.

Current Course delivery system and Classroom Components

The current DEDP course delivery format includes streamed online lectures (with down load or play options) available one hour after each class is taught on campus. There are periodic video conferencing, e-mail, phone based office hours and on campus intensive laboratory courses. The delivery format ensures that each distance program has essentially the same content as the on-campus program and the courses are taught synchronously with on-campus versions.

Five state-of-the-art “smart” classrooms are equipped with an Elmo document camera, a Wacom Cintiq digital tablet, a computer projector, and a Mimio capturing device which are integrated together through various peripherals, accessories, and a personal computer. See Fig. 2 for a block diagram of a classroom [5, 6].

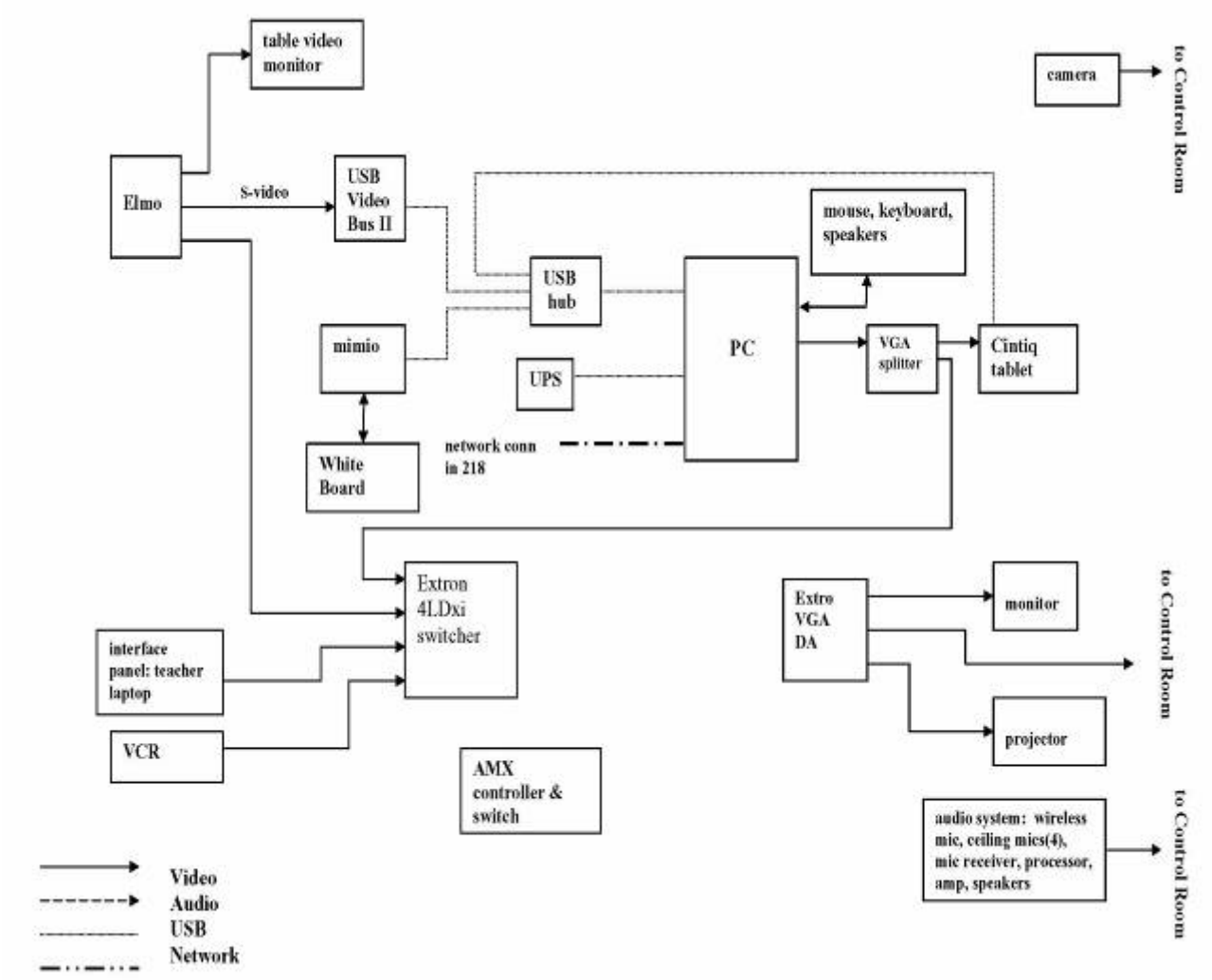

Figure 2: Various components in the classroom [5, 6].

An audio system with wireless mic and ceiling mics is used to capture the instructor's voice and students' questions. ScreenWatch software captures in real time the text and other in-class visuals, video along with the instructor's audio. To free instructors from recording their own lectures and in order to expedite access to the lectures, a central control room with a technician has been incorporated into the current design system. The instructor is responsible for the technical content of the lecture and a technician is responsible for recording the lecture and processing the lectures for Web access. The control room is equipped with a computer for each classroom (one station for each classroom) that is connected to the classroom computer via CAT 5 communication lines or directly via the Internet. Fig. 3 [5, 6] shows the control room components and how they connect to the smart classrooms.

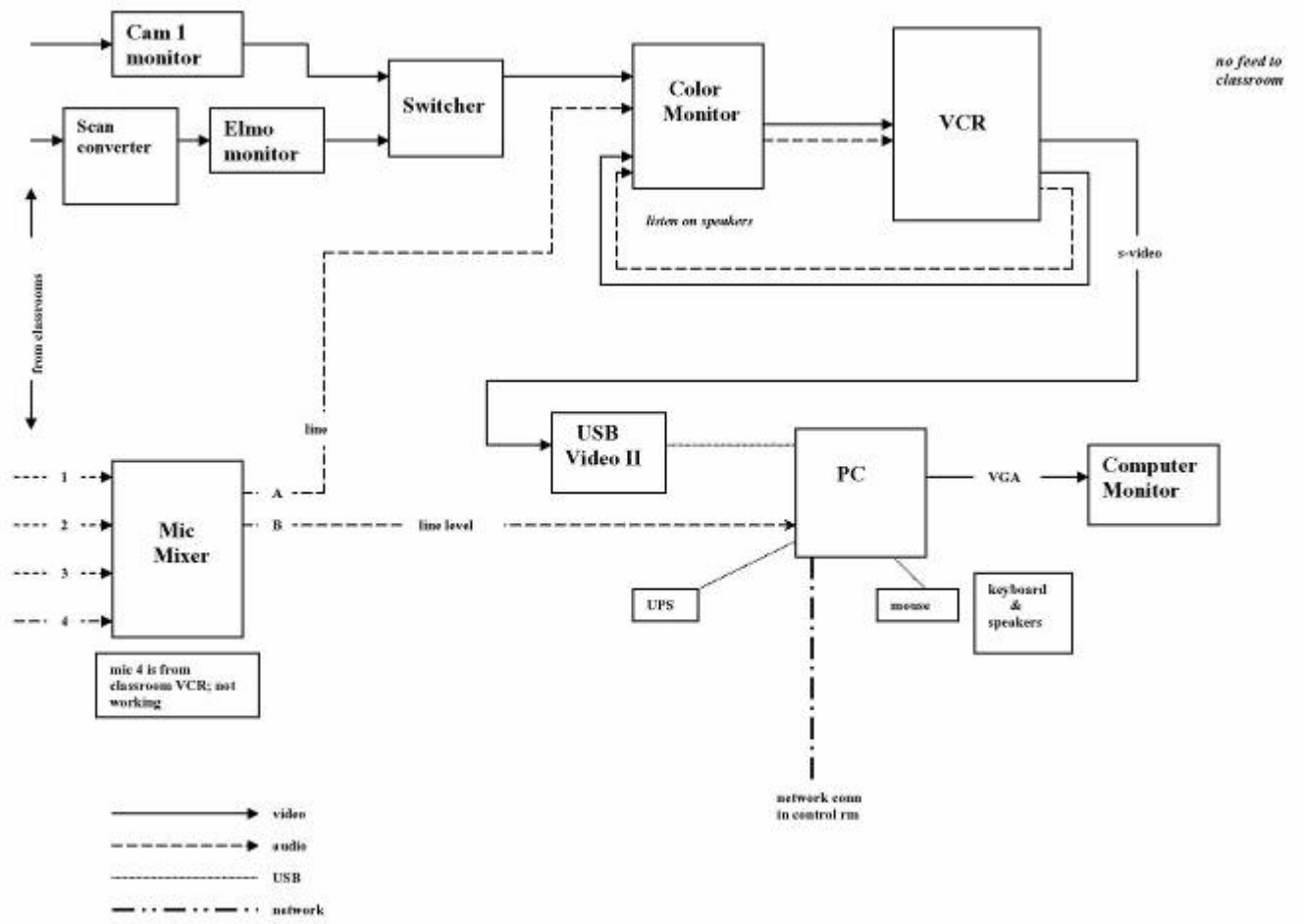

Figure 3: Control Room Components [5, 6].

Students access the streamed online course through a Web browser using RealPlayer. The majority of the DEDP students accesses the lectures through cable/DSL connections and download the lectures onto a CD ROM for future viewing and reviewing. Students are encouraged to use cable/DSL connections for the online courses. All course content, including the streamed lectures, is managed through Blackboard.

Students turn their mandatory homework and project assignments either through e-mail or fax directly to the instructors or to the DEDP program manager for delivery to the respective faculty. Class exams are e-mailed directly to the proctors at student locations. The proctors are asked to administer the exams the same day they are held in campus. Faculty provides classroom presentations, academic support for the students and grading and assessment.

Technical help with the Web access to the lecture files and/or related issues is available to distant students on a continuous basis from DEDP technical staff through phone, e-mail and the website of the courses. Several student assistants are hired to record, process, and upload all on-line DEDP classes. Currently over fifteen DEDP classes from various departments, including electrical, mechanical, chemical and civil engineering, along with math and physics are recorded and uploaded each week.

Compared to its commercially available counterparts, the designed course delivery system is an inexpensive and affordable on-line course development system that can be easily reproduced and used by other interested users and institutions. The system is very flexible and modular. Components can be added or removed from the system as needed by the users without affecting the performance of the remaining subsystem.

Senior Design Capstone

All the engineering disciplines have an important component known as Senior Capstone Design. In 1996 UND was awarded a FIPSE grant by the Department of Education to develop the Senior Capstone Design program for the DEDP students. The senior design capstone course is typically completed at the student's workplace for the Distance Engineering Degree Program. UND faculty developed policy and criteria that must be met for a project to qualify for use as a comprehensive design experience. A student and his or her supervisor and manager will choose a project that they believe qualifies, and a professor from UND will review the project for suitability and if approved, assist in the development of the project. The industry supervisor will then supervise the project. Oral reports will be required, either on-campus during the summer

or captured through Breeze video conferencing or another medium. Corporation proprietary interests will be protected but no project will be approved unless the UND faculty member is apprised of all aspects of the project and in a position to guide from a pedagogical viewpoint.

On Campus Laboratory Requirements

Laboratory courses for students in the DEDP program are completed at the UND campus in Grand Forks, North Dakota. They are offered in a condensed-time format and cover the same material as the traditional laboratory courses given during the regular 16 week semester. One semester hour laboratory takes five days to complete in the summer, two credits takes seven to nine days, and three credits takes up to 14 days to complete. DEDP students usually travel an average of four trips (over the course of the entire engineering curriculum) to the UND campus for the condensed summer laboratory courses. Although there are benefits to bringing the engineering students to the UND campus (e.g. face-to-face advising with faculty member and meeting and getting to know the other students enrolled in distance learning), the travel to UND imposes a significant financial and social burden on the students who are typically married with families and full time jobs. John Watson, the Dean of the School of Engineering and Mines has committed to reducing the amount of time that the distance students must spend on campus by implementing a variety of web based lab activities. A three year project funded by the Department of Education's Fund for the Improvement of Post-Secondary Education (FIPSE) program was initiated in 2002 to design several online laboratory courses. The faculty members from several departments have worked to create realistic and user friendly modules that preserve the essential components of traditional laboratory activities without requiring the physical presence of the student on campus for completion. The web based activities implemented at UND can be broadly classified into two categories, virtual labs and online labs. Online labs use a web based interface to control physical hardware located in the UND laboratories. An example of this type of lab is one that is currently in use at UND that allows students to control the operation of a miniature steam turbine by changing flow rates and cycle loads over the web. Virtual labs, on the other hand, exist only as information on a computer. Two examples are hierarchical databases and software simulations [7, 8].

The three year project accomplished a great deal in establishing a mechanism to design and deliver engineering assignments for laboratories to distance students. It was demonstrated that experiments could be designed and implemented to enable operation remotely over the internet. It should be noted that although there are benefits of remotely operated experiments, faculty members will not replace the entire on-campus condensed laboratory course. We believe that the benefits for the students of having on-campus experimental learning outweighs the benefits of convenience and cost that a program using entirely remotely operated experiments would accrue. At UND, personal attention, experimental learning environments, and group work are considered critical to the successful training of an engineer.

Blended Learning

The success of the Distance Engineering Degree Program has been the blended learning model. Students receive the rigorous course curriculum online through streamed lectures coupled with on-campus laboratories. Blended learning is where there is a carefully planned blend of both traditional classroom instruction and online learning [3]. Authors [4,9] state that blended learning courses and degree programs promise the best of both worlds, offering some of the convenience of all-online courses/programs without the complete loss of face-to-face contact.

There are many benefits of blended learning for students. One benefit is that incorporating the online aspect makes it easier for students to get a quality education. "That is because blended learning programs require only limited on-campus attendance, which means these kinds of college programs are now more accessible to more people in more places, which is perhaps the biggest advantage of all [3]". However, typical e-learning suffers from a lack of social communication and control over the progress over learning [10]. Since the DEDP completion program only requires 3-5 visits for condensed laboratories for any of the four degree programs, more students will be able to access the degree program. Another benefit is that when students come to the UND campus, they have the opportunity to meet with faculty members, their advisor, program staff, and fellow students. A UND student who graduated with a Bachelors of Science in Electrical

Engineering through the DEDP delivery confirmed that "coming to campus gave me an opportunity to meet my instructors, staff and other students; I firmly believe that coming to campus does add benefit [11]". Many DEDP students who have traveled to the UND campus for condensed laboratories have said that putting a name with a face is one of the greatest benefits of coming to the UND campus.

Another benefit to having the student on the UND campus meeting with faculty is that the students have an opportunity to work on 'real world' applications using a hands-on approach. Smith said, "The on-campus labs helped me gain a much better understanding of the complex material that was presented in the course [11]". Another student enrolled in the DEDP added, "The hands-on aspect of the course will excel a student's performance when it comes to handling such procedures in the 'real world [12]." He went on to ask, "Would you have a doctor perform open heart surgery on you if they learned from an online lab? What if that doctor never touched a cadaver; instead, they only performed the procedure in virtual reality?" Mr. Cimo said that he would not feel comfortable taking an engineering program completely online. He felt strongly about the benefit of the hands-on approach to laboratories. Another benefit is that the students develop a strong, cohesive cohort while they are here on campus. Bringing the students together for on-campus laboratories starts the development of a relationship among the students that continues until they graduate from UND or longer. There are some students who have graduated and still keep in touch with their fellow classmates. Another possible benefit is lower drop out rates. Institutions are adding a campus component as some colleges report high dropout rates in programs that are completely virtual. Although UND has not completed its research on drop out rates for the distance-delivered undergraduate engineering degree programs, the institution feels strongly that the blended learning model is effective and adds more benefit than hardship to the off-campus students.

The Distance Engineering Degree Program is not the only UND distance degree program that requires on-campus residencies within an online degree program. The Masters in Space Studies and Masters of Arts in Forensic Psychology each require a one-week capstone at the end of the student's degree program; the graduate coursework leading to an endorsement in Teaching English Language Learners program requires two short residencies, one at the beginning of the program and one within the practicum course, and there are many other examples that follow this model.

Engagement Teaching

Numerous Studies have shown that engagement teaching methods provide a richer educational experience for students than typical lecture based methods. Engagement methods include case studies, problem based learning, and experimental learning. In case studies, students analyze a scenario related to the knowledge, while with problem-based learning, student discover knowledge by working through a multi-part problem. These methods involve more student involvement in the in-class learning environment with the instructor, with students or both [3, 6].

In the DEDP program, our goal is to provide the distance students as close to the same educational experience as possible as is given to the on-campus students. At the same time, we do not to compromise the quality of the campus students experience in order to accommodate the distance students. These goals pose a serious challenge to the instructors who incorporate engagement teaching methods in their courses.

DEDP students obtained knowledge from the lectures and taking quiz at the end of the lecture. The quiz ensures that students acquire the basic knowledge of technologies they are learning. The

solutions are posted on the blackboard. The questions from the students are handled by e-mail or telephone. DEDP students are strongly urged to use the discussion board on the blackboard. Here the students can post their questions and comments about the course. Other students have also access to these comments and questions. They can post the answers to these comments which are monitored by the instructor, thus creating a virtual classroom with the distance students. The results show that DEDP students do not get as much engagement activity as on-campus students. It is not just possible to completely replicate the in class experience. However, DEDP students receive sufficient activity to allow for comparable course performance as measured by an examination assessment.

Conclusion

The School of Engineering and Mines of UND has successfully implemented the blended learning model for the ABET accredited undergraduate distance engineering degree program. The program has now reached students all over the world. Here are some statistics: 5 military students out of which 2 are in Iraq, and 1 is in Germany. There are also 7 students out of the continental United States; 3 are in Canada, 1 in India, 1 in Singapore and 2 in the Virgin Islands. The blended model consists of online courses as well as face to face laboratories. Although both approaches have their strengths and weaknesses, the synergy approach clearly outperforms the isolated benefits of the single approach on education. UND strongly encourages the use of the blended learning model within all of its academic offerings. One of the reasons for its success is that the faculty members who are involved in the program are looking for innovative approaches such as engagement teaching to increase student involvement. The Distance Engineering Degree Program will continue to use a blended learning format as it has many benefits for the students, faculty, and staff. On campus students also benefit in a number of ways from the classes taught in the blended format. The availability of the class material online for students who are ill or had to miss for particular reason is a great benefit.

The mission of the DEDP program is to deliver exemplary ABET accredited undergraduate degree program that respond to the unique needs of adult learners and provide opportunities for individuals who are not able to participate in traditional, on-campus educational experiences.

The development and enhancement of the DEDP program is on-going and has been assisted by three major three years grants. A $319,940 grant, Enhanced Curriculum for Undergraduate Engineering Adult Learners in Industry, was received from NSF in 1995 and a $229, 322 grant, Distance Education Involving Students and Industry in a Growing Network (DESIGN) partnership was received from FIPSE in 1996. A second FIPSE grant for $360,000 was received in 2002 to examine the development of on-line engineering laboratories to enhance access for distance students.

References

1. "Sloan consortium" http://www.sloan-c.org/resources/index.asp
2. Randy Garrison D. and Kanuka H. (2004). Blended learning: Uncovering its transformative potential in higher education, Internet and Higher Education, v 7, n 2, 2004, p 95-105.
3. Fanter, A. (2006). Hybrid education: The future of instructional Model, World WideLearn.com Download March 23. 2006.
4. Young, J. R. (2002). Hybrid teaching seeks to end the divide between traditional and on-line instruction, Chronicle of higher education, (48), 28, p A 33.
5. Salehfar, H. et al.(2004) Using information technology to offer undergraduate distance engineering degree programs online, American Society of Engineering Education (ASEE) Annual Conference and Exposition.
6. Krenelka, L., Watson, J., Salehfar, H., & Seames, W. (2006). A hybrid model for delivering ABET accredited undergraduate distance engineering degree programs. In N. Caldarola, & C. Nichols (Eds.), Proceedings of the 2006 U.S.-China Forum on Distance Learning, April 9-11, 2006, Troy, AL, USA, Vol. 1.
7. Cavalli, M. and Bibel, G. (2005). Virtual Steel lab, Computers in Education, XV, p 108-112.
8. Cavalli, M. and Bibel, G, (2005). Use of virtual lab activities to tach materials concepts, proceedings ASEE north Midwest conference.

9. Ordonez, R. L. E., (2002). Distance learning versus classroom teaching: why not combine the best of both worlds? Experiences from a pilot hybrid course. Proceedings annual meeting of the decision sciences institute, p 850-854.
10. Bunse, C. et. al. (2005). Applying a blended learning strategy for software engineering education, proceedings 18th conference on software engineering and training, CSEE and T, p 95-102.
11. Smith, K, (2006). Interview with graduate of distance engineering degree program, March 23.
12. Cimo, N, (2006). Interview with student enrolled in distance engineering degree program, March 23.

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(C.34)

An Empirical Investigation of the Success Factors Impacting Academically Gifted African American Students in Science, Technology, Engineering and Mathematics (STEM) Disciplines at Historically Black Colleges and Universities (HBCUs)

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Abstract

This presentation is based on a recent one million dollar National Science Foundation (NSF) research grant that was secured by the symposium presenters who represent the fields of adult and higher education; curriculum and instruction; chemical engineering; and computer science. Additionally, symposium presenters represent both predominantly White and historically Black college contexts. The significance of this presentation is to answer this proposed education research question is to circumvent the persistent low production of African Americans graduating with STEM (e.g. engineering (~5%) and computer science (~10%)) baccalaureate degrees (NSF, 2006), the small percentage of African Americans entering STEM majors (Maton & Hrabowski, 2004), and the low retention rates of African American STEM students—particularly among those who are identified as academically gifted and who choose to attend an HBCU. It is also significant in that this research will identify factors to better understand how to structure successful collegiate experiences for these student cohorts.

Introduction

For more than three decades, both educational and scientific communities have focused resources on increasing the number of African-American students majoring in and subsequently pursuing careers in Science, Technology, Engineering, and Mathematics (STEM) disciplines. Despite these efforts there remains an on-going concern regarding the recruitment and retention of African American students in these disciplines, particularly engineering and technology. Notwithstanding an overall increase in baccalaureate degree production, the proportion of minority freshmen in engineering has steadily declined since 1995 (Chubin, May, & Babco, 2005). In 2003, the percentages of African Americans and Hispanics that earned bachelor degrees in engineering were 4.6% and 6.2%, respectively (Chubin, May, & Babco, 2005). Referencing the number of doctoral recipients in the STEM fields, an even more dire report was provided in Hamilton's (2004) article:

In 2001, the last year for which figures are available, only two percent of doctorate holders in the sciences and engineering were African American, according to an analysis by the National Science Foundation. In some disciplines—such as computer and information sciences and math—the numbers were so small that they had to be suppressed lest they throw off the analysis. (p. 28)

Additionally, as minority populations continue to grow, increasing their participation in STEM fields will be critical to the health of our growing economy and our competitive edge in the world. Therefore, one of the most critical areas of focus should be on minority students who show extraordinary potential and promise in science and engineering related fields. According to Maton and Hrabowski (2004), "Included among those who abandon science majors and underperform in science and quantitative courses are African American students with high scholastic aptitude tests (SAT) scores, impressive high school grade point averages (GPAs), and success in high school honors math and science courses" (p. 547).

Currently, an emerging body of literature has tended to focus on the psychosocial issues African American students confront during their matriculation at post-secondary institutions. For example, in a landmark study of factors influencing student persistence, Astin (1975) controlled for family social status, academic ability, and educational aspirations, in a national sample of college students and found African American students were significantly less likely to drop out of college if they were enrolled in a predominantly Black institution. Similarly, Wenglinsky (2006) found that African American students performed better academically at predominantly Black institutions even when controlling for institutional selectivity, financial resources, size, and sponsorship. Hence, the research questions that will serve as a foundation to this emerging area becomes: *If efforts are focused to address the needs of African American STEM students who attend HBCUs, especially those who are academically gifted (high-achieving), would the data tell the same story? Are there institutional factors that can be identified and manipulated in a way to ensure the success of academically gifted African American students in STEM disciplines? More specifically, does institutional climate, culture, and environment make a difference?*

This article focuses on research related to a National Science Foundation (NSF) funded project entitled *An Empirical Investigation of the Success Factors Impacting Academically Gifted African American Students in Engineering and Technology at Historically Black Colleges and Universities (HBCUs*) currently being conducted by a research team comprised of faculty representing Prairie View A&M and Texas A&M Universities under the auspices of the National Science Foundation (NSF). As part of the Historically Black College and University Undergraduate Preparation (HBCU-UP) program Educational Research Project, this grant "provides awards to enhance the quality of undergraduate science, technology, engineering, and mathematics (STEM) education and research at Historically Black Colleges and Universities (HBCUs) as a means to broaden participation in the Nation's STEM workforce" (NSF, 2007). The authors provide a brief overview of the extant literature, design and framework for the existing project investigation, as well as key preliminary findings. The authors conclude with several tentative recommendations for stakeholders internal and external to academe who are interested in promoting the success of African American students in STEM.

Literature Review

Literature highlighting the experiences of populations of color in STEM disciplines has vacillated between positive reports depicting the rapid gains that some members of these cohorts have made in various areas of endeavor to the more negative accounts of the low numbers that persist to graduation subsequent to their selection of a STEM major. According to information cited in the National Academies critical report *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,*

Having reviewed trends in the United States and abroad, the committee is deeply concerned that the scientific and technological building blocks critical to our economic leadership are eroding at a time when many other nations are gathering strength. We strongly believe that a worldwide strengthening will benefit the world's economy—particularly in the creation of jobs in countries that are far less well-off than the United States. But we are worried about the future prosperity of the United States. Although many people assume that the United States will always be a world leader in science and technology, this may not continue to be the case inasmuch as great minds and ideas exist throughout the world. We fear the abruptness with which a lead in science and technology can be lost—and the difficulty of recovering a lead once lost, if indeed it can be regained at all. (National Academies Press, 2007).

Perhaps an even direr need to be addressed when considering viable ways to elevate the condition and status of the nation in regards to its future technological position is to recognize that STEM education and careers have to be more inclusive of populations that have historically been otherwise poorly represented. A mounting problem as complex as the statement depicted here requires a commitment by individuals representing the range of communities that are functioning and living in

our collective national space. However, conditions related to full participation by many members within our national community continues to be problematic.

African Americans and Underrepresentation in STEM

Notwithstanding the incremental improvements made by African Americans, particularly in their selection of STEM related college majors, myriad problems associated with underrepresentation continue to exist. According to the *American Society for Engineering Education*, 68% of all undergraduate engineering students in the U.S. are White, 14% are Asian American, and just over 5% each are Hispanic and African American. Still other research has revealed that the completion rates for African Americans and Hispanics in STEM disciplines is 20% less than that for White students (Anderson & Kim 2006). Roach (2004) found that the graduation rates for African Americans and Hispanics in the field of engineering has not changed in a decade—it is still a combined total of about 11%. Additionally, Chubin, May, and Babco (2005) reported that despite an overall increase in baccalaureate degree production, the proportion of minority freshmen in engineering has steadily declined since 1995. All of these statistics point to an ever-increasing problem—for the student of color in general and the African American student in particular, immediate and pointed interventions are in order to circumvent under representation.

Referencing the number of degree recipients in STEM fields, Chubin (2002) further problematizes and offers a candid view of the state of affairs for students of color,

In 2001, 20 percent of bachelor's recipients in engineering were women, and less than 12 percent were minorities. In absolute numbers, 1,000 women and barely 200 minorities earned a Ph.D. in engineering last year. You only have to do the math to see how far engineering needs to go for minorities to reach parity in degree awards relative to their numbers in the general population. The time to act was the 1980s, a generation ago, when the future composition of the school-aged population became clear (p. 72).

Again, the extant literature continues to reveal how the low populations of students of color who are missing in the STEM pipeline impact the resultant numbers of those who later pursue majors and subsequently gain employment in these disciplines. One approach to combating the problem of under representation has been the suggested focus on high achieving students; however, research has revealed that this population much like their peers who are less academically astute find that they too struggle in the academy.

According to Maton and Hrabowski (2004), many students who abandon science, mathematics, technology, and engineering majors and who under-perform in quantitative courses are students of color who possess high scholastic aptitude tests (SAT) scores, impressive high school grade point averages (GPAs), and success in high school honors math and science courses" (p. 547). Thus, a potentially viable argument is that in order to identify variables that contribute to the success of African American students in STEM fields, perhaps looking beyond those factors that relate to academic and cognitive abilities would prove valuable (Bonner, 2001; Bonner, Jennings, Marbley, & Brown, 2008; Ford, Harris, Tyson, Frazier-Trotman, M.,2002;., Sedlacek, 1993; Sedlacek & Tracey, 1985).

HBCUs and African Americans in STEM

One particular institutional type—the Historically Black College and University (HBCU)—has served as a major vehicle in providing access to higher education to African Americans in the nation (Jennings, Bonner, Lewis, Nave, 2007). HBCUs are Black academic institutions established prior to 1964 whose principle mission was and still is the education of Black Americans; this term is often used interchangeably with Black colleges (Roebuck & Murty, 1993). Brown (2002) asserts that HBCUs "have made their most important educational contribution through their profound commitment to and encouragement of African American (AA) students…The strength of the HBCU is its unique cultural context" (p.275). The Department of Education recognizes 103 HBCUs operating in

the 50 states and the District of Columbia, among which 89 are four-year institutions and 14 are two-year institutions (IES, 2007). Of particular significance is the Department Of Education statistics reporting HBCUs to enroll approximately 14% of all African American students in higher education, while constituting a mere 3% of the 4,084 institutions of higher education in the country. Additionally, in 2001, these institutions awarded 28.5% of all baccalaureate degrees earned by African Americans nationwide (Brown II, 2002).

In general, HBCUs are noted for providing access and a welcoming environment to populations of students, many who would otherwise not be afforded the opportunity to attend and institution of higher education. Benefits of attending an HBCU are often measured in terms of the individual as well as the collective benefit that these institutions provide. Although more than three decades old, Astin's (1975) study continues to aptly depict the experiences of African American students in HBCU contexts. When Astin controlled for family social status, academic ability, and educational aspirations, in a national sample of college students, African American students were found to be significantly less likely to drop out of college if they were enrolled in a predominantly Black institution. Some 12 years later Pascarella, Smart, and Stoecker (1987) similarly discovered that African American students performed better academically at predominantly Black institutions even when controlling for institutional selectivity, financial resources, size, and sponsorship.

In the STEM disciplines in particular, HBCUs play a significant role in the production of undergraduate degrees awarded to African Americans. Nationally, 30% of the undergraduate engineering degrees and 44% of the natural science undergraduate degrees were awarded to African American students who attended HBCUs (NSF, 2002, p. 4-10).

Additionally, African Americans who complete their undergraduate degrees at HBCUs are more likely to attend graduate school and complete a doctoral degree; for example, in the science and engineering fields, HBCUs account for 17% of Black graduate students (NSF, 2002, p. 30).

Thus, the shortage of a qualified workforce in STEM fields could potentially be addressed by these institutions. HBCUs appear to be ideally situated to offer viable solutions to combat the problem of underrepresentation, especially for African American students, in STEM. Perhaps the data cited in two separate HBCU-UP proposals prepared by both Kentucky State University and Southern University—New Orleans articulates this point best. According to these reports, HBCUs are unique in that they provide the country with some of the best resources to build a technologically savvy workforce.

Methodology

The **Research Question** that guided this funded research project is stated: *What are the factors that most significantly impact the success of academically gifted African American students in STEM disciplines that are enrolled in Historically Black Colleges and Universities (HBCUs)?* The **Study Population** for this project included: Academically gifted African American students enrolled in STEM programs at four-year HBCUs. We also sought input from STEM faculty to capture their perspectives on the factors that impact success among academically gifted students in STEM disciplines. The main construct that frames this study is academic giftedness.

Academic giftedness, also defined as schoolhouse, test-taking and lesson-learning giftedness, is most easily measured by IQ or other cognitive ability tests, and for this reason it is also the type most often used for selecting students for entrance into special programs (Renzulli, 1986). Students were selected based on factors including college grade point average and faculty/staff recommendations. Additionally, students were targeted in the 3.00 to 4.00 grade point average range on a 4.0 scale with a particular emphasis on high academic achievement which is recognized as grade point averages in the range of 3.50 to 4.00 (Bonner, 1998).

This article reports on the findings collected from a pilot study conducted at one of the

institutions identified for the first phase **(Phase 1)** of this project. **Phase 1** includes a qualitative study **(Focus Groups)** focusing on factors related to the success of academically gifted African American students enrolled in one of the 12 four-year HBCU engineering programs in the nation that has been accredited by the Accreditation Board for Engineering and Technology (ABET).

The list of instituions identified for this part of the grant project is listed in Table 1; Prairie View A&M University in Prairie View, Texas is the HBCU engineering program from which data for this article was extrapolated.

Table 1: ABET accredited Engineering Programs at HBCUs.

Institution	Location
Howard University	Washington DC
North Carolina A&T University	Greensboro, NC
Alabama A&M University	Normal, AL
Prairie View A&M University	Prairie View, TX
Southern University-Baton Rouge	Baton Rouge, LA
Tennessee State University	Nashville, TN
Morgan State University	Baltimore, MD
Florida A&M University	Tallahassee, FL
Hampton University	Hampton, VA
Tuskegee University	Tuskegee, AL
Norfolk State University	Norfolk, VA
Jackson State University	Jackson, MS

Although slated for year three of this study and not included as part of the data reported in this article, **Phase 2** of this project will utilize **Phase 1** data to develop a quantitative instrument that will be subsequently administered to all academically gifted African American students who are enrolled in the array of STEM disciplines at each of the 89 four-year HBCUs in the nation. In essence, the data taken from Phase 1 which includes students enrolled in engineering disciplines will be used to construct an instrument that will tease out the factors found to contribute to the success of African American students in not only engineering but also the diversity of disciplines represented in the sciences, mathematics, and technology fields. The design for the project is depicted in Figure 1.

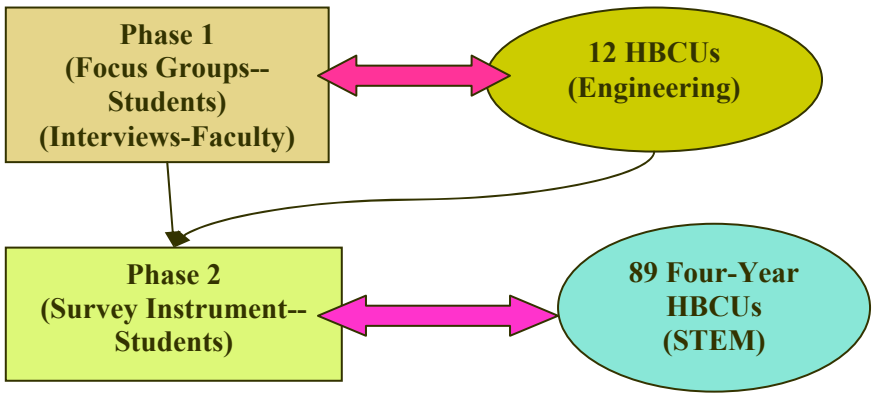

Figure 1.

This project followed a *strengths-based approach*, much like Maton and Hrabowski's (2004) work with the *Meyerhoff Scholarship Program* at The University of Maryland Baltimore County. According to these researchers, they focus on the "existing strengths of talented Black youth that transform their academic and social environments" (p. 548). Additionally, the researchers found that the HBCU context was critical for this research investigation in that not only are more significant numbers of academically gifted African American students potentially available for participation but also unique environmental factors can be explored to determine their relative impact on student success.

Data Collection and Preliminary Analysis at First Research Site

Data collection consisted of face-to-face focus group interviews with seven students who were enrolled in Engineering, Computer Science, and/or Engineering Technology programs at Prairie View A&M University. These students were selected based on faculty recommendations as well as identification as gifted based on the criteria from the definition of academic giftedness described above. We also conducted face-to-face interviews with two faculty members from the College of Engineering. The faculty interviews lasted for approximately 90 minutes and the student focus group interviews lasted for approximately two hours. All interviews were tape recorded and transcribed verbatim. Preliminary analysis focused on participants' views, experiences, and actions as they related to the factors that contributed to success among high achieving students in engineering. The data were analyzed using the constant comparative method (Strauss & Corbin 1990). We analyzed each data set (students and faculty) and then conducted a cross analysis of the themes to find commonalities between the views and experiences of the faculty and those of the students. Because of the page limitations of this paper, we will only present a brief summary of some of the findings.

Findings

This paper presents the following two findings fro faculty: (1) perceptions and definitions of academic giftedness and (2) perception of barriers to successful performance of African American students at that institution. For students, the following two findings are presented: (1) definition and characteristics of an academically gifted students and (2) factors that contribute to the academic success of gifted students in undergraduates engineering program at an HBCU.

Definitions and Characteristics of Academic Giftedness

Faculty Perceptions

According to the faculty participants, academic giftedness is demonstrated through personal attributes which collectively influences an individual's grade-point average. They hold the view that that grade-point averages and test scores, taken in isolation, are not predictors of academic success.

The following characteristics were identified as predictors of academic giftedness:

- Aptitude for learning the concepts in math and science and ability to demonstrate knowledge of these concepts;
- Being resourceful, adaptive, and self-directed;
- An appetite for knowledge;
- Passion for what you do;
- A vision for career and for living;
- Having the persistence and the patience to stay the course;
- Leadership potential;
- Ability to work collaboratively with others;
- A certain level of maturity; and
- Pride in education.

As one faculty member noted,

> The interweaving of those characteristics propels an individual to have an appetite for knowledge. So when you have this appetite for knowledge, you're going to want to learn and learn for the fun of it. You stop at some point competing with others and it's about competing with yourself. . . . Grades are still important because society places an importance on it . . . but that appetite for that learning then just shows up in the letter grade.

The data suggest that academic giftedness is not defined primarily as a factor of grades, but by the personal characteristics that the individual brings to the educational context. Several faculty participants agreed that a small percentage of students fit the more traditional profile used to identify gifted students—many of these characteristics are cited in the above bulleted list.

However, in speaking of the number of gifted students she has encountered, one faculty member noted, "It's few and far; in three and a half years, I have taught and interacted with certainly over 100, out of that, I would say 6 in my three and a half years." Her comments speak to the small number of African American students who she identified as high achieving. She like many of her post-secondary peers use what could potentially be viewed as a deficit model in profiling the student populations they encounter; namely, the students in their engineering programs are viewed as fitting into the profile listed below. Ostensibly, these characteristics often serve as barriers to the students' academic success.

Barriers to academic performance

The faculty participants identified both personal and institutional barriers impacted students' academic performance. Among the personal barriers noted were the following:

- Under prepared academically upon admissions;
- Preoccupied with materialism and activities to support a materialistic life style;
- Engagement with activities outside of school to include work and family;
- Lack of time to take advantage of academic support programs and activities;
- More focused on the money that results from an engineering degree and less prepared to commit to the academic work;
- Limited knowledge of the engineering professions; and
- Places little importance on the value of a good education.

One participant in discussing the under preparedness of African American secondary school graduates, attributed these observed deficiencies to the limited interactions these students had with teachers. Many of these students came from predominantly White secondary schools and were extremely limited in the interactions they had with their teachers. She noted,

> Whatever interfacing is going on with the teachers and our students of color, something is missing there. . . . Secondary educators in the 50s and 60s had such a sense of pride in instilling something in a kid and that kid carried that on, that I don't sense that in educators in secondary education right now and even at the collegiate level too.

This participant seemed to believe that the pride for learning that Black teachers instilled in Black students during the period of school desegregation has been lost. Additionally, she attributes this lack of pride to students' limited engagement with teachers in the school environment. What this participant is suggesting, as much of the literature does, is that students who interact with mentors and role models in the learning environment generally demonstrate a higher motivation for learning than those who remain disconnected from these key individuals.

Much like the limited experiences between students and teachers chronicled by students of color who graduated from predominantly White secondary institutions, our data also revealed evidence of these limited engagements occurring between faculty and students at the HBCUs included in this study. These limited engagements were attributed to the small number of African American professors at the institution. In speaking to the important role that African American faculty play in the lives of students, one participant stated, "You are going to find, and even right here at our HBCU campus, less faculty of color educating our students of color. So then, you've got culture issues, you've got speaking barriers. We [African American faculty] are not gonna stop at five; we're gonna be in your business til eight, nine at night or even on the weekend." What we attributed this espoused value of going beyond the call of duty to educate African American students to was the period of segregation in which "Black teachers of Black children" saw as one of their primary roles the uplift of the race.

Among the institutional barriers that were noted included faculty who were not dedicated to the profession and to student success as well as ineffective leadership throughout the organizational hierarchy. Speaking of the lack of effective leadership and its influence on academic success, one participant noted, "Leadership, lack of leadership throughout the entire chain of command; that's the biggest one. Too often we have, and this is across the board, leaders of HBCUs who have lost sight of the importance of educating people of color." Another faculty member interviewed agreed that

leadership plays a significant role in student success, but he also argued that it is the classroom faculty member who plays a more significant role in creating a learning culture where students are engaged with the learning environment. As he noted, "No matter what the administration does, it's still going to come down to that teacher teaching that student, and if they are good, bad, indifferent or what have you, that's what makes the difference."

The data seem to suggest that creating learning environments in which students are motivated to learn and are engaged in critical discourse with faculty members who are passionate about teaching are the elements necessary to promote academic excellence—particularly among those who were identified as academically gifted.

Students' Perspectives on Academic Giftedness

We sought student perspectives regarding a definition of academic giftedness, factors that contributed to their success, personal and institutional challenges encountered, the role that race and gender plays in their academic experience, and faculty influence on their academic success. For the purpose of this report, we will focus on two primary themes from the data set: Students' perspectives of giftedness and factors that promote high performance in engineering disciplines.

Definitions and characteristics of academic giftedness

Similar to the faculty participants, the students had difficulty defining the term "academic giftedness." Here are some of their comments:

- Good grades, good GPA, high scores on standardized tests, but it goes a little beyond that
- Someone who can pick up concepts and topics quickly
- Being well balanced in a multitude of other things that you do. Nonacademic activities relieve stress, which in turn contributes to better academic performance
- One who is resourceful and has the ability to tap into different resources to get the job done
- Being self-directed

In defining academic giftedness, *Student F* eloquently explained,

> The more standard answer would be good grades, good GPA, high test scores, and standardized tests and what not, but I think it goes a little bit beyond that in the sense that an academically gifted student, if that's what we're defining, is someone who can pick up concepts and topics quickly, somebody who doesn't need the teacher to explain to them twenty times before they get it; or they might understand the concept a little sooner than the rest of their peers in that class; so I think this kind of adds to the definition of academically gifted.

Student E defines an academically-gifted student as one who is well rounded and participates in both academic and other extra curricula activities. *Student A* disagrees, noting that "if we're going off on academically gifted, we are talking about academics, not your outside life." On the other hand, *Student C* sees academic giftedness as going beyond grades and test scores. The student noted, "I don't think academically gifted means you make good grades. I just think that . . . everybody has to make an "A" to be gifted in something, but it's . . . how to go and get what you need to solve whatever problems that there is." These findings suggest that there is not an agreed-upon definition of the term or its conceptualization. Overall, faculty and students view the academically gifted individual as one who demonstrates high cognitive abilities as well as particular desirable personal characteristics.

Contributors to Academic Success

While faculty focused on barriers to academic success, the students discussed the factors that have contributed to their high academic performance and, hence, their success in their engineering program. Here are some of their assertions:

- Motivation to go beyond academic accomplishments of the family, especially where the family members had not graduated college;
- Commitment to follow the paths of college-educated parents and other family members;

- Strong history and legacy of African Americans as teachers;
- Encouragement from family and desire to keep the family pride as education is viewed as a source of pride in the African American family;
- Encouragement from teachers;
- Participation in extra curricula activities to include athletics;
- An innate attraction to certain activities and disciplines at an early, for example model building and mathematics;
- Challenging classes in high school and in college;
- Participating in communities of support – communities of fellow students in engineering, initiated and maintained by students for the purpose of academic and psychosocial support;
- STEM programs at the collegiate level and the supports activities that are built into the programs;
- Vision of an engineering career beyond the collegiate experience;
- Professional organizations on campus, for example, NESBE;
- Religion and spirituality; and
- Fear of failure.

One of the major findings is the role of peer collaboration and participation in study groups which serve as sources of support for students in engineering programs. One creative approach these students used was to build communities of support in the form of study groups. In so doing, they learned to rely primarily on each other for academic support rather than rely on the teacher. All of the participants in the preliminary study reported on the value of study groups and the role they play in their academic performance. For some, engagement in extracurricular activities prepared them to function effectively as team members of collaborative groups. As *Student B* articulated, "I have been playing sports all my life . . . so I'm used to working in a lot of team environments and dealing with a lot of different personalities. So I think that helps me a lot cause like most people, I study in small study groups; and so sports helped me out with that I think." As a result of the challenges of the engineering program, students developed a sense of self-directedness and found ways to manage the rigors of the program.

Speaking of the value of community to survival, *Student C* noted, "That's the only way to survive in engineering; there's never an 'I'; there's never an 'I' in anything we do once we form [the study group]. It means that if somebody else captured something in class, and since that person has captured another concept, maybe that person can teach it better than the teacher cause all professors can't teach in a way that they can relate to the student." The students, overall, found much more value in the self-initiated team approach to learning rather than the teacher-initiated classroom instructions.

The student participants overwhelmingly spoke of family as a major contributor to their academic accomplishments. Historically, education has been viewed as a pathway for upward mobility for African Americans. Therefore, family members passed on the legacy of education and the pride associated with being an educated African American citizen. *Student F* articulated the family history and tradition that motivated her to strive for high academic success. As the student shared, "I grew up and both my parents went to college; they were teachers. So they instilled in me at an early age that I have to go to be educated; so I had to go to college. I had to go to high school and make good grades and things of that nature." Similarly, Student D agreed, "I would like to say 'family.' Just the motivation that you get and just people constantly telling you . . . you have to go on; it's gonna be hard, but you can get through it, and just knowing and just knowing that . . . you kind of want to do better than your parents." It was clear that the legacy of obtaining a good education as a demonstration of ethnic pride and career success propel many of these students to persevere.

For some students, there was an expressed need to go beyond what other family members had accomplished, particularly those family members who had obtained some measure of academic success. This phenomenon was particularly significant for those students who were identified as first generation college graduates or who had not experienced many college graduates in their family

networks. Although only one of the seven students fell into that category, her story is worth noting. According to this student, *Student C*,

> I wanted to do something that my family did not do; a lot of people in my family did not go to college or a lot of people when I say the word 'engineering,' they could not give me an answer what engineering was. . . . So that was one of my main motives on going to do something to make me . . . somebody, that somebody my family has not been.

Going beyond the academic accomplishments of the family was articulated as one of her primary motivating factors to achieve. At the time of the interview, she was scheduled to graduate in a few months and had multiple lucrative job offers from large well-known corporations. As she had set out to do, she had achieved academic success beyond that of her immediate family members.

Another factor that students identified as contributors to their success was the deep sense of spirituality and belief in a supreme being that influenced their educational sojourn. As *Student C* shared, "I just think like all of my success ties back into what I get down on my knees and pray for, the person who, I believe, gives me strength to go on day to day. It wasn't because of him I don't know where I would be." African Americans have maintained a rich history of religious traditions that have guided them from slavery to contemporary society. The value of religion and spirituality that *Student C* evokes to help manage the challenges of the academic rigor represents a rich legacy passed on by generations of Black families.

Having a vision of a better life beyond what is observed among low-income African American families is another motivating factor among those students who have been identified as being academically gifted. Again *Student C* was very eloquent in her articulation of how the visions of present and future propels her to shape her life's destiny. She shared,

> I kind of look at the long picture. . . . I know at the end when I graduate, there's a lot of money, and I can be successful. . . . I don't want to live paycheck to paycheck cause I saw people do it, and so I look at it and say, hey, you can do this if you stay in school with the end picture in mind. Yes, school might be really, really hard, the teachers might get on your nerves, you might not have any friends, but at the end of the day when you go to sleep, in four years where you going to be?

The vision of successful career in engineering as a symbol of economic mobility motivates students to persist in their academic endeavors.

In summary, there is a general agreement among both the faculty and students who participated in the study that academic giftedness is characterized not only by good grades and high test scores but by other personal requisites to include resourcefulness, self-directedness, leadership potential, aptitude and passion for learning, a certain degree of maturity, and pride in education. Faculty had difficulty identifying academically-gifted students they had encountered. Instead of focusing on attributes that were positively associated with giftedness, many chose to instead highlight the barriers that impeded the successful performance of African American students enrolled in engineering disciplines. In essence, it was as if these faculty members chose to define giftedness by revealing the negative attributes that it did not embody—attributes that they often associated with the students they encountered. Perhaps the most pervasive negative attribute identified by faculty, which we coded as a barrier, was a lack of motivation to learn that faculty perceived students held. The students, on the other hand, provided data to suggest that they embodied a high level of motivation and that they were resourceful in implementing strategies to manage the academic expectations placed on them by the academy. In essence, the portrait that faculty painted of the students was quite in contrast to the portrait the students painted of themselves.

Conclusion

So, what can be made of the findings of this study? First, faculty interviewed noted that the definitions and characteristics of academically gifted students were as follows: (a) an aptitude for learning the concepts in math and science and ability to demonstrate knowledge of these concepts; (b) being resourceful, adaptive and self-motivated; (c) an appetite for knowledge; (d) passion for what you do; (e) a vision for career and for living; (f) having the persistence and the patience to stay the course;

(g) leadership potential; (h) ability to work collaboratively with others; (i) a certain level of maturity and (j) pride in education. When reflecting on the skill sets of their African American students in engineering, faculty participants agreed that a small percentage of their students fit the aforementioned characteristics.

More importantly, the faculty in this study, noted that their students faced a plethora of barriers to academic success such as: (a) being under prepared academically upon admissions; (b) preoccupation with materialism and activities to support a materialistic lifestyle; (c) engagement with activities outside of school to include work and family; (d) lack of time to take advantage of academic support programs and activities; (e) more focused on the money that results from an engineering degree and less prepared to commit to the academic work; (f) limited knowledge of the engineering professions; and (g) little importance placed on the value of a good education. As a result, faculty noted that many African American students are under prepared for the rigors of this academic major.

Second, when examining the student perceptions of how they defined the concept of 'academic giftedness' they differed from the faculty. These students noted 'academic giftedness' as: (a) good grades, good GPA, high scores on standardized tests…; (b) someone who can pick up concepts and topics quickly; (c) being well balanced in a multitude of other things you do; (d) one who is resourceful and has the ability to tap into different resources to get the job done; and (e) being self-directed. Given these definitions, there is a slightly different view of the concept of 'academic giftedness' between faculty and students. As an example, faculty perception focused on a broader definition of academic giftedness that placed a greater emphasis on the internal drive and zeal for learning whereas students tended to offer a more classic definition which relies on traditional measures such grade point averages and cognitive ability tests.

Third, since the notion of faculty/student interaction became an issue, students discussed the importance of study groups in facilitating their success in the field of engineering. This is an important finding given that the common perception of American-born students, particularly African American students, is that they study in isolation with minimal interaction with their peers (Bonner & Evans, 2004). As previously noted, one student documented the importance of study groups, "That's the only way to survive in engineering; there's never an 'I'; there's never a 'I' in anything we do we do for the [study group].

Finally, the African American students in this study discussed the importance of family as a key characteristic of survival in the field of engineering. While many of their family members have never had the experience of venturing into a high-demanding academic field like engineering, they planted a love for learning and a motivation to beat the odds to matriculate through their academic programs. Also, many of the students used their family backgrounds as a motivation to take their lives to the next level via their educational pursuits. Given the examples presented in this study, African American students in engineering must overcome a plethora of variables; however, they still have the academic ability to be successful.

Recommendations

As a result of this pilot study, several recommendations are warranted for internal stakeholders (HBCU faculty, staff and administrators):

1. The HBCU must understand that the millennial African American student that currently matriculates in engineering programs do not have the same definition of what a student should be as the faculty who participated in this study. More specifically, many of the students feel they are in situations where they have to work to be able to survive financially while they are in school. As a result, to fit the clientele of the students in the academic program, a different approach should be considered to facilitate the success of this population.
2. African American students in this study indicated that they have minimal interaction with their faculty instructors and more interaction with their peers in study groups. As a result,

professional development should be provided to HBCU faculty to promote greater interaction between the students and faculty.

3. The HBCU should take the necessary steps to ensure they continue to promote the use of study groups for African American students in engineering. African American students in this study noted that this was critically important for their academic success.

Recommendations for External Stakeholders (Engineering Companies, HR Officials, Etc).

Engineering employers who seek to employ and retain African American students must recognize and understand their need for strong peer interactions as identified by the study.. Companies should integrate within their organizational structural programs that promote socialization and networking among their African American employees in order to avoid feelings of isolation and "not belonging." This is particularly important when African

1. American students participate in internship and co-op programs, where the students' perceptions of engineering careers are first formed.
2. Students identified having a successful career in engineering and economic mobility as a motivator. Companies should work to more clearly outline paths to upward mobility within their organization. They should empower their human resource department to develop mentoring programs to cultivate African American students for management positions and thus further increase the financial stability, professional growth and longevity in the engineering profession.
3. Engineering Companies should invest more resources (financial and human resources) and partner with engineering programs at HBCUs to identify avenues to present a portrait of the environment they are expected to perform and excel. These programs should be initiated as early as the freshman year.

References

Anderson, E. L., & Kim, D. (2006). Increasing the success of minority students in science and technology. Washington, DC: American Council on Education.

Astin, A. (1975). *Preventing students from dropping out.* San Francisco, CA: Jossey-Bass.

Bonner, F. (2001). Gifted African American male college students: A phenomenological study. *The National Research Center for the Gifted and Talented* (RM01148).

Bonner, F. (1998). Gifted African American male college students: A phenomenological study. *Dissertation Abstracts International, 58* (08). (AAT 9805829).

Bonner, F. A. II & Evans, M. (2004). Can you hear me?: Voices and experiences of African American students in higher education. In D. Cleveland (Ed.) *Broken silence: Conversations about race by African American faculty and students on the journey to the professorate* (pp. 3-18). New York: Peter Lang.

Bonner, F. A. II, Jennings, M., Marbley, A. F., & Brown, L. (2008). Capitalizing on leadership capacity: Gifted African American males in high school. *Roeper Review*, 30(2*), 93-103.*

Brown, M.C., II (2002). Good intentions: Collegiate desegregation and transdemographic enrollments. *The Review of Higher Education*, 25(3), 263-280.

D. E. Chubin, "The competition for talent" [letter],*Science* 295, 972-973 (2002). http://www.sciencemag.org/cgi/content/full/295/5557/972

Chubin, D. E., May, G. S., and Babco, E. L. Diversifying the engineering workforce. *Journal of Engineering Education*, 2005, 94(1), 73-86

Ford, D.Y., Harris, J.J., III, Tyson, C.A., Frazier-Trotman, M. (2002). Beyond deficit thinking: Providing access for gifted African American students. Roeper Review, 24(2), 52-58

Jennings, M., Bonner, F. A. II, Lewis, C. W., & Nave, F. M. (2007). The historically Black colleges and university: A question of relevance for the African American millennial college student. *National Association of Student Affairs Professionals Journal*, *10(1), 85-96.*

Maton, K. & Hrabowski, F.A. (2004). Increasing the number of African American PhDs in the sciences and engineering. *American Psychologist*, 37 (7), 629-654.

National Academies Press. (2007). Rising above the gathering storm: Energizing and employing America for a brighter economic future. Washington, DC: National Academies Press.

National Science Foundation. (2007). *Historically Black Colleges and Universities Undergraduate Program*. Retrieved August 15, 2008 from http://www.nsf.gov/pubs/2002/nsf02160/nsf02160.pdf

National Science Foundation. (2006). *Science and Engineering Indicators 2006*. Retrieved February 28, 2006 from http://www.nsf.gov/statistics/seind06/pdfstart.htm

National Science Foundation. (2002). Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) Report- NSF 02-160. Retrieved December 12, 2006 from http://www.nsf.gov/pubs/2002/nsf02160/nsf02160.pdf

Pascarella, E., Smart, J., & Stoecker, J. (1987). *College racial composition and the early educational, occupational, and economic attainments of Black men and women.* Paper presented at the meeting of the American Educational Research Association, Washington, D.C.

Roach, R. (2004). Losing ground. *Black Issues in Higher Education*, 21(2), 28-29.

Roebuck, J. B., & Murty, K. S. (1993). *Historically Black colleges and universities: Their place in American higher education.* Westport, CT: Praeger Publishers.

Sedlacek, W. E. (1993). Employing noncognitive variables in the admission and retention of nontraditional students. In *Achieving diversity: Issues in the recruitment and retention of traditionally underrepresented students* (pp. 33-39). Alexandria, VA: National Association of College Admissions Counselors.

Sedlacek, W. E., & Tracey, T. J. (1985). *The relationship of noncognitive variables to academic success: A longitudinal comparison by race. Journal of College of Student Personnel, 26,* 405-410.

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Thousand Oaks, CA: Sage Publications, Inc.

Institute of Education Sciences. (2007). Characteristics of minority serving institutions and minority undergraduates enrolled in these institutions. Washington, DC: US Department of Education.

Wenglinsky, H. (2006). The educational justification of historically Black colleges and universities: A policy response to the U.S. Supreme Court. *Educational Evaluation and Policy Archives, 18(1)*

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(C.35)

Lynn Hogue; Arlyne Sarquis, Connecting Chemistry Across Borders: The Center for Chemistry Education of Miami University (USA) has developed many unique educational programs, which have been shared with science teachers around the world. These intensive professional-development programs engage participants in a review of chemistry content, pedagogy, inquiry-based investigations, and numerous hands-on/minds-on lessons and have been taught in Mexico, Peru, China, and Finland. Additionally, a novel program was developed in collaboration with the Seoul Ministry of Education for specially selected chemistry teachers from Korea. Korean teachers traveled to Ohio for a three-week program, which included immersion into US culture; visits to schools, historical and recreational sites; and interactions with US teachers. As a whole these international programs have promoted cultural awareness and appreciation, and provided a platform for sharing ideas and networking, through the commonality of a love for science. An overview of the program and what we learned along the way will be discussed.

(C.36)

Carole R. Beal; Mike Birch, Technology-based resources for students' problem posing in mathematics: Primary and secondary students spend a great deal of instructional time learning to solve math problems that were created by others, including textbook authors and teachers. Students rarely have the opportunity to recognize, define, discover and create math problems of their own. Yet prior work on the practice of "problem posing" hints that this activity may help students to understand math concepts more deeply, and may also increase their self-confidence and their interest in studying math. Students who are not doing well in traditional math problem solving can blossom with problem posing, perhaps because they rely less on well-practiced solution strategies than their peers. Although problem posing appears to be a promising practice for supporting students' mathematical interest and talent, it can be demanding for teachers to implement. Students need resource materials and information to use in creating problems. Assessing the accuracy and quality of students' posed problems also requires more attention than simply determining if an answer is correct. The presentation will describe a web-based system to support problem posing for middle school mathematics. Students research environmental science themes via an international database of endangered species information, and then use integrated templates to create word problems. Their problems can be supplemented with images, videos and other multimedia, sent to the teacher for review, and then shared with other students. Results from initial evaluations suggest that students find the activity highly engaging and may help to challenge their perception of mathematics as dull and uncreative.

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Creating Instead of Consuming - An Approach to Make Children Understand Tomorrow's Technology

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Abstract

IT and Digital Media are key technologies of today's and of future societies. In our approach we want to look at people not as consumers, but as co-creators of tomorrow's technology. We involve young people in developing ideas for intelligent devices and processes, to invent, to design, to construct and to present. We give children access to technology in a way that makes them understand how it works and how to create it. They get access to the fundamentals of ICT, aiming at a basic understanding of its concepts. We relate to newest technologies like embedded systems, physical computing, tangible interaction in order to get children's interest and to encourage their participation in shaping the future. The concept, the material, the outcomes and experiences are presented in this paper.

Introduction

IT and Digital Media are key technologies of today's and of future societies. Children grow up with these technologies and use them as part of their normal course of life. IT is omnipresent – the electronic ticket in the bus, the music player in the pocket and computers on every desktop you see. Most visions about the future contain plenty of technical gadgets and often robots play a major role. But should we leave the shaping of our future societies to engineers and computer scientist? Enabling everyone to participate not only in civil society but also in shaping future technologies that will be so crucial for their lives should become a main concern.

In our approach we involve young people in developing ideas for intelligent devices on their own. Regarded as co-creators of tomorrow's environments we offer them to construct their own technological gadgets. The goal is that they learn to understand how intelligent technology works, what its potentials are, to gain knowledge on how they are constructed and to foster their self-confidence and belief in being able to influence technological developments of the future. We introduce them to current research topics on a level which is understandable and can be explored by own activities.

Background

In our research group of digital media in education we follow the constructionist learning approach which is based on constructivism and states high success in learning through construction activities. Concrete access to abstract models is a main concern of constructionism, the concept developed by Papert and his group at the Massachusetts Institute of Technology (Papert 1993), (Kafai & Resnick 1996), (Resnick & Silverman 2005). Learning always has to do with accessing abstract models, with building cognitive structures, and with the change of one's own cognitive models, as Piaget stated (Piaget 1953). This works best by combining immersion and "diving in", and distance and "stepping out" (Ackermann 2004). Educational approaches need to utilize the possibilities for concrete access, but also need to open up to abstract concepts like algorithms that are hidden behind the multitude of concrete pictures and processes in a computer (O'Malley & Fraser 2005).

Using this principle, our research group developed a setting for children where they have the opportunity to construct and to program on their own. We cumulated different materials that would allow physical computing (IshiI & Ullmer 1997) with the fewest restrictions possible. Resnick and Silverman argue that such a "construction kit" should allow to become expressive with new technology, to explore important concepts and to become better learners (Resnick & Silverman 2005)

what we took as suggestions to act on. We developed a whole concept which applies technology and the constructionist learning approach (Dittert et al. 2008).

In this concept we integrate the children's fantasies about technology as well as the given topic. They become creators of technically equipped artefacts that arise from their own imagination. The children construct and program these artefacts that are a combination of creative work of tinkering and /or sewing and technical products.

In a more than four-years-experience this concept was adapted and approved. During this period of time more than forty workshops applying this concept took place.

Concept of the Workshops

A workshop includes different stages and different settings. Within varying time frames and at diverse locations tutors assist young people of different ages in constructing intelligent artefacts. The aim is to perform a whole process of creating, constructing and presenting a physical object using technology. Within this process people can explore and understand the functionality of technology in a deeper way than by simply using it.

For the results presented in this paper a time frame of five days is ideal due to the fact that it provides enough time also for the visit of a research institution. A workshop usually starts by getting to know each other. Every participating person (including the tutors) states his or her interests in the field of technology and the workshop as a whole. Usually the participants are asked for their prior knowledge and their use of technology in their every day life. This conversation helps the tutors to get an impression about the participants and their expectations. Concerning research activities it provides a starting point that can be looked at after the end of a workshop.

In the first stage of a workshop the fantasies of the participants are in the center of interest. In imaginary trips or with the help of stimulating questionnaires the fantasies of the participants are to be teased out. Here, the goal is to find out about the fantasies that young people have about technology and the main general topic of the workshop which is given beforehand.

In the second stage the attendees of the workshop are introduced to the technical material as well as to the tinkering material that comes with. The technological material includes microcontrollers, sensors, actuators and the programming environment. As tinkering material everything you can use for artefacts is offered: paper, glue, fabrics, yarn, wool, wood, polystyrene, etc.

After this stage small groups join and start to bring up project ideas which they plan to realize within the workshop. After this third stage every group has a concrete idea what to construct. With the conception, construction and programming of the object the fourth stage begins, which takes the most time of the workshop. It starts the first day and ends the last day before the presentation is prepared. The public presentation in front of family, friends, press, researchers and other interested people is the fifth stage of our concept. The goal here is that the attendees of the workshop verbalize their project, make the relevance of their doing visible and receive acknowledgement for it by an audience. In the end they receive a university certificate for their work handed by the university professor.

Workshop topics in the past were for example a bag-workshop where young people equipped their bags with computer intelligence, a theatre workshop where a play was performed using an interactive stage, and a gesture workshop where children built a gesture device to control an artefact that was also build by themselves. In another workshop children invented and constructed games (see Fig. 1). Offering these topics, the young people created interesting products – all of them using basically the same technical materials. Although the children use the same materials and work on one overall topic the emerging products are quite different in their appearance as well as their functions. Hence, in our concept we provide our participants the opportunity to become expressive with the materials what Resnick et al. claimed.

Figure 1: A game where the player has to shade sensors next to flashing lights. After successful playing a candy dispenser opens to give some candy.

Understanding technology

The material

The technical material we use for our purposes consists basically of a microcontroller, different sensors and actuators and an easy to use programming environment. The construction elements are chosen in order to fulfil the conditions mentioned above.

The microcontroller builds the "brain" of the final artefact. The program runs on it and the peripheral equipment as well as the current source are connected to it. As suitable microcontrollers the Handy Cricket System[50] (see Fig. 2) as well as the Arduino board[51] proved well. Both of them look rather technically but provide a wider range of creativity and creative objects than the Lego Mindstorm[52], we used in the beginning (Reichel & Wiesner-Steiner 2006). These systems allow some insight into technical systems and do not appear as pure black boxes. For instance, both of the systems give some access to the principles of electric circuits.

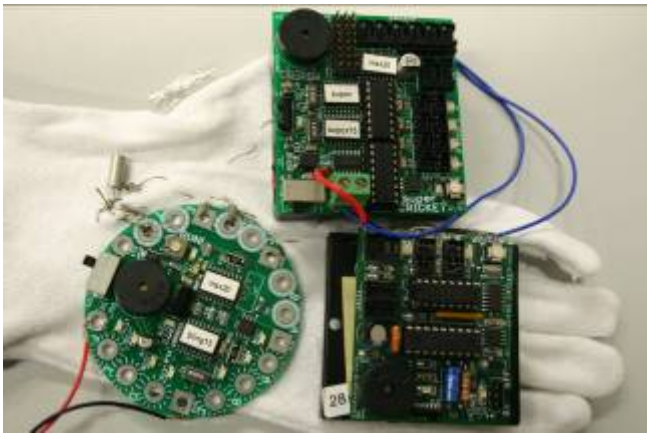

Figure 2: The Handy Cricket System[1]

In order to make the artefact perceive its environment sensors are connected to the microcontroller. There are two different types of sensors used: digital ones and analogue ones. The digital sensors are able to perceive two different values: on and off act as 1 and 0. Examples for these sensors from our kit are tilt sensors, pressure switches, push-buttons and

Reed switches. Analogue sensors have a wider range of values, e.g. from 0 to 255 or up to 1023. Examples are temperature, light or ultrasonic sensors. To give an example, a light

[50] http://www.handyboard.com/cricket
[51] http://www.arduino.cc
[52] http://mindstorms.lego.com

sensor connected to a Cricket returns values from zero for very light to 255 for very dark. All the sensors that are used are microelectronic elements that can be bought in electronic shops.

To enable the artefact to perform action, actuators like motors, servo motors, vibrating motors or LEDs are needed.

Finally, the whole technically equipped artefact needs to be programmed to make it work. An easy-to-use programming environment called RoboLogo is provided, allowing graphical and text based access at the same time (see Fig. 3). The graphical programming environment consists of blocks that can be attached to each other whereof the program to run on the controller is build. This area contains one block for each command you can type in manually. The programmer can access intuitively the use of commands. The commands and the whole program appear automatically on the right side as a written text. So, children can learn to move from a more intuitive visual mode to a more abstract mode that allows lastly more complex activities. The text based programming environment where textual code can be inserted appears on the right side of the screen and can be used at the same time (Grüter 2006). In both programming modes that are used the commands are in German in order to make it as self-explanatory as possible for our participants. But a version in English language is available too.

By offering such an easy-to-use programming environment we want to ensure that we provide the best conditions for our participants to understand basic concepts of programming instead of learning one special programming language and its syntax.

Figure 3: The programming environment RoboLogo.

How to introduce the material?

Usually we introduce the electronic materials at different stations as we want to avoid instruction whenever possible. Three stations for actuators, sensors and the microcontroller are prepared. The participants split in three groups and each group is introduced to one of these materials. They learn and explore the functionality and how to connect the devices to each other. The participants can try this out after a very short introduction immediately on their own. Afterwards we have three groups of "experts" who bring together the knowledge they gained and they teach the other students about it. On a prepared microcontroller the student experts explain to their mates where to connect the peripherals and how to program the controller and to make it run. The sensor-experts explain what they know and connect a switch to the controller. The actuator-experts explain the actuators and connect an LED to the controller.

A simple pre-prepared program that helps to make first steps in programming runs on the controller. The program might be like this: play three notes, wait for a switch to be pressed, then play three more notes and switch on an actuator in the end. The children explore then what programming

means by trying out what the controller does. They hear the first notes and since nothing else happens, they mostly bring up the idea to push the button. Afterwards they hear the next notes and see the LED light. The program code is shown to the kids and the whole group finds out what exactly happens at which time. At this point the basics of programming become clear and the further programming needed for the project is then explained later directly in the work process.

Games that help understand programming

In order to help understanding the character of programming we play different games with the participants. In one game we let the children themselves act like a microcontroller. The algorithm they perform adds the ages of all participants and finally speaks out the result.

In this game each part of the controller is represented by one participant. The sensor represented by one kid receives the ages of the participants. This is written down on a piece of paper. The sensor transmits the number via a connector, which another child is representing. The controller, another child, asks its memory for the current age of the group (which is 0 at the beginning) and adds the age that he or she received from the sensor to it. Then the child representing the controller gives the new current date back to the memory which is a number written on a new piece of paper.

This is repeated until the sensor does not receive any other age to add. Finally the controller asks the memory for the last current number and sends it via another connector to the actuator that speaks out loudly the result that is the sum of all participants' age.

In this game the participants can gain an understanding on how the controller works and how an algorithm is processed. They get another access to algorithms by performing it with their bodies in addition to make it processing physically their objects.

Another game we play with participants is a robot enacted by one child, another child playing the programmer who gives instructions to the robot. A task e.g. could be to make the robot move around the table once. The robot-child has to act out the instruction very strictly and only what is told explicitly by the programmer. That means, instructions have to be defined very exactly and correctly without leaving space for interpretation.

In this game children realize that the instructions they give need to be very accurate in order to make the robot do what they want to. They learn that computers are not able to interpret and to make sense. They even cannot use familiar words because the robot only understands defined statements. So, the robot does exactly what the programmers told him or her to do. It cannot help with any suggestions or any well-intentioned actions. Even if the statement was not given in the exact same way as it is defined in advance, the robot will not perform the command.

This game is a further way to make children understand how robots and computer programs work. They can get a better understanding of the role of the programmer and why the program that they write sometimes does not work the way they want to.

With all these activities of introducing technology and we give children access to the functionality of technology. They experience it in different ways – by making the principles visible in their tangible artefact and by playing it with their bodies on their own.

Meeting Research

Another part of the workshop activities is normally a field trip. As a university institution we want to connect the participants with advanced research and researchers. For an afternoon we introduce the kids to newest developments in the field of technology at one of our research institutes. The field is usually in some way related to what the children themselves are building during the workshop. A researcher explains the developments and the children can listen, watch and try on their

own (see Fig. 4). The third day of a five day workshop has been proven to be a good point of time for a trip.

Figure 4: A researcher explains new developments.

During these field trips and also in talks afterwards we found out some interesting facts. We try to motivate the kids to take a deeper look into these new developments. They are asked for assumptions about the functionality of the devices presented. At this point the children start to draw parallels to the artefacts they work on in the workshop. They look for sensors where the data are taken from, for the controlling device that performs computational activities and for the actuators that perform an action.

In one example a pen[53] was shown that sent data to a hospital from the ambulance so that the data would be at the hospital before the patient arrives. The children started to think on how this pen works. First, there must have been a little camera in front of the pen which receives the data. This data was stored and then sent via some (wireless) connection to a computer where a very complex program must be running. Finally it has to be re-translated into what was written with the pen and given out by some actuator like a monitor or a printer.

In another example children could try out a wearable interaction glove that was developed at the Technology Center for Informatics (TZI) at the University of Bremen[54]. They could try to control different computer applications like scrolling on a website and controlling a presentation. Especially in the gesture workshop children explored the functionality of the glove and draw parallels to their artefacts. They speculated which kinds of sensors are needed for the glove and how it might communicate and interact with the computer.

During the field trip we encourage children to speculate on how some of the presented artefacts work. As a group of children they bring up different ideas. Finally they mostly find out themselves cooperatively how the artefacts basically work. They also understand that someone has programmed a lot in order to make it work. Hence, they realize that technology does not work on its own but only performs what the programmer specified.

After the field trip, we try to encourage the participants to think about technology in their every-day-lives. In group talks we ask them for things they know and if they can bring up an idea of how these things might work. A music player for example waits for instructions to make sound out of some files that are stored on it. Finally the children realize that the principles of the technology they know are similar to the artefacts they constructed themselves.

These examples and many observations confirm the assumption that the participants are able to draw parallels between research artefacts and their own artefacts constructed which work basically the same way. Hence, we might say that the construction of physical, technical artefacts can be used as an

[53] http://www.anoto.com
[54] http://www.tzi.de

approach to make children understand new technology and to see themselves as possible actors or participators in technology design

The clearest statement that confirmed this assumption was one of a girl who said that without this workshop she wouldn't have understood anything at all at the research institute but everything would have been a miracle for her. Now that she had participated in the workshop, she understands some basic principles in how the devices work even though she would not understand the program code in detail.

By constructing own devices we can enable children to understand the principles of new technology. Basic concepts of technology become visible, tangible and clear for the participants. The step to transfer the concept from the self-made artefact to the research artefacts can be facilitated by group discussions.

Conclusion & Further work

This paper shows an approach to make children understand the basic concepts of technology that can be transferred to every day life and to future life. We encourage children to find parallels in their every day life by making them think and also talk about technology in our lives. A field trip to a research institute invites them to take a look at future developments that might be possible. By inviting them to draw parallels to what they build during the workshop they can understand basics of new inventions. Our hope is that, in doing so, they gain some knowledge and the self-confidence to decide on their own to embrace these new developments; they participate in shaping them or to refuse. By experiencing own constructing activities in respect to new technologies they are expected to behave as actors and not as passive consumers only. Children should be encouraged not only to use pre-build technology but also to participate and to create it and becoming active players in a digital culture.

We do not know about if some or how many of our participants will become any kind of "technology people" in the future. Neither can we claim that every single one of our participants would be able to understand each technical artefact he or she sees. All we can do is provide a framework that offers these possibilities in the best way.

The whole setting of our workshops is adapted and readjusted over and over again and we look continually for new topics. We evaluate our workshops formatively by interviewing the participants, by questionnaires and by observation. Most activities are videotaped. Our results give evidence that at least some of the kids grasp the basic idea. It's expressed best in one of the statements of a boy who told us in the beginning of the workshop, that he deeply believes the future world will be conquered by robots. After the workshop he stated: "The world will be conquered by robots, but now I know to construct them."

References

Ackermann, E.K. (2004). Constructing knowledge and transforming the world. In: Tokoro, M. and Steels, L. (eds.) *A learning zone of one's own: Sharing representations and flowing collaborative learning environments*, IOS Press, Amsterdam, Berlin, Oxford, Tokyo, Washington DC, (pp. 15-37).

Dittert, N. et al.: Understanding Digital Media by Constructing Intelligent Artefacts: Design of a Learning Environment for Children. In *Proceedings of the Ed-Media'08* (Wien, Austria, June 30 – July 4 2008).

Grüter, T. (2006). Software as an Element of a Constructionist Learning Environment Using Robots as Personal-Meaningful and Engaging Artefacts for Children. Universität Bremen.

Ishii, H. and Ullmer, B.: Tangible bits: towards seamless interfaces between people, bits and atoms. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Atlanta, Georgia, United States, March 22 - 27, 1997); pp. 234-241

Kafai, Y. B., and Resnick, M. (1996). *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World.* Lawrence Erlbaum, Mahwah, New Jersey.

O'Malley, C. & Fraser, D. S. (2005), *Literature Review in Learning with Tangible Technologies*: NESTA FUTURELAB SERIES http://www.futurelab.org.uk/resources/documents/lit_reviews/Tangible_Review.pdf [2008-04-29]

Papert, S. (1993). *The Childrens Machine.* Basic Books, New York.
Piaget, J. (1953). How children form mathematical concepts. In: *Scientific American* 189, (pp. 74-79).
Reichel, M., and Wiesner-Steiner, A. (2006). Gender Inscriptions in Robotic Courses. *Proceedings of the 1st International Conference on Digital Media and Learning 2006* (ICDML 2006) Tana Press, Bangkok, (pp. 61-65).
Resnick, M., and Silverman, B. (2005). Some reflections on designing construction kits for kids. *Conference on Interaction Design And Children, Proceedings*. ACM Press, New York, (pp. 117-122).

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The Problem Based Learning Approach in Distance Education: The Relationship between Knowledge Construction in the Wiki and the Asynchronous Collaboration in the Learning Management System

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Abstract

The Problem Based Learning (PBL) is a constructivist approach to learning where students learn through social interactions and self-directed learning with the emphasis on learning via meta-cognitive reasoning. There has been immense interest to incorporate this PBL approach in distance education through the use of the Learning Management System (LMS). There are two activity tools in the LMS, namely the asynchronous forum board and the Wiki, that have made the adoption of the PBL approach possible. The provision of the asynchronous forum board enables the learners to operate in small groups to engage in collaboration to solve authentic world problems assigned to them. Following the collaboration, students subsequently construct their knowledge in the Wiki. A student's contribution in the Wiki can be further added, revised and updated by other group members and the contribution continues developing and growing as the collaboration progresses to produce the final communal construction of knowledge. In this article, a study on the relationship between the level collaboration and extent of the Wiki contribution in the PBL approach is reported. It was found that there was a close relationship between the level of collaboration and the extent of Wiki contribution. In addition, the extent of the knowledge constructed in the Wiki is also discussed. Detailed discussion on the collaboration and the effect on the knowledge construction will be presented.

Introduction

Problem-Based Learning (PBL) is a student-centred and constructivist approach to learning. It occurs in a collaborative environment and involves a series of learning sequences that demand the learner to acquire critical knowledge, problem-solving proficiencies, self-directed learning strategies and team participation skills (Duch et al., 2001; Friedman & Deek, 2002).

The learning in PBL begins with a carefully designed problem posed to the students. The problem is not easily solved and does not always result in right answers. The problem thus serves as stimuli for learning and represents the vehicle that develops the students' creative and high-order thinking. The problem mirrors real-world issues and must be designed in the context of the learning that follows. It is thus in contrast to the prevalent teaching strategies where a concept is first presented in the lecture format and followed by the "end-of-chapter" problems (Barrows & Tambylin, 1980).

The important process of PBL is significant because it involves collaborative learning. Collaborative learning may be defined as learning in a group that involves an instructional method which encourages students to work in knowledge-building communities, exploring each other's skills while providing social support and observing the contribution of each member on a defined academic task (Jonassen, 1995). The collaborative learning pedagogy shifts the focus from the teacher as the contents expert to the role of a facilitator and the peer relationships play a significant role in the students' educational success (Dennen, 2000; McLouglin & Luca, 2002). The collaboration among

learners encourages them to develop multiple perspectives regarding their task and promotes articulation of different and contrasting views, resulting in a rich and robust knowledge base (Jonassen, 1995). In addition, collaboration can provide the scaffolding so that novices develop competence. Scaffolding can be achieved by offering social, cognitive and affective assistance in the form of help, online resources and guidance (Edelson et al., 1996).

The advancement of Information and Communication Technology (ICT) has led to the deployment of the Learning Management System (LMS) as an instructional delivery platform to support conventional face-to-face teaching as well as Open and Distance Learning (ODL). A distinct activity tool in the LMS is the asynchronous forum board that provides a platform for teacher-learner and learner-learner collaboration; combined with accessibility to the immense online resources for information, knowledge and data, this tool adheres well to the principle of collaborative learning and student-centeredness of the PBL approach (Omar et al., 2007a).

Another activity tool available in the LMS that fit wells with the PBL approach is the Wiki. It is essentially a communal document work space where assigned members have rights to edit the learning content that is written and uploaded previously by other members in the group (Zuraidah et al., 2008). In PBL, the Wiki can thus be used as a shared work space in the development of a group solution to a given problem. In the development of the solution, the group members are free to edit, amend and revise the content in tandem with the collaboration that takes place in the asynchronous forum board. The end-product in the Wiki is a group solution to the problem, constructed through the evolutionary process of editing and revising of the content by group members (Davis, 2004).

This article reports the study that elucidates the relationship between the depth of the collaboration in the asynchronous board forum and the extent of contribution in the Wiki when students undertake the sequence of learning tasks as required by the PBL approach. This study follows our earlier studies as reported in Omar et al. (2007a; 2007b) and Zuraidah et al. (2008). Omar et al. (2007a) reported the adoption of the LMS as a tool for the online learning environment, utilising the PBL approach for the delivery of instruction in the distance education programme, while Omar et al. (2007b) reported the dimensional analysis of the collaboration in the asynchronous forum when PBL was utilised in the LMS. In the continuation of similar studies, Zuriadah et al. (2008) reported the extent of group participation in the Wiki and found that this was high when the PBL approach was incorporated into the LMS.

Unlike the previous studies, this study looks at the relationship between the depth of the collaboration and the extent of contribution in the Wiki activity tools. In undertaking this study, the following questions were asked:

o. How does the amount of collaboration relate to the extent of contribution in the Wiki?
p. What is the depth of the collaboration of the groups with higher contribution in the Wiki when they undertake the learning tasks as required by PBL?

Methodology

In this study, the open source LMS (Moodle) was used as a delivery platform of instruction utilising the PBL approach. The sequence of the PBL learning tasks incorporated into the LMS closely followed the PBL learning sequence adopted by Omar et al. (2007a). The sequence of the learning tasks is as follows:

q. Introductory information

The first learning task is to provide information to the students regarding the processes of online PBL and the role they should play to accomplish the learning tasks. Students will be required to open and browse through the introductory information pages that provide them with the information and examples.

ii. Presentation of an ill-structured and "real-world" problem

The problem serves as the organising centre and context of learning. It is ill-structured and related to "real-world" issues. The ill-structured problem calls forth critical, creative and high order thinking. It also engages the students' interest and motivates them to probe for deeper understanding of the concept being introduced and is complex enough to require the cooperation of all members in order to work toward a solution.

iii. Online collaboration

The asynchronous forum board is used in this learning task. The students in small assigned group of 8-10 students analyse a problem together. Using activity tools, they collaborate to determine the information they already have and what information and learning they will still to acquire to solve the problem. They propose hypotheses to the problem, generate learning issues, prioritise learning issues and organise a plan of action that requires them to resolve the related learning issues.

iv. Online resources

In this learning task, each individual student has to conduct independent studies outside the group. The individual needs to select suitable online resources that will provide him/her with the solution to the assigned learning issues.

v. Follow-up online collaboration

In these learning tasks, the groups then reconvene and continue with the collaboration using the asynchronous forum board. In the discussion, each student reports on the research that has been conducted, identifying the overlapping issues, reviewing both information and hypotheses in accordance to the new information gathered by each of the groups.

vi. Solution to the problem

The learning tasks involving the collaboration and independent studies are repeated in a cycle. As these processes are repeated, students construct their understanding in the Wiki. The knowledge construction in the Wiki can be further revised and updated as the learning progresses until the group members are satisfied that they have addressed the learning issues and provided answers to the problem that was initially posed to them.

The sample of this study consisted of more than 1,300 students throughout Malaysia who had enrolled in the course JUJ 103 – *Introduction to the Distance Education and Computer Literacy* offered by the School of Distance Education, Universiti Sains Malaysia in the 2007/2008 academic session. A total of 140 groups were established with 8-10 students being assigned per group randomly using the grouping tools available in the LMS. Each group was given the problem associated with the course and each member of a group was required to follow the defined sequence of learning tasks as required by the PBL approach. All the learning tasks and the collaboration were conducted online using the LMS. The learning commenced in July 2007 and ended in January 2008.

The analysis of data in this study involved elucidating the percentage of contribution in the Wiki by the group members. The percentage of this contribution in the Wiki is defined as the number of members contributing out of the total number of members in each group (Zuraidah et al., 2008). If all the members of a group contributed in the construction of the content in the Wiki, the percentage of contribution would be 100% and if only half of the team members contributed, this percentage would be 50%. The percentage of contribution into the Wiki and its relation to the number of postings were also studied. This was achieved by looking at the number of postings in the forum board within the specific categories of Wiki contribution.

The analysis of the depth of collaboration was conducted based on the thread levels achieved by a particular topic of discussion. The analysis involved following the progression of the discussion and the number of postings at given levels was recorded and the frequencies calculated.

Results and Discussion

Overall, positive responses from the students were obtained in terms of their participation in the online collaborative learning provided by the asynchronous forum board when they undertook the learning tasks as specified by the PBL approach. The average postings ranged between 100-150 per group with maximum postings of more than 200 while a few groups recorded minimal postings of below 50. Figure 1 shows the sample of collaboration undertaken by a particular group (Zuraidah et al., 2008).

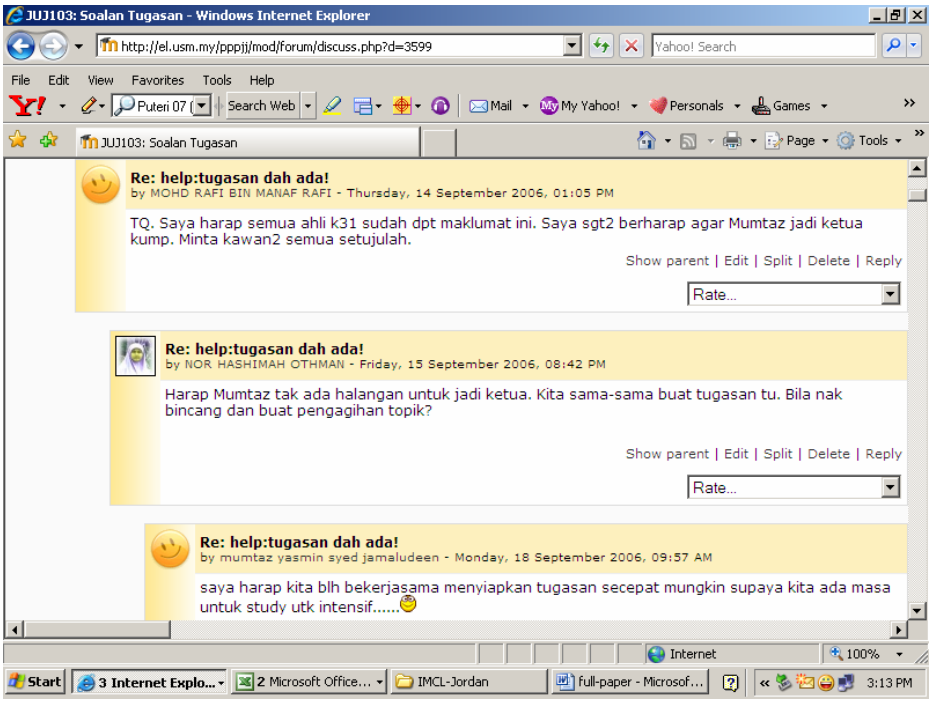

Figure 1: A sample of collaboration in the asynchronous forum board.

This study also found that the students faced little difficulties in developing the group solution of the problem in the Wiki. The evolution and growth of knowledge construction in the Wiki were clearly visible as more and more contributions, amendments and revisions were carried out by group members in tandem with the collaboration that took place in the asynchronous forum board. Figure 2 shows a sample of the communal construction of knowledge belonging to a particular group representing the group solution to the given problem (Zuraidah et al., 2008).

Figure 2: A group solution to the problem constructed in the Wiki.

The extent of the contribution into the Wiki by the group members and its relation to the number of postings in the forum board are shown in Figure.3. As can be seen, the extent of the contribution by groups was very high. A total of 94.4 % % of the postings was obtained from groups that recorded the Wiki contribution of 70% and higher. In other words, if the group consisted of 10 students in a particular group, on average, at least seven out of the 10 members in the group contributed in the Wiki and accordingly, they actively participated in the asynchronous forum board.

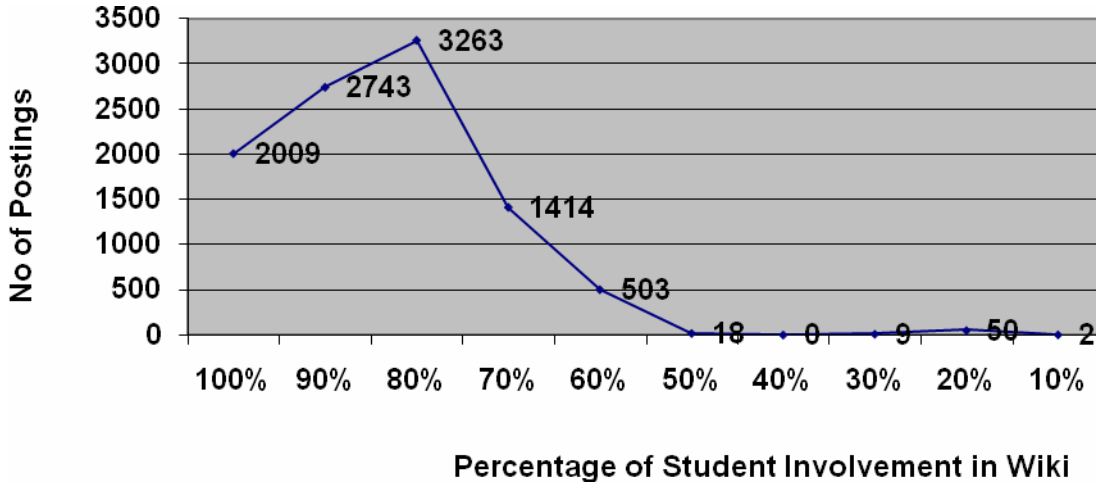

Figure 3: The extent of contribution in the Wiki and its relation with the postings in the asynchronous forum board.

It is therefore evident from Figure 3 that the students have been using the asynchronous forum board collaborative tools in tandem with the Wiki communal work space when undertaking the learning tasks as required by the PBL approach. The knowledge gained by the students when collaborating among peers and facilitator is translated into the Wiki work space. The more the collaboration takes place (represented by the high degree of postings), the more contribution has been made by the group members in the Wiki (represented by the higher percentage of contribution). So, this study found that the amount of collaboration is highly related to the extent of contribution in the Wiki.

Table 1: The level of collaboration among groups with high involvement in the Wiki.

Group	Percentage of student involvement in Wiki	No of Topics of Discussion Reaching Maximum Thread Level (TL)							Total No of Topics	Total No of Postings
		TL 1	TL 2	TL 3	TL 4	TL 5	TL 6	TL >6		
67	100	21	15	5	4	1	4	6	56	228
78	100	7	3	3	1	1	0	2	17	121
69	100	5	4	1	0	1	0	5	16	163
48	90	12	8	5	5	0	1	3	34	134
98	90	9	5	4	4	0	3	7	32	128
74	90	8	7	6	1	1	2	4	29	127
79	80	7	6	0	2	4	1	8	28	140
35	80	13	5	2	1	1	2	4	28	122
63	80	8	7	1	2	1	1	7	27	148

Table 1 depicts the thread levels of topics of interactions among groups which recorded high percentages of student involvement in the Wiki. For the purpose of discussion, the groups selected were from the 100%, 90% and 80% categories of Wiki contribution. As can been seen, the depth of

the collaboration of the groups with higher contributions in the Wiki ranged from thread level 1 to more than thread level 6. However, more topics of collaboration ended at thread level one, an indication of a single or an initiator posting with no responses or feedback from the other members in the group. It is also probable that the topics of discussion posted by the initiator were more individualistic in nature and hindered contribution from the other students. Topics that ended at thread level 1 were of less benefit to the group, in terms of fulfilling the learning tasks as required by the PBL approach.

However, there were some topics of collaboration that progressed to thread level 2, implying two-way communications between an initiator and subsequent respondents in the group. The topics of discussion gained the interest of the other members who then responded accordingly. Some learning occurred in these cases, where the exchanges of ideas took place, but the amount of learning that occurred was limited.

The topics that ended at thread level 3 and higher represented active participation in the collaboration from group members. As seen, there was collaboration on some topics that progressed up to more than thread level 6. This collaboration was a higher level collaboration with active participation and engagement from other members of the group creating rich social interactions. The active participation in turn prolonged the progression of the discussion leading to more exchanges of ideas and knowledge which then enhanced learning among the members of the group.

Summary

This article presented the study that elucidated the relationships between the amount of collaboration and the extent of contribution in the Wiki when students participated in the PBL learning approach utilising the commonly deployed open source LMS in the delivery of instruction in distance education. The results revealed that the amount of collaboration was closely related to the extent of contribution in the Wiki. The higher the amount of collaboration, the higher was the extent of contribution in the Wiki, an indication that the asynchronous collaborative tool was used in tandem with the Wiki communal work space.

The depth of the collaboration of the groups with higher contribution in the Wiki ranged from thread level 1 to further than thread level 6. This implies that the depth of collaboration depended on the topics posted. Only topics attracting the interest of the group members in fulfilling the learning tasks would record rich social interactions and progression to higher thread levels.

References

Barrows, H S & Tamblyn, R M. (1980). *Problem-Based Learning: An Approach to Medical Education*. New York: Springer.

Davies, J. (2004). Wiki Brainstorming and Problems with Wiki Based Collaboration. http://www.users.cs.york.ac.uk/~kimble/teaching/students/Jonathan_Davies/wiki_collaboration_and_brainstorming.pdf

Dennen, V. P. (2000). Task structuring for on-line problem-based learning: a case study. *Educational Technology & Society*, 3(3), pp. 329-336

Duch, B.J. (2001). Writing problems for deeper understanding. In B.J. Duch, S. E. Groh & D. E. Allen (Eds.). *The Power of Problem-Based Learning*. Sterling, Virginia: Stylus Publishing, pp. 47- 54.

Edelson, D.C., Pea, R.D. & Gomez, L. (1996). Constructivism in the collaboratory. In B.G. Wilson (Ed.). *Constructivist Learning Environment: Case Studies in Instructional Design*. Englewood Cliffs, New Jersey: Educational technology Publication Inc. pp. 151-164.

Friedman, R S & Deek F P. (2002). The integration of problem-based learning and problem solving tools to support distributed learning environments. Paper presented at the 32nd ASEE/IEEE Frontiers in Education Conference, Boston, MA, 6-9 November.

Jonassen, D.H. (1995). Supporting communities of learners with technology: a vision for integrating technology with learning in schools. *Educational Technology*, 35(2), pp. 60-63.

McLoughlin, C. & Luca, J. (2002). A learner-centred approach to developing team skills through web-based learning and assessment. *British Journal of Educational Technology*, 33(5), pp. 71-82.

Omar Majid, Rohana Mohd Yusof, Zuraidah Abd Rahman, Ahmad H. Mohamad, Noraida Abd Ghani & Hanafi Atan. (2007a). Problem-based learning and the open source learning management

system in the delivery of the distance education programme. CD Proceedings of the 21st Asian Association Open Learning Conference, Putra Jaya, Malaysia, 29-31 October 2007.

Omar Majid, Rohana Mohd Yusof, Zuraidah A Rahman, Ahmad H Mohamad, Noraida Abd Ghani & Hanafi Atan. (2007b). Interaction in the problem based learning utilizing the open source learning management system in the delivery of distance education courses. CD proceedings of The Second International Conference on Interactive Mobile and Computer Aided Learning, 18-20 April 2007, Amman, Jordon.

Zuraidah Abd Rahman, Hanafi Atan, Omar Majid, Ramanathan, K, Fong Soon Fook & Ahmad H Mohamad. (2008). A Study of the Asynchronous Collaboration and the Wiki Contribution in the Learning Management System. CD proceedings of the International Conference and Workshop on e-Learning Strategies, 7-11 March 2008, Bangkok, Thailand.

(C.40)

Jafar Asgari Arani, Medical Students' EMP Learning through Interactive SMS Platform: Virtual learning communities are radically redefining the traditional language learning classroom, where computer assisted language learning (CALL) is being replaced by mobile assisted language learning (MALL), with increased use being made of wireless networked mobile computers to facilitate internet based language learning. Meanwhile, cell phones are becoming ubiquitous, with students presuming their right to personal use during class, frustrating teachers who regard this as disruptive. MLearning is defined as the teaching and learning processes through the use of mobile and handheld devices such as cell phones, Personal Digital Assistants (PDAs), laptops, and tablet PCs. MLearning is the ability to receive learning anytime, anywhere, and on any device. Objective: This paper aims to describe the development of a mobile-based interactive learning environment (MOBILE) in classroom as well as to understand the impacts that mobile applications such as short -message services (SMS) can have on students' EMP (English for Medical Purposes) learning experience. Method & Material: A brief description of the system as well as the trial that took place is presented. Based on the literature described on mobile technologies and ICT in the classroom and pedagogy, two new classroom dynamics were designed, applied and evaluated i.e. SMS Feedback and SMS quiz. Subsequently a discussion of the survey results, obtained from 40 students of medicine studying the EMP course, is presented. Findings &Conclusion: The findings indicate that students and instructors can benefit from the additional channel of communication in the classroom. The lecturer perceived a gain of quality and quantity of feedback from the students. The research implies that students are of the opinion that the system was useful -making classes more interesting and interactive (over 90%). The post project feedback on a Likert scale gives strong evidence that "SMS Feedback" was found to be an especially useful, efficient and preferred method of communication (94%).Overall, the main inhibitors for adoption of SMS in the classroom, among other challenges, were time constraints (20%) and the cost of text messages (52%), rather than a perception of the systems value.

About the Author

Jafar Asgari Arani is a full time faculty member of Kashan University of Medical Sciences and the head of English Department in this university. He has published 13 papers on Education, e-Education, Specialized English, learning Strategies, M-Learning and E-Learning and also published 9 university text books. He has presented lectures at 15 international academic conferences. He teaches English and Linguistics to the university students. In addition to teaching and doing research , at the time being he is working on designing a new educational system for teaching online and continuing education for the university graduates.

(D.1)

Yuh-Yin Wu; Molly Hsieh, Taking over a school: a virtual role play in real life of a pre-service teachers' practicum project: This study aims to investigate how a pre-service teacher project brought up the students' passion and commitment through a real life role play school-based practice. This activity was embedded within an 8 credit two-semester course, instructional practicum, in their senior year. The three-week role play project was held at the last quarter of the course as a transition for them to full time interns. Before the course, the mission team of 17 members searched their base school and finally collaborated with Da-Si primary school with the consideration of the school size (16 full time school staff) and their appreciation of the idea. The team was structured according to the real school administrative responsibility and the needs of teamwork: a school principal, three directors, and three project leaders. Besides administrative service, every 2 to 3 team members cooperatively took care of a homeroom and share all the teaching and classroom management. The team lived in the school for the whole three weeks due to the distance of the school to the university, plus the strong intention to accomplish the mission. On-going assessment and reflection from selves, peers, and mentors were implemented about classroom instruction and team/school administrative service. The team had published one introductory film, one farewell film, one school flyer, and two issues of news paper. The project challenged the scope of pre-service teacher training in the following ways: 1. Could a school be taken over in this way considering parents' and teachers' concerns? 2. Would virtual roles in real school promote their instructional quality? 3. Would a team enhance self-efficacy and commitment of the members to be teachers? 4. Would the practice benefit the members' proficiency in future career other than teaching? The team members' responses regarding the above four questions were summarized and discussed. Keywords: school-based pre-service teachers' training, project-based learning.

(D.2)

Heinz Neber and Michael A. Anton, Promoting pre-experimental epistemic activities in chemistry education: The pre-experimental phase of inquiry cycles often remains neglected in high-school chemistry instruction. In this phase, students should formulate epistemic questions that are focusing on knowledge goals. Such questions are required to generate hypotheses, and to plan the investigation. These pre-experimental activities were fostered in a study with tenth-graders. Compared to a control group, the intervention resulted in stronger preferences for a more open type of experimentation, and, most importantly, in increased skills for formulating causal epistemic questions. The study provides information for implementing inquiry cycles in chemistry classrooms.

About the Author

Heinz Neber is a professor of psychology, and had different positions as a professor of educational psychology (currently at the University of Ulm/Germany). His research focuses on learning, in particular on discovery learning, and inquiry (e.g. in chemistry education). He published on the acquisition of usable knowledge, problem-solving, cooperative learning, and self-regulation most of them in German). On questioning, he published several studies focusing on ways to promote students' epistemic questions in regular classroom contexts (history, chemistry). Together with Kurt Heller, he extensively evaluated the German Students Academy (a summer school for highly gifted students). Other contributions concerned competitions, the quality of teacher nominations for programs.

(D.3)

Kyoung-Mi Kim; Seung-Urn Choe, Middle School Teacher's Teaching Experience of Scientific Inquiry: Scientific inquiry is the problem without the opportunity of students' developing argumentation using their evidence to support their claims. How can teachers apply it to their students and promote their idea about scientific inquiry? This paper introduces middle school teachers' understanding of scientific inquiry and their experiences about scientific inquiry embedded in the classroom. And we research the difficulties they experience in teaching scientific inquiry methods to middle school students and their suggestions for future inquiry materials. For the purposes of this study, 95 middle school teachers participated in a survey and 5 teachers were interviewed in-depth in relation to their ideas and experiences of scientific inquiry. The results show that most middle school teachers had a lack of understanding of scientific inquiry skills, and lacked educational experiences of inquiry methods in general. They generally perceived the 7th science textbooks as being inappropriate and inadequate for teaching students scientific inquiry processes. This study makes implication in professional development program and teacher preparation program at university for teachers' profession by introducing scientific inquiries through the various types of teaching materials.

(D.4)

A Teacher Training Model of 'Teacher-Researcher-Artist Collaboration' for Gifted Education in Arts in South Korea: The possibilities and significance

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Abstract

Among the variety of roles of school teachers in gifted education in arts, identification of the giftedness, curriculum development, and educational coordination seem to be essential. In order to pursue these, connoisseurship of arts and the sound concept of education and giftedness are critical elements for teachers have. However, current teacher training system for gifted education in South Korea is not quite appropriate for fostering development of these elements due to its separation from the field of arts and arts education research. To overcome this situation, this paper suggests a model of teacher training system through collaboration of teacher-researcher-artist and tries to show its theoretical significance as well as its possibilities with a case study in South Korea.

I. Introduction

A gifted person in arts is the one who can search the world of arts by oneself with one's ability in arts and passion (Han, 2006). Gifted education in arts is a form of life where a gifted person pursues one's ascending education with one's mentor as a correspondent descending education partner (Han, 2006). However, as the gifted education policy has been reinforced since year 2002 in South Korea, gifted education in arts is no longer reserved in a private section but attracts public attention and government support.

If we look at gifted education in arts in the perspective of educational policy or at the institutional dimension, the participants of gifted education are no longer limited to professional artists and the gifted in arts. Whoever supports gifted education in arts, such as educational policy makers, parents, school teachers, are also important human resources in this system. Among them, this paper is focusing on the meaning of school teachers and their particular roles because schools are one of the major starting points of identifying and nominating the gifted in arts.

In Korean educational system for the gifted in arts, school teachers participating in gifted education in arts have dual roles at school. They have to teach regular class and do an extra work for the gifted class in arts. What we need to look at carefully, however, they usually do not teach this gifted class but work as a gifted coordinator or gifted class administrator. For example, when Han, et al.(2006) surveyed what kind of roles the school teachers for the gifted class in arts do, admission, curriculum development, counseling, and class(usually in the form of pull-out program) management were most popular. Therefore, school teachers need to have sound and appropriate perspective in arts, education, counseling, and curriculum development. However current teacher training system in South Korea does not foster development of teacher's ability required to pursue these roles.

Traditionally, teacher training system in Korea is usually held by government, school district office mainly composed of theoretical lectures in a third place rather than individual school. Also, teacher training in gifted education is mainly geared to math and science education area (Han, et al., 2006). In the following chapter, the limits of current teacher training system in gifted education in arts will be discussed in the perspective of concept of gifted education in arts, methods of teacher training, and the relationship with the field of arts.

II. What has been missing in teacher training system for gifted education in arts in South Korea

1. The proper concepts of gifted education in arts

The most common trait of the gifted, no matter in what fields they show their talents, is the high ability of 'learning by themselves' (Han, 2006; Winner & Martino, 1993; Winner, 1996, 2003). They are able to find their own problem not by following instruction but making their environment a context for problem finding, which is usually a way beyond the level of their peers. This ability can be

elevated through the experience of bona fide education. No matter how it is called, the first thing we need to be concerned about gifted education is whether it can encourage the gifted to find their own problems by themselves and give them a chance to elevate the level of those problems enough for their minds to be fully exercised.

Unfortunately, however, there is a great deal of consensus on pragmatism among discourses on gifted education in South Korea. On the one hand, this opinion may be acceptable because gifted education policy is supported by national tax, of course which is supposed to be used effectively. On the other hand, if we add a concept of knowledge as representative of human greatness, this pragmatist approach to gifted education will face some difficult questions: What on earth do 'the outcomes' mean in the context of education? Is it 'actually' possible to define it before educational practice? If so, what can we count? Is educational practice valuable only when some outcomes (usually pre-assigned by others rather than the subject of education, the student) are possible?

As we view a pragmatic way of thinking, development of science indicates a process in which we adapt our thinking to our environments. The term 'effect' appears to be not only apprehensible, but also persuasive to people since it entails a diversity of value standards of the world outside the realm of science. However, the term 'effect' or 'consequence' is desperately vague when we apply it in judging the true value of human belief. Science is tremendously effective not only in curing disease, but in massacring humankind. Furthermore, the criteria of effect are different depending on the various fields. This is why we need to be back to the basic subject, even though it sounds like a cliché, what education is.

A new horizon of the study of education: Endogenous Theory of Education

The Endogenous Theory of Education (ETE) is an educational theory recently proposed by Chang (1998, 2005). ETE begins on the ground that previous studies of education have been misdirected. Chang explains this misdirection in three folds: Firstly, previous studies of education have defined education functionally and made no rigorous attempts to reveal its nature as a self-regulatory discipline (Chang, 1986, 1990, 1991, 1994). Secondly, previous studies of education have defined education as an applied science and imported research results from other disciplines, such as philosophy, psychology, and sociology, without sharp distinction among them as to what education is. Thirdly, previous studies of education have considered the sum of such heterogeneous disciplines and have not asserted the study of education as its own in the academic community (Chang, 1990, 1991).

To correct this situation in the study of education, Chang (1994) proposes a new idea of education which is supposed to have its own totality with a certain structure as other various domains of life. He asserts that the study of education has to contrive its own theoretical concepts to distinguish education from other disciplines. According to ETE, it should be understood that education is not a matter of concept-definition, but of finding its structure; thus, 'the context' where education is situated has to be emphasized to construct a theoretical framework that captures the ubiquitous educational phenomena in our lives.

The history of human beings shows that there are many 'transcendental realms', such as science, art, meditation, Zen, yoga, and judo, where a person has realized one's own latent possibilities or potentialities only through the inner compass of one's mind. Participants in each transcendental realm pursue unique intrinsic values and confirm them through personal experiences. Realization of each transcendental realm has been testified historically, but its existence can be proved only by persons who experience them (Chang, 1994). Therefore, every transcendental realm can have many participants' developmental stages similar to a ladder, called a 'transtalent'. Since no one has reached a final or ultimate stage, transtalent is always a relative standing in the hierarchy of the transcendental realm.

It is between different levels of transtalents in a specific transcendental realm where 'education' occurs with an autonomous structure of its own. Education is composed of two processes which facilitate vertical development of humanity. One is 'ascending education (AE)' and the other is 'descending education (DE)'. AE is the process of developing higher transtalents based on a participant's present level, while DE is the process of transmitting one's desirability to other persons.

Ascending education (AE) and descending education (DE) make up a whole structure respectively, maintaining their own subordinate elements. Both processes are not only complementary to each other, but also reveal a holistic new character that cannot be reduced to individual characters.

It is assumed that every person occupies one's own transtalent at a specific level in a specific transcendental realm. Therefore, when two persons meet, there is a possibility of interaction between them in such a way that the person with a higher transtalent, the 'more advanced' participates in DE, while the person with lower transtalent, the 'less advanced' participates in AE. The peculiar features of this interaction make up the totality of education. When this happens, another holistic structure, called 'educooperation' appears.

Educooperation constitutes a unique structure by itself. The surprising characteristic of this structure is that there are respective elements whose meanings are decided by the relations among themselves. More importantly, the meanings of those elements are not dependent on external facts outside the structure. The structure of educooperation is more like 'a wheel' (Chang, 1998, 2005) as the following figure.

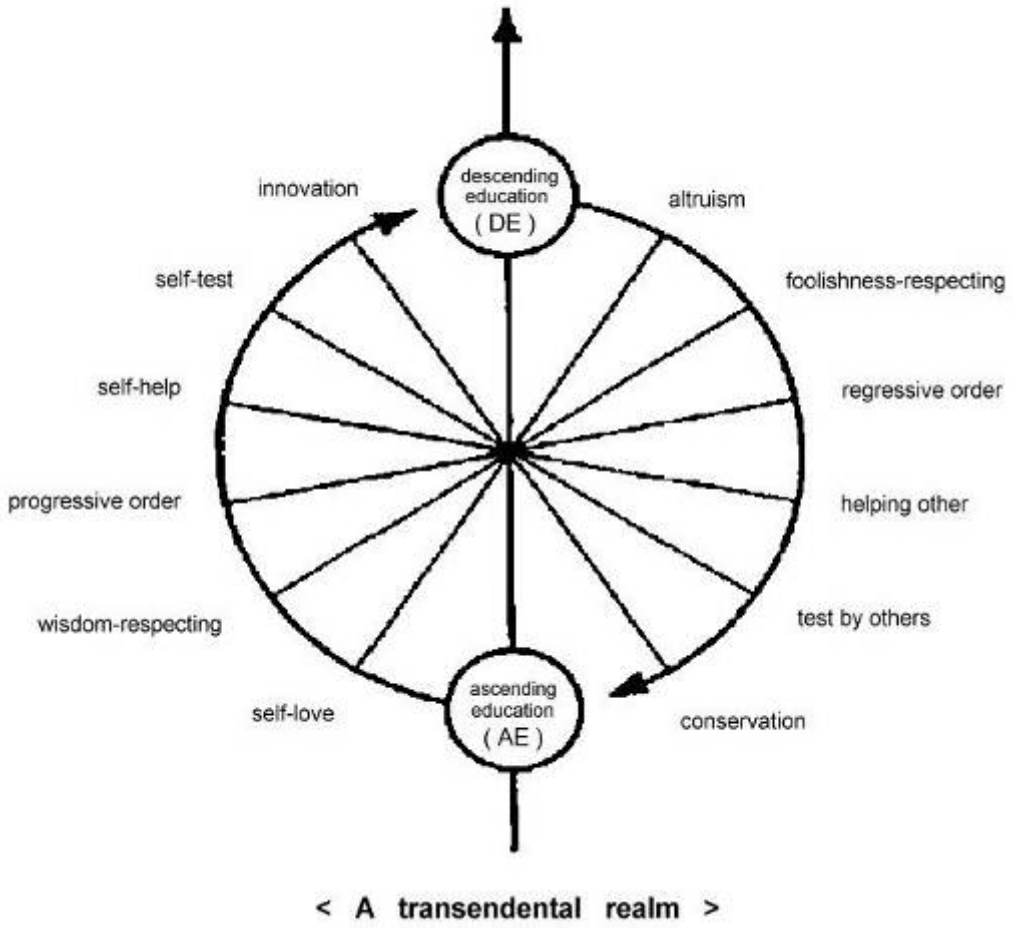

Figure 1: A Wheel of Education.

In [figure 1], AE and DE have six contrasting elements to each other. Each AE and DE has a unique whole composed of their own elements, and they make up a cooperative system with contrasting elements. The six elements of each world are syntagmatically related and contrasted paradigmatically as an autonomous world. They show motives of action, subjective meaning of results, relative perspective, arrangement of stages, forms of transformational activity, and validation of greatness (Chang, 1998, pp. 21-61).

Summarizing up the discussions above, we need to clarify the concept of education and clear out the utilitarian attitude toward the value of education before moving on to the concept of gifted education in arts. Firstly, in much education research, 'education' has been traditionally used as an umbrella term to include all the issues and agendas around the school (Atkin, 1968; Brockman, 2005; Chang, 1986, 1990, 1991; Lagemann, 2000). For instance, Han (2004) showed that quite a few research efforts involving the school laboratory, if not all, have been mostly concerned with 'schooling' problems rather than with theoretically grounded ones arising from authentic concepts of

education. And also, she showed most studies in science education have focused on how functions of the school laboratory are related to development of science and various goals of schooling rather than revealing educational aspects themselves of the school laboratory. Therefore, all sorts of exogenous perspectives and methodologies, such as ones that originated from disciplines of psychology, sociology, and anthropology could be considered as relevant to education research.

Secondly, education is not an instrument conveying knowledge, which usually means contents of textbooks. It is common among traditional discourses on education that existence of education is rationalized only in subordination to the value of subject matters. However, the intrinsic value of education should be considered separately from subject matters and they should not be considered as educational goals, but as 'educational materials'. Also, the value of education should not be calculated only by its outcomes. Actually, the value of education is the sum of its intrinsic and extrinsic values, and it is the intrinsic values that we, as an academic community of education studies, would stress first between the two.

Gifted education in arts under a new concept of education

If we introduce the new concept of education, gifted education can be conceptualized as a form of life where a gifted person pursues one's ascending education with one's mentor as a correspondent descending education partner. This concept of gifted education implies the following details toward the gifted education in arts.

Implication 1. The gifted are not the object, but the subject of gifted education.

Implication 2. The world of arts is one of the transcendental realm where a person has realized one's own latent possibilities or potentialities only through the inner compass of one's mind. The concept of arts cannot be fixed at this moment but develops further toward the future as is the history of arts so that we cannot say what it should be now.

Implication 3. The gifted in arts are the ones not only having special talents in arts but also being able to find out the world of arts by self-directed learning with enthusiasm.

Implication 4. Gifted education in arts is a whole process of educooperation between a mentor-artist and a mentee-a gifted child with tacit and practical knowledge of arts and education as an educational material.

2. Overlooking reflective thinking process in the context of practice

In traditional school setting in South Korea, teachers are supposed to be recipients of national standard curricula without filtering them and to deliver the contents of textbooks to the students without skipping any single page (Yang, 2003; Han, 2006b). This is not a strange situation if we look at teacher training system in South Korea. In teachers college, pre-service teachers are delivered all sorts of knowledge what teachers should get and in-service teachers are trained to deliver the contents of textbooks effectively through regular teacher training system, usually held by the government or school district office. Teacher evaluation, even though refused by national teachers' union, is mostly based on the facts of whether he or she follows the rules of teachers as recipients of national standard curricula and deliverers of contents of textbooks. A teacher training system for gifted education in arts is not much different from this.

However, many researches on teacher education claim that what teachers really do in class is different from what they were supposed to do. Not all the teachers do mechanically follow the national standard curricula. Instead, most teachers try to analyze their tasks and reflect the result of their performance upon the following practice (Cobb, 1994; Snyder, Bolin, & Zumwalt, 1992). Teachers also continually interpret students' responses and try to reflect the result of their interpretation about students' act upon next class. According to Schön(1983, 1988), professional knowledge of teachers is the practical knowledge obtained through reflecting their action during their work. He addressed that the theory based on scientific tradition is different from the knowledge obtained through reflection on their practice. People in professional area, such as doctors, lawyers, baseball players, textile specialists, and so on, make their own knowledge through reflection-in-action and reflection-in-practice, which is usually in the form of tacit knowing.

Researches on the characteristic of teachers' knowledge and what they really do at schools are sufficient to show that we need to change the viewpoint of teacher training system. Teachers are not

passive recipients of knowledge, just taking the theory of scholars in the study of education. On the contrary, they are actively constructing their practical knowledge by themselves in their work place, school. Therefore, teacher training system needs to support this new perspective of teachers' practical knowledge.

3. Fostering development of artistic connoisseurship of teachers

It is very competitive to become a teacher in South Korea, especially since 1990s when job stability became a serious issue due to a crisis of foreign exchange. The competition ratio of passing examination for teaching credential is usually over at least 1:10. To pass the entrance examination of teachers' college is not easy, too. All together mean that the transcripts from teachers' college and the scores of examination for teaching credential are critical elements to be a teacher. In other words, only a few students with high GPAs in college have chances to become teachers in the future. However, high GPA or test scores is not a sufficient condition to have a good teacher even though it is necessary in selection process. This problem is closely related with the curriculum of teachers' college and the components of examination for teaching credential.

During four years of teachers' college, a month of internship training at school (usually 2units) is the only chance for pre-service teachers to get acquainted with the works what school teachers really do. This is the same with art teachers. Moreover, most of the art teachers do not have work experience as professional artists because teacher training system do not require them to have one. Why bother with hard working at studio? They can be art teachers any way if they want to without studio experience. To make matters worse, in-service teacher training program for art teachers do not support fostering development of artistic connoisseurship of teachers. In this way, not many art teachers really do art and have ability to grasp how the world of arts is changing.

III. The relationship between teacher training and curriculum development in gifted education

The trends in the study of teacher education and recognition on teachers' professional knowledge show that the teacher training system for gifted education in arts needs to be changed in some way. According to Han (2008), curriculum for the gifted is a constructive process depending one's educational cycle through life. In this perspective, teachers participating gifted education should be considered as one of the two educational subjects, along with the student, and have rights to develop curriculum for the gifted. Therefore, the teacher training system for the gifted in arts should be the one supporting reflective thinking of teachers on their action in the context of work. Then, the consequences of reflection on their action effect on the following task making a sequence of 'action-reflection-redesign-action'. This means teacher training should happen at the same time with curriculum development as shown in [figure 2] (Han, 2008).

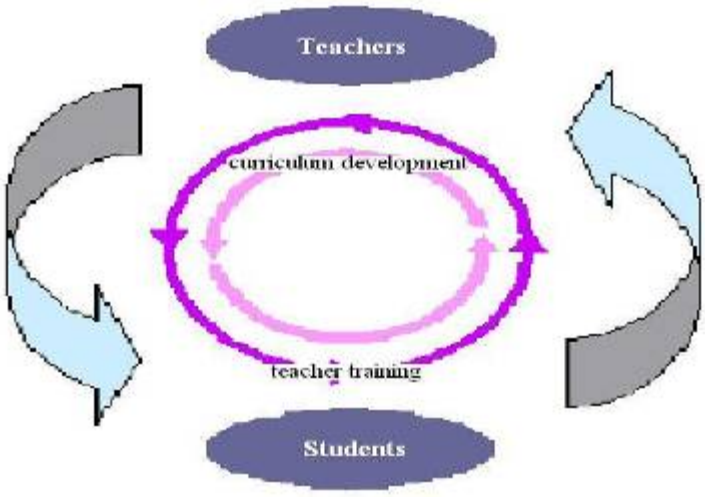

Figure 2: The relationship between teacher training and curriculum development in gifted education.

If we accept the new perspective of teacher training system, teacher training for gifted education in arts should contain a process of fostering reflective thinking on their tasks in the context of work and able to help teachers to execute their roles based on proper connoisseurship of arts, the gifted in arts, and the sound concept of education. Also, teacher training had better be taken place at the level of individual school than either of government or school district. For example, individual school (where a pull-out program is held) or summer camps for the gifted in arts can be perfect environments for teacher training.

Current teacher training system on gifted education in arts in South Korea needs to be changed to overcome the limits described above, such as lack of proper concept of gifted education in arts and reflective thinking process on their tasks, and insufficient support of fostering artistic experience of teachers. Moreover, researches on the relationship between teacher training and curriculum development reinforces the necessities of reforming teacher training system.

IV. Teacher-Researcher-Artist Collaboration: A new model of teacher training system for gifted education in arts

Teacher-Researcher-Artist Collaboration (TRAC) can be a new model of teacher training system for gifted education in arts, able to overcome the conceptual and methodological limit of traditional system. In TRAC model, teachers are supposed to develop their expertise in gifted education in arts by themselves through reflective thinking on their tasks in the context of practice with help from professional researchers and artists as a team. The following is a short description of a teacher training case in South Korea using TRAC model.

In 2007, a project "Gifted Education in Arts for the disadvantaged class" was executed by Korean Ministry of Culture and Tourism. Three institutes were selected for this project, two in rural area and one in the city with relatively low SES population. In each institute, the number of students was from fifteen to twenty, aged 6-8. Three teachers were assigned to each institute, one of them being a leader teacher.

A consulting team with experienced researchers and professional artists was organized to monitor classes, help curriculum development, and facilitate peer evaluation among the teachers and institutes. During the whole period of this project, from March to December, 2007, monitoring classes was done by either visiting individual institutes or video tape recording when the consultants were unable to visit them. Regular meeting and workshops were also held with the teachers in their work place. The consulting was geared to four points: Direction of education, arrangement of educational materials, constructing educational activities, and developing educational environment.

V. Conclusion

TRAC model has its significance from various perspectives. First of all, it supports the possibility of exchanging knowledge among people who have expertise in different area. In other words, 'pedagogical coordination' (Galison, 1997) or 'education exchange' (Chang, 2005) is taken place through collaboration of a teacher, a researcher, and an artist. Artists were willing to share their expertise in arts with teachers at schools. Also, they could have a chance to understand what they have been doing in the studio in order to learn something or to get it through others what they thought. Researchers were able to closely look at the life of artists and figure out how their artistic knowledge is different from that of education. Researchers were also able to conceptualize these findings and help teachers to reflect them on their tasks. Through this cooperation, teachers could have an opportunity to find their own problems by themselves, while researchers and artists could find how their works were different from those of teachers and how difficult it is.

Secondly, TRAC model has significance in the perspective of intrapersonal transferring of educational materials. Persuading process is not always unidirectional. Even though the consulting

team was organized to help teachers at the beginning, researchers or artists could also have chance to reflect the way of their works or roles in life and to be interested in teaching through this project.

Finally, TRAC model should be remarked from the point of developing artistic connoisseurship of teachers. Giving art teachers an opportunity to work with professional artists has a very special meaning in South Korea because most of Korean art teachers don't have experiences in doing art professionally, neither before nor after becoming art teachers at school.

References

Atkin, J. (1968). Research styles in science education. *Journal of Research in Science Teaching*, 5, 338-345.

Brockman, J. (2005). A talk with Howard Gardner. *Edge: www.edge.org*.

Chang, S. (1986). The problems of academic disorientation in the educational research (in Korean), *The SNU Journal of Educational Studies*, 1, 5-53.

Chang, S. (1990). Conceptual confusion of education as related with heteronomy of educational research (in Korean), *The SNU Journal of Educational Studies*, 5, 21-64.

Chang, S. (1991). Reconceptualizing research domains in education (in Korean). *SNU Educational Research Monographs*, 91-92. Educational Research Institute, College of Education, Seoul National University.

Chang, S. (1994). Educational methodology (in Korean). In Y. Han (Ed.), *Construction of the educational nation* (pp. 281-321). Seoul: Yang Seo Won.

Chang, S. (1998). Epistemological significance of educational relationship. *Korean Social Science Journal*, 25(1), 21-61.

Chang,S. (2005*). Science and education: What is education?* (in Korean) Seoul: Seoul National University Press.

Cobb, P. (1994). Where is the mind?: Constructivist and socio-cultural perspectives on mathematical development. *Educational Researcher*, 23(7), 13-20.

Galison, P. (1997). Three laboratories. *Social Research*, 64(3), 1127-1155.

Han, S. (2004). Educational reflections on laboratory experiment in school science (in Korean). *The Journal of Educational Principles*, 9(1), 47-82.

Han, S. (2006). Conceptualization of gifted education in arts in the perspective of Endogenous Theory of Education (in Korean). *Journal of Educational Principles*, 11(1), 63-99.

Han, S., Shin, K, Cheon, J & Lee, H. (2006*). Research on teacher training for gifted education in arts* (in Korean). Seoul: The Korea National University of Arts Korean national Institute for the Gifted in Arts.

Han, S. (2008). Reconceptualizing curriculum for the gifted in the perspective of education (in Korean). *Journal of Educational Principles*, 13(1) (in publishing).

Lagemann, E. (2000). *An elusive science: The troubling history of education research.* Chicago: The University of Chicago Press.

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Schön, D. (1988). *Educating the reflective practitioner.* San Francisco: Jossey-Bass.

Snyder, J., Bolin, F., & Zumwalt, K. (1992). Curriculum implementation. In P. W. Jackson (Ed.). *Handbook of research on curriculum* (pp. 402-432). New York: Macmillan.

Winner, E. & Martino, G. (1993). Giftedness in the visual arts and music. In K. Heller, F. Monks, & A. Passow (Eds.), *International handbook of research and development of giftedness and talent*. (pp. 253-281). New York: Pergamon Press.

Winner, E. (1996). *Gifted children: Myth and realities*. New York: Basic Books

Winner, E. (1997). Giftedness vs. creativity in the visual arts. *Poetics*, 24 (6), 349-377.

Winner, E. & Martino, G. (2003). Artistic Giftedness. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (3rd edition). Boston: Allyn and Bacon.

Yang, M.(2005). Curriculum studies based on Endogenous Theory of Education; The logic and implication (in Korean). *Journal of Educational Principles*, 10 (2), 39-69.

About the Author

Sooyoun Han is a senior research fellow of Korean National Institute for the gifted in Arts established by Korean government, Ministry of Culture, Sports and Tourism in 2005. Her main interests are in theoretical frameworks on gifted education in arts as well as curriculum development and educational evaluation. She is also specialized in designing teacher training program for the gifted education in arts. Since 2006, she has been directing Korean government's national training program for teachers and school administrators who are in charge of gifted class in arts. She is also actively working as a government advisor. Dr. Sooyoun Han received her M.S. in biology from Stanford University, and her Ph.D. in education from Seoul National University, South Korea. She is lecturing at some major universities in South Korea, and has authored or co-authored numerous peer-reviewed articles including 'Reconceptualizing Curriculum for the Gifted in the Perspective of Education' and 'The Meaning and Direction of Gifted Education in Arts based on the Endogenous theory of Education'. She is currently running national projects on curriculum development for the gifted in visual arts and identification of giftedness in visual arts.

(D.5)

The Efficiency of Educational Technology and Material Course

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Abstract

Educational and material course is an important course for the students of the faculty of Education. The aim of the research is investigate the efficiency of Educational Technology and Material Course. In this study, beginning of the semester before the course, two questionnaires were used and after the course same questionnaires were used again. Students' mean points about independent variables were compared.

Keywords: Educational technology, material course.

Introduction

Instruction is the process to deliver knowledge to learners. The deliver of information from a source to a learner is called communication. New learning depends on delivering information. During the deliver of information, using educational technology is very important in order to effectively send new knowledge. There is a strong relationship between educational technology and learning. For this reason, instructors should use educational technology during learning and teaching process.

Methodology

Operational definition of variables

This study was designed to examine students' information level about classical and modern educational technologies before and after Educational Technology and Material Course. It was design to examine students' preferences about educational technologies, too.

Independent variables

Students' characteristics: department, educational type, gender and situation taking the Educational Technology and Material course firstly.

Identification of population

The population under investigation included students who have took the Educational Technology and Material course at the faculty of education in Sakarya University in Turkey.

Sample

Sample selected by the method of random sampling as 342 from the Education Faculty of Sakarya University in Turkey in 2007-2008 academic years.

Instrument

For this research study, pre test and post test were used. The students were asked their information level about 16 classical technologies and 19 modern educational technologies. Their responses are on a series four likert scale (1: no information, 2: little information, 3: enough information, 4: too much information).

The reliability analysis test revealed that the Cronbach's alpha score of pre test is 0,93, the Cronbach's alpha score of post test is 0,94 and the Cronbach's alpha score of students' preferences about educational technologies is 0,89.

Statistical Method for this research

The research was based on quantitative research method. Technique of questionnaire was used in order to gather multiple data. Frequencies, t-test and ANOVA were applied to find the significance differences between the variables using the statistical program, SPSS 13.

The Demography of the participating students

The departments of the students completing the questionnaires was 28,7 % (98) of the students from the department of Computer and Instructional Technology, 31 % (106) of the students from Primary Education , 28,4 % (97) of the students from the department of Science Education and 12 % (41) of the students from the department of Physical Education And Sports Education.

Table 1: Departments of the students.

Department	Frequency	Percent
The department of Computer and Instructional Technology.	98	28,7
Primary Education.	106	31,0
The department of Science Education.	97	28,4
The department of Physical Education And Sports Education.	41	12,0
Total	**342**	**100,0**

The educational type of the responses were 59,1% (202) day time and 40,9 % (140) night time.

The gender of the students completing the questionnaire was 52,1 % (176) male and 47,4 % (162) female.

Frequencies of Individual Items

According to the single item indicating overall pre test for classical educational technologies, it appears that the students of the faculty of Education were satisfied with classical educational technology before the course. However, for 10 of the 16 specific items, more than 50 % of students indicated that they were satisfied with classical educational technologies. At least 50 % enough information or too much information that:

1. Blackboard (89,2 %)
2. Whiteboard (80,4 %)
3. Text books (64,9 %)
4. Graphics (66,7 %)
5. Model and reals (52,0 %)
6. Still pictures (62,0 %)
7. Posters (64,0 %)
8. Newspaper clippings (71,3 %)
9. Cartoons (53,5 %)
10. Field trips (74,3 %)

For 11 of the 19 specific items, more than 50 % of students indicated that they were satisfied with modern educational technologies. At least 50 % enough information or too much information that:

1. Telephone (78,1 %)
2. Radio (73,7 %)
3. Cassette tape and CD (76,9 %)
4. Tape player (75,7 %)
5. Camera (71,6 %)
6. VCD and DVD (73,4 %)
7. Slide projection (60,2 %)
8. Overhead projection (69,3 %)

9. Computer (84,5 %)
10. Internet (85,4 %)
11. Television (91,2 %)

There were 6 items about students' responses that their information levels are no information and little information about classical educational technologies. At least 50 % no information or little information that:

1. Magnetic board (12,0 %)
2. Cloth board (45,0 %)
3. Flip charts (14,0 %)
4. Sand table (9,4 %)
5. Bulletin board (40,4 %)
6. Dioramas (34,2 %)

There were 8 items about students' responses that their information levels are no information and little information about modern educational technologies. At least 50 % no information or little information that:

1. Electronic board (10,8 %)
2. Lamination (12,6 %)
3. Pickup (31,1 %)
4. Elmo (5,0 %)
5. Opaque projection (15,2 %)
6. Data projector (35,1 %)
7. Film strips (18,7 %)
8. LCD panel (19,9 %)

According to the single item indicating overall post test for classical and modern educational technologies, it appears that the students of the faculty of Education were satisfied with classical educational technology after the course. However, all of the 16 specific items, more than 50 % of students indicated that they were satisfied. At least 50 % enough information or too much information that:

1. Blackboard (98,2 %)
2. Whiteboard (96,2 %)
3. Magnetic board (90,1 %)
4. Cloth board (94,7 %)
5. Flip charts (92,1 %)
6. Sand table (83,6 %)
7. Bulletin board (92,7 %)
8. Text books (95,0 %)
9. Graphics (94,7 %)
10. Model and reals (95,0 %)
11. Still pictures (95,0 %)
12. Posters (93,3 %)
13. Newspaper clippings (95,9 %)
14. Cartoons (94,7 %)
15. Dioramas (91,2 %)
16. Field trips (90,4 %)

According to the post test for modern educational technologies, students' all responses about the 19 specific items are at least 50 % enough information and too much information.

1. Electronic board (72,8 %)
2. Telephone (96,8 %)
3. Radio (96,8 %)
4. Cassette tape and CD (97,1 %)
5. Tape player (94,2 %)
6. Lamination (73,4 %)

7. Camera (94,7 %)
8. Pickup (71,1 %)
9. VCD and DVD (93,6 %)
10. Slide projection (93,0 %)
11. Overhead projection (92,4 %)
12. Elmo (53,2 %)
13. Opaque projection (65,2 %)
14. Data projector (82,5 %)
15. Film strips (83,9 %)
16. LCD panel (69,6 %)
17. Computer (96,2 %)
18. Internet (96,5 %)
19. Television (97,1 %)

Statistical Analysis

After the questionnaire was completed and percentages were taken, it was important to see if the results showed any significant variations due to the asked independent variables. Therefore, t-test and one-way ANOVA were applied to find the differences. While doing so, the value of alpha (p) was accepted if the finding value is lower than p: 0,05. All analysis was made according to this value.

Results of t-test analysis

This section presents the results of the statistical test of the two independent variables in the study. Research independent variables of the study were investigated by using t-test. The results of the quantitative data analysis show that there were some significant relationships between gender and education type.

The t-test revealed significant differences between student's genders on 11 of 16 pre classical educational technology survey. The t-test noted significant differences for the following variables:

- For "blackboard" p value is found 0,014. Before the course female students agreed that their information level about blackboard (X=3,397) is higher than male students (X=3,221).
- Before the course, there was a mean difference about white board between male and female students. P value was found 0,002. Female students agreed that their information level about whiteboard (X=3,167) was higher than male students (X=2,926) like blackboard.
- There was a mean difference about cloth board between female end male students. P value is 0,004 for cloth board. Female students mean point (2.524) was higher than male students (2.258).
- For text books, p value was found 0,000 between students gender. Female students' information levels (X= 2,956) were higher than male students (X= 2,613).
- P value was found 0,007 about graphics. There was a mean difference between female and male students. Before the course, female students' information levels for graphics (X= 2,944) were higher than male students' information levels (X= 2,698).
- For models and reals, p value was found 0,007. Before the course female students agreed that their information level for models and reals (x= 2,710) was higher than male student (X= 2,471).
- There was a mean difference for still pictures between female and male students (p= 0,003). Before the course, female students agreed that their information level for still pictures (X= 2,625) was higher than male students (X= 2,900).
- P value was found 0,010 for posters. There was a mean difference between students' gender. Before the course female students agreed that their information level for posters (X= 2,888) was higher than male students (X= 2,647).
- Before the course for newspaper clippings, there was a mean difference between female and male students. Male students information level (X= 2,801) was lower than female students (X= 3,030).

- P value was found 0,003 for cartoons. Before the course, female students' mean point was 2,714, male students' mean point was 2,425.
- For the last classical educational technology (field trips) p value was found 0,029. There was a mean difference between students' gender. Female information level (X= 3,092) was higher than male students' information level (X= 2,897).

The t-test revealed significant differences between student's genders on 14 of 16 post classical educational technology survey. After the course, the t-test noted significant differences for the following variables:

- For black board p value was found 0,001. There is a mean difference between female and female students after the course. Female students' mean point is 3,851, male students' mean point is 3,701.
- There was a mean different between female and male students for white board (p= 0,025). Female students agreed that their information level (X= 3,753) is higher than male students (X= 3,624).
- For magnetic board p value was found 0,000. There is a mean difference between students' gender. Female students' mean point is 3,524, male students' mean point is 3,272.
- After the course a mean difference was found between students' gender for cloth board. Male students' mean point for cloth board is 3,467 and female students' mean point is 3,654.
- P value was found 0,003 for flip charts. Male students' mean point for flip charts (X= 3,401) is lower than female students' (X= 3,617).
- There is a mean difference for bulletin board. P value was found 0,016. Male students information level (X=3,418) is lower than female students (X= 3,590).
- For text book p value was found 0,005. There is a mean difference for textbook between students' gender. Male students' mean point is 3,508 and female students' mean point is 3,691.
- After the course for graphic, there is a mean difference between female and male students (p= 0,004). Male students mean point is 3,497 and female students' mean point is 3,689.
- For model and reals p value was found 0,000. There is a man difference between students' gender. In other words male students' mean point for models and reals is (X=3,419) lower than female students' mean point (X=3,685).
- P value was found 0,018 for still pictures. Male students agreed that their information level is (X=3,497) lower than female (X=3,648)
- After the course for posters there is a mean difference (p=0,001). Female students' mean point is 3,670 and male students' mean point is 3,454.
- P value was found 0,021 for newspaper clippings. There is a mean difference between students' gender, after the course. While male students' mean point is3,574, female students' mean point for newspaper clipping is 3,716 .
- For cartoons, there is a mean difference between female and male students' mean points. Male students' mean point is 3,505and female students' mean point is 3,746.
- The last mean difference between students' gender is about dioramas. P value was found 0,001. While male students' mean point is 3,374, female students' mean point is 3,623.

The t-test revealed significant differences between student's education types on only 1 of 16 pre classical educational technology survey. The t-test noted significant differences for blackboard. P value was found 0,000.

Day time students agreed that their information level for black board (X= 3,417) was higher than night time students (X= 3, 137).

The t-test revealed significant differences between student's education type on 2 of 16 post classical educational technology survey. The t-test noted significant differences for magnetic board and sand table. P value was found 0,025 for magnetic board.

Day time students agreed that their information level for magnetic board (X= 3,331) was lower than night time students (X= 3,496). The other mean difference is for sand table (p= 0,027). While day time stuents' mean point is 3,182, day time students' mean point is 3,369.

Table 2: T-Test For Classical Educational Technologies.

Classical Educational Technology Survey items	**Pre Test**		**Post Test**	
	Value		**Value**	
	Gender	**Education type**	**Gender**	**Education type**
1. Blackboard	0,014*	0,000*	0,001*	0,339
2. Whiteboard	0,002*	0,129	0,025*	0,948
3. Magnetic board	0,268	0,479	0,000*	0,025*
4. Cloth board	0,004*	0,333	0,003*	0,686
5. Flip charts	0,706	0,149	0,003*	0,333
6. Sand table	0,548	0,218	0,064	0,027*
7. Bulletin board	0,322	0,173	0,016*	0,402
8. Text books	0,000*	0,251	0,005*	0,616
9. Graphics	0,006*	0,670	0,004*	0,762
10. Model and reals	0,007*	0,676	0,000*	0,216
11. Still pictures	0,003*	0,550	0,018*	0,521
12. Posters	0,010*	0,520	0,001*	0,851
13. Newspaper clippings	0,010*	0,398	0,021*	0,643
14. Cartoons	0,003*	0,374	0,000*	0,256
15. Cartoons	0,054	0,624	0,001*	0,486
16. Field trips	0,029*	0,873	0,062	0,120

*p<0, 05

For modern educational technology, the t-test revealed significant differences between students' gender on 2 of 19 pre modern educational technology survey. These mean differences are about overhead projection and television.

- Before the course, for overhead projection p value was found 0,033. Male students' mean point is 2,7529 and female students' mean point is 2,9565.

- On the other hand p value was found 0,010 for television. While male students' mean point is 3,4034, female students' point is 3,6025.

After the course post modern educational technology survey was used for the research. The t-test revealed significant differences between students' gender on 3 of 19 post modern educational technology survey. There are mean differences for radio, slide projection and film strips.

- After the course, p point was found 0,015 for radio. Male students' mean point is 3,616 and female students' mean point for radio is 3,746.

- For slide projection p value is 0,033. Male students agreed that their information level is (X=3,444) lower than female student' information level (X=3,615).

- The last mean difference is about film strips. P value was found 0,022 between female and male students' information levels for film strips. While male students' mean point is 3,115, female students' is 3,295.

For modern educational technology, the t-test revealed significant differences between students' educational type on only 1 of 19 pre modern educational technology survey. This mean difference is

about slide projection. P value was found 0,008. Day time students agreed that their information level about slide projection (X=2,801) is higher than night time students' (X= 2,582).

The t-test revealed significant differences between students' educational type on only 1 of 19 post modern educational technology survey. This mean difference is about LCD panel. P value was found 0,016. Day time students' mean point is 2,8325, night time students' mean point is 3,0719.

Table 3: T-Test For Modern Educational Technologies.

Modern Educational Technology Survey items		**Pre Test**		**Post Test**	
		Value		**Value**	
		Gender	**Education type**	**Gender**	**Education type**
1.	Electronic board	0,045*	0,260	0,761	0,147
2.	Telephone	0,397	0,949	0,213	0,466
3.	Radio	0,838	0,245	0,015*	0,990
4.	Cassette tape and CD	0,644	0,819	0,314	0,402
5.	Tape player	0,227	0,340	0,497	0,525
6.	Lamination	0,383	0,114	0,257	0,219
7.	Camera	0,065	0,792	0,420	0,103
8.	Pickup	0,997	0,958	0,364	0,209
9.	VCD and DVD	0,368	0,630	0,772	0,886
10.	Slide projection	0,093	0,033*	0,008*	0,249
11.	Overhead projection	0,023*	0,059	0,218	0,595
12.	Elmo	0,181	0,395	0,126	0,631
13.	Opaque projection	0,147	0,755	0,789	0,302
14.	Data projector	0,139	0,504	0,757	0,646
15.	Film strips	0,415	0,721	0,022*	0,658
16.	LCD panel	0,455	0,362	0,939	0,016*
17.	Computer	0,141	0,872	0,904	0,681
18.	Internet	0,296	0,820	0,136	0,273
19.	Television	0,010*	0,515	0,370	0,710

*p<0, 05

One Way ANOVA and Results

This section presents the results of the statistical test of independent variables in the study. The results of the ANOVA there were 3 mean differences between students' department before the course. These mean differences are about magnetic board, flip charts and textbooks.

- P value for magnetic board was found 0,017. There is a mean difference for magnetic board between students' department. According to Scheffe test this mean difference is between the department of Science Education and the department of Physical Education and Sports Education (p= 0,024).

- The other mean difference is about flip charts (p=0,003). According to Scheffe test, this means difference between three departments. These departments are the department of Computer and Instructional Technology, Primary Education and the department of Physical Education and Sports Education. P value between Primary Education and the department of Physical Education and Sports Education was found 0,014.

- For textbooks p value was found 0,005. There is a mean difference for textbooks between students' department. According to Scheffe test this mean difference is between the department of Science Education and the department of Physical Education and Sports Education (p= 0,008).

Table 4: ANOVA for Pre Classical Educational Technologies Survey.

Pre Classical Educational Technology Survey Items	One Way ANOVA					
		Sum of Squares	df	Mean Square	F	Sig.
1. Blackboard	Between Groups	3,102	3	1,034	2,395	,068
	Within Groups	144,603	335	,432		
	Total	147,705	338			
2. Whiteboard	Between Groups	1,217	3	,406	,808	,490
	Within Groups	168,204	335	,502		
	Total	169,422	338			
3. Magnetic board	Between Groups	5,728	3	1,909	3,424	,017*
	Within Groups	186,283	334	,558		
	Total	192,012	337			
4. Cloth board	Between Groups	,415	3	,138	,188	,905
	Within Groups	245,813	334	,736		
	Total	246,228	337			
5. Flip charts	Between Groups	8,582	3	2,861	4,819	,003*
	Within Groups	199,474	336	,594		
	Total	208,056	339			
6. Sand table	Between Groups	2,692	3	,897	1,834	,141
	Within Groups	163,951	335	,489		
	Total	166,643	338			
7. Bulletin board	Between Groups	5,207	3	1,736	2,290	,078
	Within Groups	253,092	334	,758		
	Total	258,299	337			
8. Text books	Between Groups	9,619	3	3,206	4,343	,005*
	Within Groups	247,342	335	,738		
	Total	256,962	338			
9. Graphics	Between Groups	5,129	3	1,710	2,578	,054
	Within Groups	222,163	335	,663		
	Total	227,292	338			
10. Model and reals	Between Groups	,929	3	,310	,462	,709
	Within Groups	222,911	333	,669		
	Total	223,840	336			
11. Still pictures	Between Groups	1,315	3	,438	,592	,621
	Within Groups	247,303	334	,740		
	Total	248,618	337			
12. Posters	Between Groups	1,960	3	,653	,877	,453
	Within Groups	249,686	335	,745		
	Total	251,646	338			
13. Newspaper clippings	Between Groups	,804	3	,268	,392	,759
	Within Groups	229,370	336	,683		
	Total	230,174	339			
14. Cartoons	Between Groups	2,941	3	,980	1,227	,300
	Within Groups	265,938	333	,799		
	Total	268,878	336			
15. Cartoons	Between Groups	3,025	3	1,008	1,141	,333
	Within Groups	296,125	335	,884		
	Total	299,150	338			
16. Field trips	Between Groups	,586	3	,195	,288	,834
	Within Groups	227,402	335	,679		
	Total	227,988	338			

*p<0, 05

The results of the ANOVA there were 3 mean differences between students' department after the course. These mean differences are about sand table, graphics and cartoons.

- For sand table, p value was found 0,001. According to Scheffe test, the significant differences for the following variables:
  - the department of Computer and Instructional Technology and the department of Physical Education And Sports Education (p=0,031).
  - Primary Education and the department of Physical Education And Sports Education (p=0,001).
- The department of Science Education and the department of Physical Education And Sports Education (p=0,027)
  - According to one way ANOVA p value for graphics was found 0,021. Sceffe test was used for this mean difference. According to results of Scheffe test between Primary Education and the department of Physical Education And Sports Education (p=0,043).
- After the course a mean difference was found for cartoons between students' departments (p= 0,024). According to Scheffe test between the department of Computer and Instructional Technology and Primary Education, p value was found 0,027.

Table 5: ANOVA For Post Classical Educational Technologies Survey.

Post Classical Educational Technology Survey Items		**One Way ANOVA**					
			Sum of Squares	df	Mean Square	F	Sig.
17.	Blackboard	Between Groups	,378	3	,126	,672	,569
		Within Groups	62,534	334	,187		
		Total	62,911	337			
18.	Whiteboard	Between Groups	1,914	3	,638	2,351	,072
		Within Groups	90,371	333	,271		
		Total	92,285	336			
19.	Magnetic board	Between Groups	3,123	3	1,041	2,399	,068
		Within Groups	142,757	329	,434		
		Total	145,880	332			
20.	Cloth board	Between Groups	,858	3	,286	,848	,469
		Within Groups	111,638	331	,337		
		Total	112,496	334			
21.	Flip charts	Between Groups	1,968	3	,656	1,512	,211
		Within Groups	144,006	332	,434		
		Total	145,973	335			
22.	Sand table	Between Groups	9,770	3	3,257	5,838	,001*
		Within Groups	184,636	331	,558		
		Total	194,406	334			
23.	Bulletin board	Between Groups	1,577	3	,526	1,260	,288
		Within Groups	138,166	331	,417		
		Total	139,743	334			
24.	Text books	Between Groups	1,791	3	,597	1,727	,161
		Within Groups	115,129	333	,346		
		Total	116,920	336			
25.	Graphics	Between Groups	3,613	3	1,204	3,291	,021*
		Within Groups	121,526	332	,366		
		Total	125,140	335			
26.	Model and reals	Between Groups	2,366	3	,789	2,367	,071
		Within Groups	111,279	334	,333		
		Total	113,645	337			
27.	Still pictures	Between Groups	,991	3	,330	,969	,407
		Within Groups	113,478	333	,341		
		Total	114,469	336			
28.	Posters	Between Groups	1,061	3	,354	,935	,424
		Within Groups	125,942	333	,378		
		Total	127,003	336			
29.	Newspaper	Between Groups	,174	3	,058	,184	,907

clippings	Within Groups	105,223	334	,315		
	Total	105,396	337			
30. Cartoons	Between Groups	3,436	3	1,145	3,192	,024*
	Within Groups	119,845	334	,359		
	Total	123,281	337			
31. Dioramas	Between Groups	1,617	3	,539	1,204	,308
	Within Groups	148,133	331	,448		
	Total	149,749	334			
32. Field trips	Between Groups	1,035	3	,345	,647	,585
	Within Groups	176,939	332	,533		
	Total	177,973	335			

*p<0, 05

One way ANOVA was used to investigate pre modern educational technology survey. The results of the ANOVA there were 3 mean differences between students' department before the course. These mean differences are about lamination, opaque projection and data projector.

- For lamination, p value was found 0,000. According to Scheffe test, the significant differences for the following variables:
  - the department of Computer and Instructional Technology and the department of Physical Education And Sports Education (p=0,015).
  - Primary Education and the department of Physical Education And Sports Education (p=0,000).
  - The department of Science Education and the department of Physical Education And Sports Education (p=0,016).
- According to one way ANOVA p value for opaque projection was found 0,026. Sceffe test was used for this mean difference. According to results of Scheffe test between Primary Education and the department of Physical Education and Sports Education (p=0,037).
- After the course a mean difference was found for data projector between students' departments (p= 0,034). According to Scheffe test there is no mean difference between students' departments.

Table 6: ANOVA For Pre Modern Educational Technologies Survey.

Pre Modern Educational Technology Survey Items	One Way ANOVA					
		Sum of Squares	df	Mean Square	F	Sig.
1. Electronic board	Between Groups	1,710	3	,570	1,054	,369
	Within Groups	180,683	334	,541		
	Total	182,393	337			
2. Telephone	Between Groups	1,555	3	,518	,621	,602
	Within Groups	281,114	337	,834		
	Total	282,669	340			
3. Radio	Between Groups	4,125	3	1,375	1,630	,182
	Within Groups	282,636	335	,844		
	Total	286,761	338			
4. Cassette tape and CD	Between Groups	2,637	3	,879	1,363	,254
	Within Groups	217,381	337	,645		
	Total	220,018	340			

5. Tape player	Between Groups	2,149	3	,716	,883	,450
	Within Groups	271,786	335	,811		
	Total	273,935	338			
6. Lamination	Between Groups	11,321	3	3,774	6,116	,000*
	Within Groups	207,323	336	,617		
	Total	218,644	339			
7. Camera	Between Groups	1,229	3	,410	,569	,636
	Within Groups	240,345	334	,720		
	Total	241,574	337			
8. Pickup	Between Groups	5,804	3	1,935	2,348	,072
	Within Groups	277,644	337	,824		
	Total	283,449	340			
9. VCD and DVD	Between Groups	3,498	3	1,166	1,876	,133
	Within Groups	207,543	334	,621		
	Total	211,041	337			
10. Slide projection	Between Groups	1,070	3	,357	,416	,742
	Within Groups	283,843	331	,858		
	Total	284,913	334			
11. Overhead projection	Between Groups	3,328	3	1,109	1,644	,179
	Within Groups	225,999	335	,675		
	Total	229,327	338			
12. Elmo	Between Groups	1,942	3	,647	2,009	,113
	Within Groups	108,305	336	,322		
	Total	110,247	339			
13. Opaque projection	Between Groups	5,805	3	1,935	3,112	,026*
	Within Groups	207,665	334	,622		
	Total	213,470	337			
14. Data projector	Between Groups	8,108	3	2,703	2,921	,034*
	Within Groups	309,075	334	,925		
	Total	317,183	337			
15. Film strips	Between Groups	2,670	3	,890	1,348	,259
	Within Groups	221,833	336	,660		
	Total	224,503	339			
16. LCD panel	Between Groups	3,751	3	1,250	1,531	,206
	Within Groups	272,784	334	,817		
	Total	276,536	337			
17. Computer	Between Groups	,375	3	,125	,237	,870
	Within Groups	176,952	336	,527		
	Total	177,326	339			
18. Internet	Between Groups	,978	3	,326	,600	,616
	Within Groups	182,584	336	,543		
	Total	183,562	339			
19. Television	Between Groups	,766	3	,255	,505	,679
	Within Groups	170,484	337	,506		
	Total	171,249	340			

*p<0, 05

One way ANOVA was used to investigate post modern educational technology survey. The results of the ANOVA there were 2 mean differences between students' department after the course. These mean differences are about Elmo and computer.

- For Elmo, p value was found 0,016. According to Scheffe test, the significant difference between the department of Computer and Instructional Technology and the department of Physical Education And Sports Education (p=0,020).

- According to one way ANOVA the other mean difference is about computer. p value for computer was found 0,015. Sceffe test was used for this mean difference. According to results of Scheffe test between the department of Computer and Instructional Technology and the department of Physical Education And Sports Education (p=0,03).

Table 7: ANOVA For Post Modern Educational Technologies Survey.

Post Modern Educational Technology Survey Items	**One Way ANOVA**					
		Sum of Squares	df	Mean Square	F	Sig.
1. Electronic board	Between Groups	1,471	3	,490	,689	,559
	Within Groups	234,664	330	,711		
	Total	236,135	333			
2. Telephone	Between Groups	,230	3	,077	,314	,815
	Within Groups	81,029	332	,244		
	Total	81,259	335			
3. Radio	Between Groups	,449	3	,150	,628	,597
	Within Groups	78,629	330	,238		
	Total	79,078	333			
4. Cassette tape and CD	Between Groups	,450	3	,150	,614	,606
	Within Groups	80,881	331	,244		
	Total	81,331	334			
5. Tape player	Between Groups	,674	3	,225	,648	,585
	Within Groups	114,896	331	,347		
	Total	115,570	334			
6. Lamination	Between Groups	4,447	3	1,482	1,896	,130
	Within Groups	257,252	329	,782		
	Total	261,700	332			
7. Camera	Between Groups	,988	3	,329	,985	,400
	Within Groups	110,666	331	,334		
	Total	111,654	334			
8. Pickup	Between Groups	5,664	3	1,888	2,473	,062
	Within Groups	251,905	330	,763		
	Total	257,569	333			
9. VCD and DVD	Between Groups	,740	3	,247	,718	,542
	Within Groups	113,439	330	,344		
	Total	114,180	333			
10. Slide projection	Between Groups	,897	3	,299	,877	,453
	Within Groups	111,580	327	,341		
	Total	112,477	330			
11. Overhead projection	Between Groups	1,647	3	,549	1,435	,232
	Within Groups	124,305	325	,382		
	Total	125,951	328			
12. Elmo	Between Groups	9,920	3	3,307	3,499	,016*
	Within Groups	312,809	331	,945		
	Total	322,728	334			
13. Opaque projection	Between Groups	4,046	3	1,349	1,708	,165
	Within Groups	260,564	330	,790		
	Total	264,611	333			
14. Data projector	Between Groups	1,180	3	,393	,690	,558
	Within Groups	189,059	332	,569		
	Total	190,238	335			
15. Film strips	Between Groups	1,265	3	,422	,819	,484
	Within Groups	170,973	332	,515		
	Total	172,238	335			

16.	LCD panel	Between Groups	1,335	3	,445	,547	,650
		Within Groups	270,091	332	,814		
		Total	271,426	335			
17.	Computer	Between Groups	3,232	3	1,077	3,528	,015*
		Within Groups	101,688	333	,305		
		Total	104,920	336			
18.	Internet	Between Groups	1,443	3	,481	1,725	,162
		Within Groups	92,531	332	,279		
		Total	93,973	335			
19.	Television	Between Groups	,910	3	,303	1,552	,201
		Within Groups	65,131	333	,196		
		Total	66,042	336			

*p<0, 05

Conclusions

Before and after the course, several mean differences observed for classical educational technologies between students' gender. Between students' educational type, before the course there was only there was only a mean difference for blackboard, after the course there were 2 mean differences. They are about magnetic board and bulletin board.

Between students' gender for modern educational technologies, before the course there were 2 mean differences about overhead projection and television. On the other hand, after the course there were 3 mean differences between students' gender. They are about radio, slide projection and film strips.

The results of ANOVA demonstrate that there are some mean differences classical and modern educational technologies between departments of the students. These mean differences are particularly about the department of Physical Education and Sports Education.

References

Heinich, R.; Molenda, M.; Russell, J.D. (2005). Instructional Media. Macmillan Publishing Company, New York, USA.

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(D.6)

Sandra Linke, Gifted Education in Germany: How do we reach reluctant students, how do we open minds and engage those who feel disconnected from learning? How do we tap into the innate human need to learn and discover that is present in every student? How do we level the playing field by providing essential productive thinking skills which are not dependent on school funding, leadership or socioeconomic level? How can we give students voice? This paper will shed some light on the current practices and future trends of gifted education in Germany. In addition, this paper will discuss issues of motivation, making curriculum engaging and relevant, creating strong trusting relationships with students, building thinking skills and creating a space of intellectual freedom, taking into account that: if students are given voice, taught to question, and shown how to look at the world through a critical lens, then we have succeeded by providing essential tools and opening minds to learning and reflection.

About the Author

Sandra Linke is a specialist in gifted education. She has a B.A. and M.A. in Gifted Education, and a Ph.D. in Creativity. She has developed a dynamic model to represent the conception of creativity. She has published a book and a number of articles. She has conducted a number of workshops in different countries, including: Germany, France, Austria, Kuwait, United Arab Emirates, Turkey, and Jordan. She is an active member of an impressive list of academic institutions including: the British Educational Research Association (BERA), the European Council for High Ability (ECHA), and the World Council for Gifted and Talented Children (WCGTC). In 2006 she was elected as a member of the editorial board of the Gifted and Talented International. In addition, she has established, in cooperation with Taisir Yamin and Todd Lubart, the International Centre for Innovation in Education (ICIE).

(D.7)

Around the World with 360 Degree Panoramic Images

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Abstract

This interactive session integrates innovative technology with real world experiences to enrich gifted students' learning environment through 360-degree virtual reality panoramic images. Applications for gifted students include showcasing independent study presentations, art portfolios, science projects and social studies models in a rotating 3-D format with web applications accessible by anyone around the world! When students place virtual reality projects on the web, they gain rich authentic problem-based learning experiences. Students may receive feedback and support from peers, friends and family members. This interactive session provides background content, explains digital imaging techniques, suggests software applications and demonstrates placement of interactive material into e-Learning environments. Despite tight budgets, educators can produce quality images with equipment already available or purchased at a reasonable price when they create panoramic turntable objects. Benefits from the session will assist educators as they facilitate and advance gifted students' collaborative research, creative problem solving and digital presentation skills.

Gifted Students Project Content Goals

As John Dewey noted, W*ithout some goals and some efforts to reach it, no man can live.* Content goals for gifted students can easily integrate research and the use of technology by generating quality digital presentations which students then share in the online environment. Combining student-selected content goals with cutting edge technologies can result in an enriched approach towards teaching students to generate questions, conduct in-depth research using a wide variety of resources, solve authentic problems and formulate effective action plans.

If the content goals are well-suited to gifted students, they can serve as a catalyst to inspire creative problem-solving and higher-level thinking skills. Students can then transform complex theories to real world applications that stimulate their interests and motivation level. The active real world interdisciplinary collaborative approach is an effective way to meet gifted students' curricular needs in "cognitive, affective, social, and aesthetic areas" (Davis, 2006, p. 207).

Project Standards

Student research can easily encompass any content area desired and align to meet international, national, state, regional or district standards. Often a combination of standards may include specific content areas of interest, reading research materials, writing about the study findings and using high-level technology for advanced graphical presentations.

Technology and Content Alignment

It is important to align the type of technology used with the content information knowledge goals. When selecting 360-degree panoramic images to present student research, it helps to keep topics in mind that align well with the demonstration of concrete objects or environments. Students need three-dimensional objects readily available or they must have the capacity to take field trips to on-site locations for the all-important image captures. Below is a list of possible topics to help students in the initial brainstorming process:

- Math – engineering constructions, architecture, bridges, machines.
- Science – aeronautics, rockets, airplanes, robotics, anatomy, fossils.
- Geology – security, pollution, environment, inventions, prototype, redesign.
- Technology – build a computer.
- Social Science – history, cultures, current events, careers, social problems.
- Community Service Learning – solve community problems.

Panoramas for Learning

"VR has great potential for educational use" (Xiao, 2000, p. 183-184). Learning opportunities using rotational turntable objects can include any type of content specific equipment needed to teach. The real benefit and strength lies in the ability to view concrete object examples in a three-dimensional environment where the object can be rotated and viewed from any angle. The teaching and learning is not restricted to flat two-dimensional front views or a series of flat views from the front, side and back that take up more instructional space to present.

Learners enjoy the ability to move and interact with the object by controlling the movement of the object to be viewed at their own comfortable pace. What a great way to expand teaching opportunities in any content area and add interest to presentations! In addition to content specific equipment, any integrated topic-related object may increase learners' sensory experiences. Some examples might include showcasing art, projects, portfolios, medical models, constructions and more. Students may add audio, hot spot links to websites or web pages that provide additional resources or even link to another panorama to take an expanded virtual reality tour.

Collaboration

Gifted students can thrive on the social benefits of collaboration while working toward mutually shared goals. They have a chance to interact on an equal level with talented peers to learn from each other and pool their collective knowledge to the benefit of the group. Additionally, gifted students benefit from social interactions that help them build friendships as they support and share in each others' similar interests.

Gifted students working together who pool their talents can move quickly through topic or project research at an advanced level. When students add high-level interactive technology such as panoramic images to enhance the subject matter, their curiosity increases which may then challenge them to excel in the overall project learning goals.

Higher Level Thinking Skills

Using new media such as panoramic images allows students to more fully engage in the technical process and presentation outcomes. Panoramic images are a great way for gifted students to showcase concrete learning objects in an interactive manner. A high-level research foundation can then be used in the final presentation to make sure it includes content analysis, comparisons, generalizations, discriminations, hypothesis, synthesis, inferences, plans, predicts, relations and evaluation. The visual presentation itself can also stimulate critical thinking skills as students demonstrate how best to present the study findings while stating their case. When the visual presentation is highly effective, it gains the potential to effect meaningful change in its viewers.

Placing the project content online then provides an additional benefit of making it easy to share creative efforts with instructors, peers, family, and friends to increase the amount of feedback students may receive, with an eye towards future improvements.

Creative Problem Solving

The creative problem solving process includes having students research the topic, discuss potential problems, brainstorm solutions, select one or more issues to address, determine a logical sequence for problem resolution, form a scope of coverage, research and analyze the best approach, report the findings while presenting the results in an interesting and informative way. The processes of thinking, reflecting, and reasoning assist students in moving concepts from theory to practical application. When the problems are real world issues, students have the opportunity to learn what it takes to become a part of the solution while developing their social consciousness in the process. In turn, gifted students become more effective role models to others. To include panoramic photography your online lesson plans or in student-based projects, here are short how to instructions.

Panoramic Photography Presentation

As a result of teaching pre-service and graduate level students, the increasing use of multimedia reaches a wider range of learning styles and preferences. Instructors are moving towards the integration of more authentic, immersive media to inspire and motivate deeper learning of the content presented. After observing instructors in the field using two-dimensional handouts with learning objects, it is easy to see how a three-dimensional format dramatically increases the effectiveness of a presentation.

Other benefits of panoramic photography save instructors valuable time. By placing the content online, absent students can have access to missed information without requiring the instructor to spend additional class time repeating course content. Placing learning objects in the online environment also allows students to be able to study and review at their own pace to gain full comprehension. Integrating 360-degree panoramic images allows students to view objects in a three-dimensional environment. Students have the ability to zoom in or out and even rotate the object to view from any angle. Specific parts of the object can have hot spots or active areas that provide additional information when selected. The additional content can then link to web resources, text, images, movies or additional panoramas to teach relevant concepts. Virtual reality panoramic simulations may also allow learners to more fully interact without the risk involved in manipulating expensive or dangerous equipment.

Most people tend to think of virtual home tours when they think of 360-degree panorama images on the web. This application expands to include products, museum tours, medical, education and more. Due to recent events, homeland security accounts for a large market share in the virtual reality panoramic market (Fritz, 2004). Rocker David Bowie led the way using panoramic video followed by the Rolling Stones, U2, Britney Spears and even fictional Harry Potter (Fritz, 2004).

Panorama History

Robert Barker received a patent on June 17, 1767, conceptualizing the panoramic as an artistic form of painting. During the 1800s, the Europeans adopted the term *panorama*; by the 1830s, panoramic art was the rage in Paris (Benosman & Kang, 2001). Panoramas have subsequently progressed from paintings, to early photography and to the use of modern digital equipment. To learn more about the history of panoramas, a good resource book is *Panoramic Vision: Sensors, Theory, and Applications,* especially chapter two, "A Brief Historical Perspective on Panorama" (Benosman & Kang, 2001). Popular panoramic topic areas in the past included capturing historical events, landscapes, architecture, cities, towns, villages, biology, nature, wildlife, weather, seasons, portraits, industry and more. The topic areas possible today are only limited by the technology selected and a creative imagination.

Panorama Equipment Options

Modern photographic equipment options include simple and relatively inexpensive compact digital cameras such as a single lens reflex (SLR) with the ability to change the lens and video cameras with potential problems with streaks. The price tag can easily range from $50.00 to $20,000 or more for the camera set up alone. High dollar equipment includes rotating cameras, rotating tripod motors, digital scanning, one shot one stitch and one shot no stitching parabolic mirrors which requires no tripod when it captures movement.

Panorama Photography Considerations

Some photography tips for improving the quality of the images before editing include paying close attention to lighting conditions. Use overcast or diffused lighting to soften any harsh shadows. Depending on the equipment, capturing images outdoors requires one to take into account wind that may cause trees and other objects to move which increases the potential for blurring or ghosting. Photographers normally capture panoramic images in a clockwise manner. Some lenses may cause distortions, blurs, and color fringe. Distortion examples include pincushion effects for a wide-angle lens, barrel effects for wide-angle fisheye lens, and perspective problems when capturing photographs

while aiming the camera at an incline towards buildings when the architecture lines can be out of alignment. When distortions occur, an image-editing program can make the needed corrections. Depending on the camera, lens, and software selected to create the panoramas; the image composition could be cylindrical, spherical, or cubic in format each with their own unique distortion issues to overcome.

Interactive Panorama Options

There are many different types of panoramas which may accomplish a variety of learning goals; depending on the identified need, different hardware and software setups accomplish learning goals. A list of several available options includes:

- Object Movies - object rotated on a turntable;
- Stereo - 2 cameras width of eyes;
- Macro - metal ball in the center for a reflective photo;
- Sound - specific areas;
- Video – integrated; and
- Virtual Reality Tours - hot spots.

A technical sequence to create panoramic turntable objects or room views follows this order:

1. Photographing images;
2. Digitizing images;
3. Stitching images into a panorama;
4. Creating hot spots on panoramas; and
5. Publishing the virtual tour on the web (Xiao, 2000, p. 180).

Creating Panoramic Rotational Turntable Objects

Educators are often on pretty tight budgets, so a primary consideration is to produce quality images with equipment already available or purchased at a reasonable price. To begin, select a small digital camera with the lens tripod mount on the bottom of the camera aligned to the center of the lens. A tripod will secure the camera in the desired location. If the ground is uneven, a leveler will help set up a steady tripod. Lay one white poster board horizontally for the ground surface and place another one vertically behind the object to remove clutter and help reflect the light onto the object. Next, set the panoramic turntable on top of the white poster board ground surface, then place the learning object on the turntable. The turntable should have the ability to rotate the object every ten degrees in order to take a photo at each interval. When moving clockwise, a panoramic image has 36 photos when complete.

To digitalize images, connect the camera to the computer and download the images to the folder created for this purpose. Open all 36 images in an image-editing program to rotate the image, if needed, and change the image size and resolution depending on the desired effect. For example, if the image has a document width of 9.6” and height of 17.067” at 180 pixels per inch, it will be too large to place on the website. To be website ready, change the image size to a 5” height at 72 pixels per inch and save it in a .jpg file format. Once the images are ready, launch the VR Worx 2.6 software from VR Toolbox, select Object, and OK. Along the top there are six buttons for setting up the desired parameters: setup, acquire, hot spots, effect, compose, and preview. In the last preview window, select the export button on the left to render and compress it into a QuickTime movie.

To view, install a QuickTime player on your computer. Check your browser preferences to enable Java. The exported panoramic movie controls are located along the bottom of the movie to activate the play, stop, zoom, and adjust the audio level if added. You can also move and view the scene using key commands if desired.

Creating Panoramic Rotational Room Views

A more sophisticated, higher end approach to creating panoramic room views uses the PC platform with a budget of slightly over $3,000.00. The camera included a package deal from 360 Degree Voyager using a Nikon P5100, Nikon FC-E8 185 degree fisheye lens, tripod and leveler by Manfrotto, and Stitcher Unlimited software.

Set up the tripod leveled with the camera and fisheye lens attached. Next, take four photos of the selected room. Then, transfer the photos from the camera to the computer and placed them in a folder setup on the computer desktop. Launch the Stitcher Unlimited Software; from the top menu, select File>Load Images or use the images icon. Shift click on the first and last file to select all to upload. When uploaded, the images will appear along the bottom of the stitcher screen. When the first stitcher unlimited setting window appears, it will say, "Lens Parameters could not be deduced from EXIF header. Default lens type is set to Rectilinear. Do you want to keep these settings?" Select "No." For the second properties window, select Fisheye Circular from the drop down box and close the properties window. Select "stitch" from the top menu of the Stitcher Unlimited Program or select the stitch icon. This process may take up to five minutes. When complete, you will see an enlarged room view with the four small images along the bottom. Next, select Tools>Auto-Align Panorama from the top drop-down menu or select the Auto-Align icon. Then, select Render>Render from the drop down menu or the render panorama icon. With the render parameters window now open, change the Type drop down box to Cubic QTVR. In the same window, next to the Filename you will see a dropdown box on the right side with several … appears which allows change to file name, as desired. The next step is the location of the saved file from Stitcher Unlimited 5.6 to Room Tours file on the Desktop. With the same render parameters window open, select the lower left render button. This process may take up to ten minutes to complete. Once the files have finished rendering, minimize the Stitcher.

Next, open the Room Photos file and tour.mov QuickTime movie file. To view, install QuickTime on your computer. Be sure to check browser preferences to enable Java. The exported panoramic movie controls located along the bottom of the movie activate the play, stop, zoom; if installed, they also adjust the audio level.

Showcasing Panoramas on the Web

Begin by setting up a folder to hold website pages and the panoramic movie created. Using the Adobe Dreamweaver software for the web authoring program, it is a good idea to define the site by going to Site>New Site or Site>Define Site so the files will go to the desired location. To begin, add a table to the page to hold the contents placed into the desired locations such as the logo, title, navigation buttons, body text and image area. Place the cursor is placed in the desired table cell to hold the panorama movie and mouse click to select the table cell. Next, from the top drop down menu, Window>Properties will appear set to align to the top of the table cell. From the top drop down menu, select Insert>Media>PlugIn. The plug-in is very small in size and needs to be resized to match the size of the panoramic movie created. Check the point width and height for the QuickTime movie in order to size the plug-in correctly. Then, go to File>Save As to save the webpage to the created website folder. Next, go to the top drop down menu and select File>Preview in Browser. Select the desired browser to be ensure the entire movie and controls appear as desired. When completed, you may upload the website to your server space and test the images in a new browser window. Once happy with the results, you may share the website Uniform Resource Locator (URL) address with your learners! Students who place panoramic images on the Web, gain additional feedback and support form peers, family and friends.

Learning opportunities using 360-degree views can include studying geography, archaeology, history, architecture, biology, nature, weather, seasons, events, sports, medicine, cultures, and industry to name just a few. Students can supplement learning opportunities with research, writing, and even add audio for media rich authentic problem-based learning on almost any topic area.

State, federal, and international technology standards recognize the importance technology and multimedia plays in our society today. Multi-sensory media helps us communicate effectively with all types of learner preferences and styles and serves to motivate learning. Allowing gifted learners to work with this media provides them with concrete examples of immersive media supporting standards-based learning" (VR Toolbox, 2003, p. 4). Instructors often look for good books to further their knowledge of new technology they plan to adopt or resources to support student learning. The following list recommends books to further panoramic imaging skills and knowledge:

- *Assembling Panoramic Photos: A Designer's Notebook* (Preparing images).

- *360-Degree Imaging: The Photographer's Panoramic Virtual Reality Manual* (VR Tools).
- *Interactive Panoramas: Techniques for Digital Panoramic Photography* (Comprehensive)
- *Stretch: The World of Panoramic Photography* (Visual Examples).
- *Panoramic Photography: From Composition and Exposure to Final Exhibition* (Visual Examples).

Instructors as Panoramic Facilitators

Instructors can serve as facilitators to assist gifted learners as they create their own immersive project-based virtual reality panoramas. Instructors can support and coach students "in their various roles" (VR Toolbox, 2003, p. 4). Designing learning opportunities so students can communicate and share common learning goals is conducive to building social networks. "When these features are present in social networks, they are likely to have a high capacity for cooperative problem solving" (Root & Schmidt, 2008, p. 125). As educators we want gifted learners to be able to work together cooperatively towards common goals and objectives.

Placing Panoramas on the Web

If your budget or time does not allow for the creation of your own panorama, you can find a wide range of ones already posted to the Web. "Today, immersive panoramic still images (all the way up to full 360-degree spherical ones) are common on the Web, where you can take a virtual tour of the Tower of London, the Great Well of China, Glacier National Park, the Mount St. Helens volcano, Durham Cathedral, the Dolphin Institute, or the Andy Warhol Museum. You can even tour the surface of Mars" (Fritz, 2004, p. 13). Looking towards the future it is anticipated "digital video will soon supersede still images as the next medium of choice for creating immersive VR-style experiences" (Fritz, 2004, p. 19).

In the digital age, panoramas are easily created using "high-resolution digital cameras, specialized wide-angle imaging devices, and sophisticated stitching software to help us" (Benosman & Kang, 2001, p. 18). This trend results in the technology that becomes more widespread, available and affordable for anyone to use and provides an appropriate milieu for the rapidly changing technological needs and interests of gifted learners.

Online Resources

- Turntable $29.95 http://www.anything3d.com
- VR Worx from VR Toolbox http://www.vrtoolbox.com/vrthome.html
- Adobe Dreamweaver http://www.adobe.com/
- Apple QuickTime Player http://www.apple.com/quicktime/download/
- Digital Cameras and Tripods http://www.bestbuy.com/
- 360 Degree Voyager http://www.kayyah.com/store.php
- Stitcher Unlimited from Realviz http://stitcher.realviz.com/

References

Benosman R., & Kang S.B. (2001). A brief historical perspective on panorama. In Benosman R., & Kang, S.B., *Panoramic Vision: Sensors, theory, and applications* (pp. 1-20). New York, NY: Springer.

Davis, G. (2006). *Gifted children gifted education: A handbook for teachers and parents*. Scottsdale, AZ: Great Potential Press, Inc.

Fritz M. (2004). Will the circle be unbroken? *Emedia Magazine*, *17*(8), 12-19.

Root A.C., & Schmidt D.E. (2008). Collaborative community management through social networking. *National Social Science Journal*, *31*(1), 125-136.

VR Toolbox, Inc. (2003). VR Worx 2.6, [Computer Software and Manual]. The QTVR Workbook: Building better learning with immersive media.

Xiao D.Y. (2000). Experiencing the library in a panorama virtual reality environment, *Library Hi Tech, 18*(2), 177-184.

About the Author

Janet Holland completed a Ph.D. in Teaching and Leadership, Instructional Design and Technology, with a minor in Communications from the University of Kansas. Dr. Holland currently serves as an Assistant Professor at Emporia State University teaching pre-service teachers and master degree students in Instructional Design and Technology.

(D.8)

Elnour Hamad, Synergizing Selected Visions in Education, Theology and Spirituality for Lessening Skepticism toward the Arts among Muslims: This paper focuses on discussing the attitude of religious Muslims towards the arts and shows how submission to Muslim clerics' rigid religious interpretations has sustained a chronic state of stagnation in Muslim intellectual life and how that had cast shadows on every walk of life. The paper investigates the possibility of synergizing Islamic reformist visions, postmodern educational visions, and spirituals visions to formulate a multi-modal theoretical framework for educational reform that can help achieving modernization and global competency without meticulously mimicking the western model, or scarifying the Arab/Muslim identity. Elliot Eisner's work entitled *Two Visions of Education* combined with Howard Gardner's *Multiple Intelligence Theory,* Ken Wilber's spirituality, in addition to progressive and moderate views in contemporary and past Muslim thought will be synthesized in an attempt to formulate a workable theoretical framework for educational reforms in Muslim Arab States, namely in the field of the arts.

(D.9)

Nguyen Viet Anh; Dam Ho Si, Rules for Adaptive Learning Activities in Web-based Training Course: For recently years the concept of adaptation of computer education has been an important topic. Although Adaptive Educational Hypermedia Systems (AEHS) are different disciplines with IMS Learning Design (IMS LD), they have the same goal is to create the best possible environment for a learner to perform his/her learning activities in. How IMS LD addresses many requirements for computer based adaptation and personalized e-Learning is one of the main concerns for researcher in this field. In this paper, we represent an approach to learning design for adaptive learning system for adaptation of learning activities. Constructing set of rules for learning activities adaptation represented in first order logic, and mapping them into IMS LD specification. In addition, we design an adaptive course of computer science domain in online context using IMS LD design.

(D.10)

Ling-Yu Melody Wen; Jun-Yen Wu, The Importance of Technological Creativity as Perceived by Enterprises and Technical Teachers in Taiwan, R. O. C.: The main purposes of the study were to (1) explore the content of technological creativity, (2) gain the perceptions of both enterprises and schools, and (3) compare the perceptions of both groups. The information could establish a mutual platform for people to communicate with each other. Also, it should help technical college teachers well prepare students for the workplace and thus close the gap between classroom and the workplace. In order to accomplish the purposes, in-depth interview was adapted to gather information from experts of enterprises and government. Data for the study were collected by a survey questionnaire including four factor domains: personality traits, learning environment, workplace experience and social environment. The questionnaire subjects selected by the expedient random sampling method included 800 from enterprises and 150 from academia with 88.3% (706) and 49.3% (74) valid return rate. The data was submitted to descriptive statistics, t-test, ANOVA, Kruskal-Wallis test. The result of study indicated that most the experts thought the technological creativity was an advance concept. It was a critical factor for increasing competitive advantages of enterprises; thus the government should build a mutual platform to let schools and enterprises communicate each other. The perceptions of both schools and enterprises believed that the "workplace experience" was the most important factor domain. Enterprises perceived all of four domains had significant differences. Technical college teachers perceived that the gap existed in "learning environment" and "social environment" domains. Finally, recommendations based on conclusions were made for schools, enterprises, government and further study.

About the Author

Ling-Yu Melody Wen is a professor at the Department of Business Administration at Yuanpei University, Hsin-Chu, Taiwan. She was pointed the Dean of the College of Business and Management since August 2007 transferred from National Changhu University of Education. She earned her Ph.D. from the Dept. of Business Education at University of Missouri, USA in 1994. From 1994 to 1999, she was an associate professor at the NCUE and was awarded a professorship in 1999. From Feb. 2006 to July, 2007, she was the Chair and Professor in the Dept. of Business Education, the Director of Graduate Institute of e-Learning at NCUE. Her specialization and main research experience included human resource management, training and development, business communication, knowledge management and business education. She conducts research many programs by the support from National Science Council yearly from 1997. Dr. Wen has received the best teacher award (2006) for her extinguished teaching performance at NCUE. She is also the consultant of Bureau of Employment and Vocational Training since 1998.

(D.11)

Christer Johannesson, Saturday Courses for Children in order increases their interest for Science and Technology: There are rather many children who would like to perform experiments, build interesting equipment and watch demonstrations in Science and Technology. Ordinary schools can normally not deliver that to their pupils. The Saturday courses we deliver at KTH (The Royal Institute of Technology, Stockholm, Sweden) have all these parts and the activities are done in small groups of children or young women and university students work as assistants and supervisors. Each student has a group of four children and for older children, those above 12 years old, the groups comprises of up to 8 young men and women. In the Summer Schools the groups are larger. The small groups bind the student and the children close together as a working team. In this atmosphere science and technology is very efficiently passed to the youths. The key words are fun, interesting and meaningful. The transfer of knowledge and experience from the students to the children/young women is most efficiently transferred under these circumstances. This introduction to science and technology has in many cases been the start for a career in SET (Science, Engineering and Technology). The Summer Schools for young women funded by the Swedish National Agency for Education and the weekend course children are paid by KTH and parents. The goal for the Summer Schools is to convince young women to make a career in SET. 48% of the young women who have attended our Summer School for Young Women have chosen to study science at secondary school level. I have never claim this is the way to deliver interesting and creative courses for children and youths. However, this kind of courses have been delivered for more than 10 years some up to 20 years with several thousands of children joining our activities and the courses have so far been a total success. The main part of the talk will be about the experiments and demonstrations. A budget for a course will be mentioned.

About the Author

Eric Christer Johannesson has got his Ph.D. in Physics in 1984. He is a Senior Lecturer and the Director of Basic Science Education at the Department of Physics, Royal Institute of Technology, since 2002. In his different activities, there have been more than 20 000 participating young people during the last 30 years. More than 100 schools have been visiting his laboratories, most of them several times. Other activities have been directed to children, girls, young women and young women. He has been granted more than €2.5 million to cover the expenses of his scientific initiatives.

e-Learning Pilot Programme in Singapore

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Abstract

Raffles Junior College (RJC) is an internationally renowned co-educational independent school in Singapore offering a two-year pre-university course.

RJC had commenced its E-Learning Pilot Programme in Jan 2007. eLearning is positioned to be as a tool to enhance and supplement the face-to-face classroom teaching and learning environment. With this in mind, RJC needs to move forward with a flexible online environment that is conducive for both teachers and students' GCE "A-Level" and Raffles Diploma certification.

This paper discusses the triumphs and difficulties through the adoption of E-Learning and the following areas are discussed:

- **Blended learning/teaching – classroom vs technology based applications;**
- **Digital rights management for protection of RJC intellectual property rights;**
- **Should teachers be media producers?**
- **Learning modes vs assessment modes;**
- **Holistic teaching/learning strategies with technologies;**
- **Benefits of using dual operating systems for content production (MAC OSX, Windows); and**
- **Interactive content development through partnerships.**

Keywords: e-Learning, learning management system, digital rights management, blended learning, Raffles Junior College.

Introduction

Raffles Junior College (RJC) commenced its e-Learning Pilot Programme in January, 2007. Prior to this initiative, basic IT tools were used for teaching and learning. While other schools were more advanced in using technology and supported systems, RJC's fundamentals of outstanding teaching complement its body of exceptional gifted students. RJC has consistently produced top students in both Singapore and around the region to be placed in top universities in the world.

The e-Learning pilot programme had specific deliverables, which cascaded into 3 main areas:

1. Infrastructural setup & support.
2. e-Courseware development.
3. Student development.

The school was undergoing a transitional phase in curriculum rollout after its declaration of independence from Ministry of Education. Although the Ministry of Education determines the 'A-Level' guideline, RJC has the independence to develop content and steer teaching strategies for students to prepare for this exam. During this transitional phase, it was both an opportunity and a struggle to launch the pilot programme. It was clearly communicated to all internal stakeholders that:

> Management, teachers and students must keep an open-mind and trust that using technology is not everything, however with the right blend RJC can develop a better learning environment for the digital natives

The following is the mission statement of Education Technology Unit in Raffles Junior:

> Education technology is to provide a digital platform to enhance and supplement the face-to-face teaching & learning environment. The goal is to strike a balanced approach, wherever

possible to meet the learning outcomes of each subject with effective pedagogical design strategies.

In order for E-Learning pilot to have stability, sustainability and progression, the following conducive environmental characteristics are essential:

1. Allows for flexible and blended learning.
2. Supports the role of the teacher.
3. Supports a facilitated team process.
4. Supports learning teams.
5. Supports networks and communities.
6. Accesses reliable and ubiquitous technology.

Background

Singapore-Cambridge GCE A-Level Examination

To better understand what students and teachers face at a Junior College level in Singapore, please refer to:

http://library.thinkquest.org/05aug/01348/alevels.html
http://www.moe.gov.sg/media/press/2002/pr24092002.htm

There is a fundamental disparity between the assessment method in GCE A-Level Examination and the of teaching/learning with Web 2.0. RJC lectures, tutorials and labs are very much classroom focused and teacher-centric. This may work best for this type of examination, however, if Web 2.0 learning methods were introduced, it has limited benefit on assessment criteria.

This poses an obstacle for E-Learning pilot programme in RJC because the assessment structure of GCE A-Levels may not fit in well with Web 2.0 learning techniques.

When to Adopt Technology?

Upon interviewing teachers, department heads and management, the E-Learning Pilot Programme had a solid direction. Careful of amount of technology would be used to blend into existing classroom environment to both allow teachers to deliver content better and help students learn more efficiently and productively.

The pedagogical design and content production model for e-Learning were to be performed by ETU. This model created E-Learning materials and allowed teacher to continue focus on classroom teaching, rather than media producers. However, ETU had to look into expansion, in both human resource and infrastructural support.

With the above factors in mind, it was decided that content development made most sense when it augmented class-contact.

Learning and Teaching Strategies

The following guidelines is to be kept in mind when RJC adopts the e-Learning:

⇒ ***Guideline #1 – Be Result Driven***

e-Learning should have a positive impact on teaching, learning or both. It caters teaching to the mass, but accommodates learning needs of the individual.

⇒ ***Guideline #2 - Time is Finite - Productivity Warps Time***

Take special consideration of students' time and provide an enriching learning experience. More often than not, eLearning increases the hours that each student spends on reading, rather than understanding from effective learning. Pedagogical design should harness on electronic tools to make learning equally engaging and productive for students. Keep in mind that if students can learn the same amount in less time, teachers should not give more work to fill up their free time.

⇒ **Guideline #3 - Paper vs Bits/Bytes**

e-Learning is NOT the product of converting teaching materials to an electronic format. It is only an electronic medium with many communication formats. Educators can now leverage on technologies to create multi-dimensional teaching/learning experiences. To reach this next level of

instruction, pedagogical designs need to be flexible to support the advantages of both new media technologies and the traditional teaching approaches.

In summary, e-Learning should simply add value to teaching and learning! See Appendix # 1 on how eLearning can help teachers and students.

Assessment Strategies

Formative Assessment

Formative assessment is often done at the beginning or during a program, thus providing the opportunity for immediate evidence for student learning in a particular course or at a particular point in a program. This can also lead to curricular modifications when specific teaching methods have limitations to the student learning (i.e., Class contact time). Some suggestions to fully leverage eLearning for this type of assessment:

Include practice questions to test their understand and application of topics and/or preparing for summative assessments. Interactive feedback will be provided to explain how to reach correct answers. Build a test data-bank for students to practice on. If feedback is not sufficient for students, they may then opt to consult with teachers. This may reduce consultation contact time for teachers, especially weeks before large tests/ exams:

- Online games/exercises to test their understanding and use tutorial/lab time for discussions. This media rich approach is more engaging for students to learn from because they are in the digital native generation;
- Engaging online discussions moderated by selected students on a rotational basis to learn from each other. The teacher then becomes the overall moderator of discussions;
- Learning blogs can be suggested for reflective learning or student learning journal with multimedia elements (ie. Podcast audio/video); and
- There are many other types of methods and it is also evolving over time. It is in the best interest of the curriculum specialist to be aware of such learning technologies that can be applied to enhance learning and teaching.

Summative Assessment

Summative assessment is comprehensive in nature, provides accountability and is used to check the level of learning at the end of the program. Since students will be learning from home most of the time, eLearning is not positioned well for this type of assessment. The traditional assessment methods are best for final accountability of student grades (ie. Paper-based common test).

Identify Current Positions

As of the start of 2007 academic calendar, eLearning activities are limited and informal. For those subjects in e-mode, the courseware range from simple offerings to extensive set of eLearning tools available to students. These activities are either hosted in the department sites and/or self-supported/free LMS (i.e., Moodle or websites).

Generally speaking, teachers have the following profile about eLearning:

1. Motivated and enthusiastic about eLearning, but lack the formal structural guidance in terms of technologies and instructional designing.
2. Motivated and enthusiastic about eLearning and already launching e-courseware. These staff has the necessary skills and knowledge to fully leverage on eLearning and impact the way they deliver a subject.
3. Indifferent individuals that needs to see more potential before deciding on eLearning journey.

4. Somewhat indifferent and/or negative about using ICT for their subject. However, they are open-minded to refreshing methods of instruction.

Role of Teachers, Students and eLearning Unit

Student Role

The role of student is to realise and be open-minded to the full potential of eLearning. They must understand that eLearning is not a forced set of additional activities to their learning journey. Most students have convenient access to a computer either from home or at school labs and eLearning is not a reservoir of digitised assets that are already on paper. The objective is to cultivate students to become independent and efficient learners outside the classroom environment without having to add a substantial amount of time to their schedule. If designed correctly, eLearning can help students to be more productive and free up more time in their studies.

Teacher Role

The role of teacher will not change drastically. Rather teacher need to be organised with the preparation of their existing content to be handed over for eLearning production. They are **not** expected to be media producers, unless each individual has opted to be one and has been approved for staff development. However, teachers need time to select interactive learning objects that may already be available on the Internet (ie. Interactive physics/econ/biology/chemistry/math presentations). This process is time intensive for teachers to identify what will add/enhance the teaching and learning experience. Thus, this is a foreseeable bottleneck in production.

However, a staff must take into consideration on how comfortable they are to use ICT for teaching and learning outcomes.

Software Pyramid

When software is used in the classroom, part of the control of the learning is taken over by the ICT. The type of software being used affects the level of contribution that must be made by the teacher, and the breadth of the learning outcomes [1].

Graeme Oswin has illustrated these concepts in the software pyramid (1997):

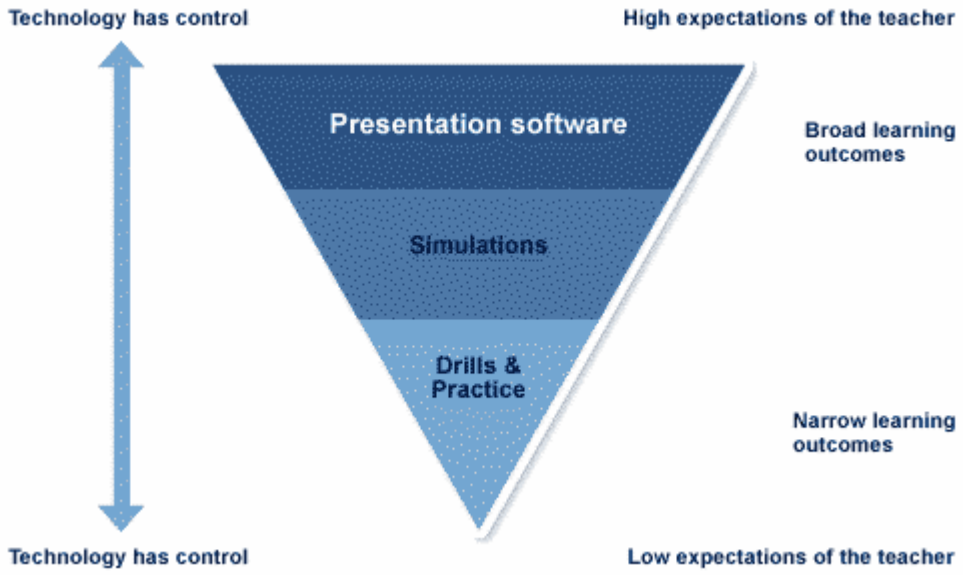

Figure 1: Education Technology Unit Role.

The Education Technology Specialists will help produce eLearning courseware for teaching staff, LMS administrator and sourcing of digital teaching and learning assets. With the assistance from an IT staff member (Jaime Liao), she will partition her time to assist with development. The eLearning Lab will also be managed by the Jerome Lo.

ICT Support and Resources

e-Learning can be sustainable to meet academic goals/objectives over 3 – 5 year period by combining both existing and proposed resources in RJC.

Online Resources (free and subscription based)

License/Copyright Free Learning Objects

There are many non-profitable organisations and colleges/universities that have for free-of-charge with no copyright issues for educational purposes. This list has been sent to respective departments and it is advisable to fully leverage on these interactive learning objects before requesting to develop customised from ground.

Online Training Video Library (Campus Use Only)

Various ICT online training resources have been proposed for subscription. These online libraries are very effective training videos for all areas in I.T. – such as productivity applications, programming languages, animation and array of web publishing tools. This will be useful for both staff and students to learn from. You may see more details at http://www.lynda.com.

Publisher Resources

Customised Textbook/ e-book

McGraw-Hill Singapore has an infrastructure that can cater to customized textbooks or E-books for students. Teachers can combine any chapters from any textbook under the publisher. Lecture materials, supplementary and exercises currently used and originally created by teachers can be published in the same textbook. With RJC materials in this customised packaged book, it is a recognised collaboration with RJC, teacher and McGraw-Hill. The final product can be either in printed format or as an E-book for students. Thus, RJC teachers can have the opportunity to co-author and publish their works with the McGraw-Hill brand.

For more information, visit http://www.primisonline.com

Access to Publisher's Online Resources

Should a subject adopt a textbook from any publisher, RJC can use any of the following online resources:

- Animation;
- Powerpoints;
- Instructor's resources;
- Interactive games;
- Videos; and
- Graphics.

McGraw-Hill has an incentive for schools to freely use ANY of its online learning objects if their textbook or customised textbook were to be adopted. For example, McGraw-Hill has 10 textbooks for Physics, if RJC were to adopt any of the titles (in part or whole), teachers can use any of the thousands of learning objects of all textbooks under the publisher. It is a huge database for enhanced course delivery.

The customized textbook or E-book would be great resources in library for students to learn and do research on.

Digital Rights Managed Resources

RJC teacher has a repository of content considered as valuable intellectual property. This content consisting of teaching materials and test banks are considered a competitive advantage among the local junior colleges. It is natural that other students from other schools may want to also use these materials for their learning. It was a quest to protect documents, images and videos in a presentation format for students to learn from through our LMS (Studywiz v 9.3.1).

In mid 2007, we engaged with a digital book packaging solution company called eBooksys Private Limited in Singapore to pilot a protected e-book with its renowned FlipAlbum™ Viewer. Currently the FlipAlbum™ serves 3 main market segments: commercial digital photo album for mass market; print publishers converting newspaper to e-newspapers and book publishers creating e-books with digital rights management features. RJC reside in the last segment of the market.

What is effective about this FlipAlbum™ format for RJC is that a student cannot copy-paste, screen capture image or video the content. Hardware keys are disabled and this FlipViewer™ is cross-platform (Windows & MAC OS).
You can find out more at http://www.flipviewer.com.

Cyberlibrary (Online Subscription-Based Databases)

To further support the holistic teaching and learning experience, a school cyberlibrary is necessary. A cyberlibrary can:

- Coordinate access to all resources;
- Streamline resource locations on networks;
- Provide remote access to resources; and
- Provide access to resources throughout the LAN locations (e.g. in all classrooms).

Table 1: Cyberlibrary functionality.

Functionality	How it can be used
Distributing catalogue information for physical resources	• Books, videos, kits, cameras • Items can be located and reserved
Distributing electronic resources	• Teacher librarian trains students and teachers • Catalogue links for useful Internet sites • Build online databases such as JSTOR, Britannica online, Factiva, GMID, etc. • Provide links to CD-ROM materials • Provide links to online electronic reference material • Scan articles to build subject databases • Integrate digital libraries with external systems.

Managing the cyberlibrary

- Establish a well-balanced acquisition of physical and electronic resources;
- Reallocate library budgets; and
- Maintain links and networks.

Librarians, teachers and e-Learning unit should work in unison to manage the overall expectations and objectives of the library. Evaluation of electronic online databases is essential and all departments should play an active role through time.

Equipment and Physical Resources

Campus Internet Network Connection

Currently, RJC has wireless hotspots within the campus. It is readily accessible by staff laptops and school issued systems. The campus is using 5 mbps line through MOE network. Although with a school population of 2900 teachers and students, RJC is considering a dedicated leased line to meet the rising need of ICT and E-Learning activities.

Education Technology Lab for Teachers

This lab is specifically for E-Learning courseware development. It contains all of the related software and hardware for teachers and developers to package content for LMS. In addition, it is a place for teachers to discuss and plan their E-Learning developments.

Situated in the Instruction Room within the library, it will house a total of 10 computers on both Windows and Mac operating systems. A LCD projector is also installed for testing and sharing sessions with staff.

Student Desktop Research Workstations

Discussions were raised to allocate a dedicated computer resource room for students to perform the following tasks:

- General Internet access
- Desktop research using subscribed online databases
- Viewing of E-books in respective disciplines
- Printing and scanning of materials for simple presentations
- Library resource search (OPAC)
- Or content that is exclusive for campus use

Results

- Setup and administration of LMS for 2500 students and 300 staff;
- Mathematics, Physics, Biology, Chinese Lanaguage, General Paper and Economics departements fully adopted education technology;
- Lecture Series Lab for Students;
- Education Technology Lab for Teachers;
- Media Lab for English Language Studies;
- New Media for Creative Communication Programme;
- 50 e-courseware;
- 70 hours on e-lectures; and
- DRM protected presentations and e-books.

What's next?

- Apple Laptop Mobile Carts (http://www.apple.com/education/k12/mobilelabs/index.html)
- Customized interactive learning activities (Java, Flash formats)
- Web courses (html or SCORM)
- Customized ebook and textbooks
- Commercialization of RJC intellectual property (i.e. Online courses and assessment books)
- e-Portfolio system
- Student development programmes/certification – *New Media for Creative Communication*
- Built partnerships with content providers and book publishers

Reference

[1] (2008) University of South Austraila [Online] Available: http://www.education.unisa.edu.au/education/school/subjects/EDUC4061/Determine_ICT_Solution.doc

Appendix (1): When instructional technologies can be used?

Suggested strategies:	Suggested strategies:	Suggested strategies:
1. Develop "bite-sized" learning packages to **prepare** for classroom contact. 2. Create content for students to **review** and **prepare** for difficult topics ahead. 3. Develop engaging pre-requisite materials/exercises/notes to **support** classroom contacts. 4. Provide external website links to **prepare** for discussions in class. 5. Cultivate students to be more **disciplined** when learning. This leads to better time-management practices.	1. Interactive presentations (animation, videos, audio, etc) to **complement/support** traditional lecture/tutorial/lab/practical classes. 2. Create **optional** classroom presentation recordings (ie. use of tablet PC's and screen capturing software) for students to **review** what was taught during class contacts.	1. Online exercises/formative assessments to **validate** their understanding of all or some topics. 2. **Integrate** topics vertically/ horizontally with continued learning. 3. Captured, archived, and indexed classroom lectures allows students to make up missed classes or **review/reinforce/master** specific material before an exam, ultimately improving student learning outcomes. 4. Provide a "just-in-time" or asynchronous learning platform and promote/cultivate **independent learning** outside classroom.

(D.13)

Regis Blain, Cyclothymia and artistic creativity in gifted adolescents: Evaluation and potential channelization: This presentation seeks to recall the link between the mood disorders, and the artistic talent and how this talent could be evaluated at an early stage of life. Unlike the development of creativity in other fields (science, politics, journalism), the artistic effort requires a certain level of depression and resilience.

About the Autrhor

Regis Blain is a member of a well-known artistic family. He studied creativity and psychiatry in France and the US. Author of the book: "La cyclothymie, pour le pire et le meilleur: bipolarite et creativite" (Robert Laffont, 2008).

(D.14)

New Technologies and continuum education: The role of the Institutions of higher education in the development of work competencies for a non academic population

Mireya Sandoval Aspront
Julieta Flores Michel

Abstract

The development of countries in the context of knowledge society requests for individuals that apart from the knowledge acquired out of their field of specialization, get to be able to demonstrate a set of general competencies, from communicative competencies to management of the NTC (New Technology in Communication) focused on flexible, collaborative, intercultural and interdisciplinary work, among others. In order to reach the above, universities, day by day, are making strong efforts to improve their curriculum bringing up to date their topics and teaching strategies; nevertheless, science and technology given their accelerated and incessant advance, have made this effort not to be considered sufficient so far.

From this point of view, we can realize that there are university graduates with knowledge which has already been exceeded by more updated knowledge; we can also find many people who would like get a job again (housewives, handicapped, adults) or people who wish to excel themselves economically and professionally speaking in their jobs. For these people it would be, to some extent, difficult to start a bachelor's degree for the following reasons: lack of time to fulfill the requirements of an inflexible schedule, lack of money, no room to enroll at a university or just because of the generational difference with the rest of their classmates. For these people who wish to be successful, universities should spread their human, academic and technological resources so people can gain access easily to a lifelong education. In this way, the implementation of virtual platforms, such as "Nexus" platform of Nuevo Leon State University (UANL), has allowed the School of Philosophy and Letters to offer online and semidirected courses and BSc, allowing graduates and participants who are not university students, to reach challenges that ask for emergent roles in favor of a better human and social development.

In this way, the School of Philosophy and Letters, with its program on lifelong education and training, is contributing to fulfill the principles established by "Visión UANL 2012" (Nuevo Leon State University 2012 View): "To compromise itself to offer a wide educational cover in relation to prioritized strategic areas of knowledge for regional, national and international development, making use of non-presentatial lessons, taking great advantage of information and communication technologies used in excellent quality programs centered in the learner, programs structured by competencies and with an integral system of evaluation". At the same time, the School of Philosophy and Letters with the program mentioned above fullfils the Mexican model of competencies according to "Consejo de Normalización y Certificación de Competencias Laborales (CONOCER, 1999),

"Regulation and Certification of Laboral Competencies" which arises form the necessity of training people to solve regional problems, translated into a curriculum model which aspires to get excellent quality in teaching and social belonging.

This model is based itself , in the development of knowledge, abilities and attitudes such as learning to learn, learning to be and learning to coexist (DeLors, 1999) essential aspects to be successful in their work field, such a program is also looking for an integral education which allows individuals to handle themselves in any specific professional activity, with a balance between the development of productive and intellectual capacities, with personal aspirations, values and contributions to so ciety.

To fullfil the above, professors in charge of the different training and lifelong education courses, should consider the new educational paradigms which apart from the management of the new technologies of communication, these courses request for a new reorientation in the attitude of the professor who now should center its teaching practice in the learner, being a guide, a facilitator and advisor and not as a knowledge transmitter, and in this way to be able to foster the development of a laboral competency which is determined in terms of performance in a working context and which is also measured not only in what is related to knowledge, but also abilities, skills and attitudes. An effective way to reach this goal, was the one developed by the "Subdirection of the Department of Technology of the Open System and Long Distance Education of the School of Philosophy and

Letters" that along with a team of instructors oriented to teaching mediation and under a constructivist approach, offered lifelong education courses on key topics such as, Development and Human Resources Management, Information and Communication technologies and its repercussions in the teaching learning process, Technology and Didactics in the XXI century, Educational Technology in view of the new millennium challenges, Construction of efficient communicative environments for fostering virtual learning, Tutoring in presencial and virtual learning environments, Microsoft office 2000 course, workshop on educational technology, writing and spelling offered to secretaries and administrators, Program design for group and personal development.

These courses were attended by workers from different government dependencies of the private initiative, professors, university students from different areas, and housewives. Its is important to mention that the use of NTC like Nexus virtual platform was an element of motivation for many people to participate in such courses since this way, time and space obstacles in presencial teaching settings are overcome, the above without lessening at all, the human quality that has to have all type of communication, specially mediaTIC communication.

The performance of specific situations, as a set of identifiable and evaluative knowledge, attitudes, values and abilities allow participants in these courses, satisfactory performances in real working situations, according to standards in occupational areas.

The above oriented to the necessity of having a competent work force specialized in every area, that at the same time could be constantly updated and adapted to changes in the world. Once the functions and derived tasks in a profession, and the specific competencies have been identified, it is learning the starting point for the development of these competencies.

This is the right time for formal educational institutions to get involved more and more in the model of competencies, offering more options for lifelong education which implies the design of new educational forms, considering a very particular flexible curriculum, expressed in a teaching practice through a system of credits, and not in fixed and ordered plans, in the interdisciplinarity of contents, in the idea of updating plans and programs constantly, in new teaching learning methods, in updating professors and in the use of the NTC.

This model appears to improve the quality and accessibility for professional education (quality translated as a response to a labor market and the possibility to adapt to it constantly), this model provides flexibility (open to everyone, by credits, considering presencial, open system and long distance education), allowing the development of competencies based on quality standards to reach "professional certification", considering excellence parameters and indicators (CONOCER, 1997). This is our goal at the School of Philosophy and Letters and Nuevo Leon State University (UANL).

(D.15)

Ronald Sterkenburg, The Challenges of Increasing Student and Faculty Participation in Study Abroad Programs: Six years ago the aviation department of Purdue University started a study abroad program. The industry advising committee had emphasized that the aviation industry was quickly becoming a global industry, and new graduates would have to interact and cooperate with people in many different countries. The faculty explored multiple options of study abroad, and the most successful of these efforts was the development of a 10 day Aviation Tour of Europe, which has been organized each year during spring break in March. The tour could accommodate only 30 students, and we felt that more students would like to participate. This paper discusses the evaluation of our past efforts and the development of a follow-up plan to increase study abroad participation. At this time we have about 30 students per year involved in study abroad programs, and we would like to increase this number to 60. A new 10 day Aviation tour of Asia was developed, and the first tour will start during the spring break of 2009. In addition a three week maymester course in London, Paris or Amsterdam is under development, and the first course offering will be in May 2009. Our new plan for increasing student participation in study abroad programs started with a survey of students and faculty to determine their attitudes towards study abroad. It was found that one of the major obstacles for student participation in study abroad programs was money. Therefore a fundraising effort is underway to enable more students to participate. The main concern for faculty was going abroad for longer time periods. Many didn't mind to spend 10 days oversees, but most were opposed to spending a semester abroad.

(D.16)

Jamila Ammar, **L'impact de l'histoire et l'épistémologie des sciences sur le développement du potentiel créatif des étudiants: cas de la microbiologie**, L'objectif de cette étude est de déterminer le développement du potentiel créatif des étudiants induit par une stratégie d'enseignement basée essentiellement sur l'histoire et l'épistémologie de la microbiologie et pratiqué durant 5 ans. Ce travail est mené à l'institut supérieur de la biotechnologie de Monastir dans le cadre d'une étude d'un module d'enseignement (histoire des sciences : évolution du concept de biotechnologie, communication, travail en groupe) destiné à tous les étudiants de 1ère année biotechnologie médicale, marine, et alimentaire : Nous demandons aux étudiants d'une part de jouer le rôle de quelques savants choisis tels que : Haeckel Pasteur, Liebig, Buchner, Flemming…etc afin d'apprendre l'esprit scientifique ainsi que la confiance en soi en essayant de résoudre les problèmes scientifiques rencontrés par les chercheurs à travers l'histoire. D'autre part, ils doivent traiter au sein d'un groupe un sujet de recherche appliquée, choisi librement et montrer leur capacité d'innover, en proposant des idées originales qui pourront être réalisées dans le cadre du projet de fin d'études. Par ailleurs, nous mettons en relation la qualité du travail présenté publiquement à la fin de l'année et le développement de la créativité scientifique. Les résultats nous montrent que la plupart des étudiants deviennent très impliqués et présentent des idées intéressantes et des propositions originales qui reflètent leur ambition de faire avancer la science biotechnologique. C'est pour cela, nous pensons qu'il est judicieux d'adopter cette stratégie afin de mieux exploiter l'histoire et l'épistémologie des sciences comme stimulateur de la créativité ainsi que la formation des étudiants innovants dont l'économie de notre pays a beaucoup besoin.

(D.17)

Tan Wee Chuen; Hanafi Atan; Baharrudin Aris; Mohd Salleh Abu, The Dynamic Attributes of Learning: Learning object has triggered a lot of studies and discussion about how it could be used to support teaching and learning. The paper examines the dynamic attributes of learning object in supporting a learning environment that is grounded in collaborative learning environment. The pedagogical relationships between collaborative learning and learning object are discussed. A conceptual model is then proposed for the design and development of a pedagogically-enriched Web-based learning system based on learning object and collaborative learning. The conceptual model aims to provide a unique learning environment which incorporates dynamic features of learning object and collaborative learning to promote learning and critical thinking. The model also incorporates multi-faceted learning approaches that include reusable learning objects, collaborative learning and essential components of critical thinking in technology-supported learning environments.

(D.18)

Greet de Boer; Karen van den Broek, From dream to reality (1): Education for gifted learners: Strategic development processes and networking Greet de Boer, Karen van den Broek Dutch National High Ability Consultancy Centre CPS educational development and consultancy In the Netherlands the demand for suitable education and care for gifted learners is a current topic. The Dutch National High Ability Consultancy Centre, a division of CPS educational development and consultancy has a major role in the realisation of national developments, such as a covering network of schools with programmes for gifted learners. As intermediary between experts, policy makers and the field (schools and parents), CPS educational development and consultancy has taken initiative to realize suitable provisions for students from 10 to 18 years of age. In this presentation we show you the results of both prolonged networking with several stakeholders as well as strategic development processes of schools with programmes for gifted learners. The results of prolonged networking with several stakeholders - High ability is on the political agenda - CPS as centre of excellence for high ability - Diverse divisions are working with and for schools - National network of schools with programmes for gifted learners - Schools are making a strategic choice for gifted learners - Focus on quality and assurance Strategic development processes of schools 1. Organisation and policy: focus on vision on education for gifted and talented pupils, clear objectives, action plans, organisation of flexible educational arrangements and examination rules, teachers as coach and tutor, partnerships with businesses and schools for further education; 2. Quality improvement and assurance: the way in which objectives are formulated and adjusted internally and in co-operation with other specialist schools and monitoring of results.

(D.20)

Club of Parents of Gifted Children and its functions

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Abstract

Many parents from the whole Czech Republic look for advice and help in their GC education. That is why we organize Club of Parents of Gifted Children since 1993 year. It is held in Prague, once monthly every school year. Until now there were realised more than 130 meetings. Newly it is connected with Club of Teachers. Every meeting has its topic important and interesting for parents. Our invited guests are specialists: psychologists, teachers, scientists, etc. Parents and other participants can ask questions. They also exchange their experience with guest and with other parents. Thanks to good atmospheres in the Club they are not afraid to be more open than they use to be in school or even in the family. Our meetings are a form of „psychotherapy" for many of them. "Our" parents and other participants became well informed in the GC education. We inform them on care for GC in other countries and on news from GC education. Thanks to parents and their children´s experience we are informed on schools which are friendly to GC and on many others not so good. Participants of our meetings are not only from Prague. Some students interested in GC education and schools from the whole CR cooperate with us. In our paper and poster we introduce you some good schools and several extremely gifted children.

Association for Talent and Giftedness (Společnost pro talent a nadání – STaN) started its work 20 years ago in previous Czechoslovakia as the ECHA (European Council for High Ability) branch. At the very beginning we organised STaN-ECHA seminars for psychologists and teachers and Club for Clever and Curious Children´s meetings. Since then many parents in the Czech Republic have been seeking advice and help educating their gifted children.

At that time there was no literature nor available specialists in this field. Therefore we founded the Club of Parents of Gifted Children in 1993. Since that time over 130 meetings took place. In the year 2005 the Club of Teachers was founded. Later it became a part of Club of Parents.

Other participants of our meetings are psychologists, university students (future teachers and psychologists) and other people interested in the GC education. In every meeting there is a topic of interest to parents and teachers of gifted children. The speakers who are invited are specialists in fields related to education and behavioral development of children.

The Club of Parents has all kinds of members. Some of the parents attend meetings regularly. Not all of them are from Prague. some parents are willing to travel in order to attend meetings and some parents are communicating with us by mail. Because our coverage is so wide we get a large volume of feedback about the situation in the gifted education in the Czech Republic.

University students can introduce their research at Club for parents meetings. One of them is Martina Palkova. She finishes her study of psychology at the Masaryk´s University in Brno. Martina realised a small research in Club of Parents of Gifted Children (STaN) during spring 2006.

She asked gifted children about how they were satisfied at school:

Are you satisfied at school?
Very satisfied: 7% Quite satisfied 23% Quite unsatisf: 50% Very unsatisf.: 20%

Are you bored at school?
Always: 17% Often: 60% Seldom: 23% Never: 0%

Do you find it easy or hard to make friends at your school?
Very easy: 3% Quite easy: 23% Quite hard: 57% Very hard: 17%

What is your relationship with teacher?
Very good: 13% Quite good: 40% Quite bad: 40% Very bad: 7%

Martina is highly motivated to improve the situation of gifted children in schools.

Actually she collaborates with the 1st private elementary school "Path towards success in Prague".

At our meetings parents can receive useful information about appropriate schools and after school programmes interesting for their gifted children. They can meet there other parents who have similar issues and who can be supportive of each other.The parents can see that their children share similar traits and that they are actually normal. They can exchange their experience with other parents of gifted children. Nurturing and supportive enviroment is one of the most important functions of the Club.

Many parents are looking for a good school for their gifted children, which is not very easy. One such school (and there are not many) is the state school Chlupova, Prague 5, where meetings of the Club take place. It is a popular school but small. Not all children can be accepted.

Parents of the preschool children are dealing with the similar problem when they are looking for a school for their precocious and sometimes oversensitive children. Which is why in September 2005 the principal of the Rosemary preschool with help of STaN started a special class for gifted children. It is very popular and successful program. Thanks to the teacher who is so exceptionally supportive and understanding. The class is mixture of giftedness: from exceptionally gifted to overaverage children.

The Rosemary Kindergarten is a state school. That is why there are no extra money for this special class nor it is allowed to collect more money from parents. There are 18 children in the class and only one teacher, without assistent.. The „privilege" of that class is in a smaller number of children – other classes have about 26 children (!). It is however common in our country. And because there is a baby boom right now, we cannot expect any change for the better in the near future. That is why parents who can afford it pay for private kindergarten. There is a variety of private preschools in Prague and other big cities.

Situation with elementary schools is completely different. STaN and its Club for parents collaborates with Dr. Ing. Stanislav Svoboda, father of a "twice exceptional" child and founder of civil association „School for the children" and the 1st private elementary school for gifted children „The Path towards Success in Prague".

Despite the fact that the project was highly elaborated and all due formalities were all right, Ministry of Education didn't accredit it for several years. It changed in the October 2006, with the new ministress. The school was registrated in 17.10.2006 after long and hard effort of the association and started its work in September 2007. There is no similar elementary school in Prague. There are not going to be more than 16 children in one class. The fee is affordable. The faculty is young, enthusiastic and motivated. More information you can find on our poster.

Another exception in the Czech Republic is a state school Maj 2 in České Budejovice, with its very good elementary classes for extremely gifted children. The project which started also in 2005 is strongly supported by regional government of Southern Bohemia.

Case studies

Let us introduce you a case study of an extremely gifted child:

Radek (11), actually finished the 7th class, 2 years accelerated. He was accepted to study a moreyears gymnasium (grammar school). His entrance exams were excellent - the 4th place among 13 years old students.. Radek is not only intellectually gifted, he is highly talented musician as well. He plays piano – two times he winned the 2nd place in the national piano competitions 2008 in the Czech Republic.

Next report is Radek´s school work assessment (2 years ago) from his mother´s point of wiev. It illustrates how his school life looked like:

"Radek is currently accelerated two years and attends only 5th grade for all his subjects. In the core subjects—Czech, mathematics, science, and social studies—Radek has no problems. Sometimes though, he considers it pointless to study something he already knows. In these cases, I always tell him that he is not doing it to learn the material, but to practise his handwriting, which he vehemently despises".

There were also some problems, including that of a bullying:

"However, Radek does have problems with subjects like art and physical education. In these subjects, his younger age does become evident. In foreign language, he is far ahead of his peers. He takes an hour of English every week and he has won many awards. In February, he won a county tournament in reading English, and in April he won the county round of the English Olympics.

Over the last two school years, Radek has no longer had significant problems with bullying. Previously, his classmates were jealous and envious of his grade acceleration".

Music:

"Radek is also currently (2005) a student at the Jirkov School of the Arts, where he has studied for four years at piano, and has started the clarinet and flute.Along with his curriculum at ZUŠ, I am paying for him to have private instruction in piano with a professor at the Austrian and Dutch Conservatory, with whom only English is spoken. Radek was a guest at one of the professor's concerts. Part of the lesson material at Radek's music school is sheet reading and „Musicians", which is a children's orchestra (he plays the piano, clarinet, and flute). Next year, Radek is going to attend a computer science school".

Radek´s school assesment from the 5th class, school year 2005/06 (age 9):

The 1st Semester:

Czech Language: Radek independently and with foresight familiarizes himself with the material. He is also focused and can apply much of the learned material. However, he does have a few small problems. He writes quite slowly sometimes and cannot complete an assignment on time. His handwriting is also poor. Despite his weaknesses, he is one of the best students and he can do the material without a problem.

Mathematics: In 5th grade math, Radek has no problems. He can abstract very well, he can apply the lessons, he can tell formulas apart, etc. The only problems are in geometry.

Assesment - the 2nd Semester:

Czech Language: Radek, once again, finished the school year with almost no probems. Hi is independent, precise, and confident of himself. He does, however, have messy handwriting. However, this is noly because he hates having to practice handwriting. He also has to be urged and prodded to do work. For him, it is much easier to explain verbally than through writing. Overall. Though, Radek is a great student.

Mathematics: Radek understands and can solve the material very well. He reliably finishes his homework, even if he's not sure about it. Geometry is still a problem, but that is a result of the speed in which he completes his homework.

Radek´s letter to the specialist in GC education (at that time he attended the 4th and 5th classes together (2005):

Dear Dr. Vondráková,

It was a pea rash (I sneaked some secretly). I have an allergy for them, but also a sweet tooth. ;-)

I am always bored. I am taking a break from studying (I play piano 2 to 3 hours a day), and do 7th grade chemistry. My grandma is cutting circles (atoms) out for me and I will create polar and non-polar bonds.

Today I rode 8 km. on my bike with grandma. When I do not do anything, I am reading or composing music on the computer. Because I don't like to study, I am doing the things that I write about.

Sincerely

Radek

Radek started his accelleration at school in the 2002. He was boring at the 1st class and was waiting to accelleration to the 2nd or 3rd class – at that time Radek´s peers were in the kindergarten:

Dear Dr. Vondrakova

I passed the report on to Radek's teacher and the principal, who informed me that under the new rules that kids have to be tested with PPP at the place of residence. I talked to psychologist over the

phone, she would not test Radek again. She said that I need to bring your report and Radek's work samples. The principal wants to make it clear that Radek is to go to the third grade.

I hope this will make it so that my son gets the education that he needs.

You will believe me when I say that I feel sorry for Radek. I don't want him to become a laborarory experiment. He really wants to get into third grade, but I am not making any promises to him. Have a good day.

Sincerely

X.Y. (Radek´s mother)

Conclusion:

We have met more extremely gifted children and their parents in our Club. For instance Matyas (now 13) – probably future scientist, Frantisek (11) – maybe technician, Majda (3,5) creative and clever girl, able in mathematics, arts and nearly in everything other. All these children have/had problems with their school and/or kindergarten attendance. All of them (and many other gifteed children) need education appropriate to their special educational needs. STaN, its Club of parents and our co-workers strive to improve system of the care for gifted in the Czech Republic.

We are looking for an inspiration also in conferences and in cooperration with our colleagues from all over the world.

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(D.21)

Selma Mokrani Barkaoui, The Dynamics of Excellence in the Teaching of Literature: Issues and Challenges: The Dynamics of Excellence in the Teaching of Literature: Issues and Challenges Within a given horizon of expectation, literature in an EFL classroom can enact cross-cultural communication and breed a spirit of kinship between cultures, especially with the growing interdependence of an emerging "global" society. A well thought-out pedagogy of literature can achieve the goals of two major dynamics of excellence in education—those of cultural and linguistic competence. My talk will address the following issues: 1.The need to train teachers on paradigms of comparison in offering foreign culture material to their students. 2.The detection and neutralisation of the complexities inherent in the literary discourses on culture which are by nature ultimately marked by relativism and subjectivism. 3. The necessity of keeping in view the value of literary texts as media of culture which calls for a more careful choice of the appropriate texts to be studied and for their meaningful application in order to overturn the phenomenon of "hypercanonisation." 4. The setting up of EFL classroom priorities to be given either to "formal culture" and /or "deep culture".

(D.22)

Different Hats: Multilingualism a resource to Draw on or a Drawback for Learners of Diverse Englishes

Maureen Lilion Klos

Abstract

This paper investigates how South African learners experience a genre based English for Specific Purposes course. Many learners in South Africa are expected to master English as a language of instruction as well as a global lingua franca in the context of specific academic learning areas. However, most of these learners are culturally and linguistically challenged in accessing discourse specific concepts housed in various subject-specific forms of English. The problem is that the multilingual learners in South Africa are not only expected to master English, they have to access to different types of academic English via methodically planned discipline-specific and contextualized tasks that determine the following: different subject-specific textual genres (types of text); register (styles of communication); discourse semantics (stages of meaning); the actual wordings (lexicogrammar) and the formation of letters and sounds (graphology/ phonology). Nevertheless, the basic paradigm of communicating in different languages may not be foreign to South African learners who have to cope in an environment that recognises eleven official languages. Institutions such as the Nelson Mandela Metropolitan University in South Africa give strong academic support to learners who may struggle with English language competencies appropriate for academic success in fields such as Pharmacy and Nursing. In this context, the researcher explores whether a group of Pharmacy and Nursing students were able to successfully wear diverse sociolinguistic hats and communicate in different levels of English as determined by subject-specific textual genres.

1. Introduction

In this paper, the researcher will discuss the experience of South African learners who are expected to master more than one type of English to communicate meaning in an academic or professional environment. English is only one of eleven official languages in South Africa and is not the primary language for the vast majority of learners who are often more skilled in communicating in isiXhosa or isiZulu for example. Moreover, they rub shoulders with international multilingual learners from countries outside the country such as Somalia, Nigeria, Zimbabwe and China. As a result, these learners may be quite adept at shifting from a language such as Setswana to another completely different one such as Afrikaans in their daily lives. They may be also familiar with speaking different types of language within one particular language area as well. For instance there is the language of the townships on the one hand and that of the rural areas on the other. The question is, however, whether multilingual learners are also able to code-switch within the boundaries of English as determined by professional and academic discourse-specific contexts. Is it too much to expect learners already immersed in so many linguistic contexts to nimbly shift key in English, a task English native speakers may even find daunting?

With regard to what may be an incongruity between multilingualism on the one hand and mastery of the intricacies of professional and academic English on the other, the researcher will discuss the experience of a group of first and second year nursing, pharmacy and science learners of English for Specific Purposes learning at the Centre for Extended Studies at the Nelson Mandela Metropolitan University, Port Elizabeth, South Africa. The two-year ESP in question adopts the paradigm that language creates meaning. Thus, it aims to empower learners to skillfully cope with the complexity of the English language task in cognitively challenging contexts.

2. Key concepts

2.1 Different hats

In the context of this paper, the writer uses the term *different hats* to refer to the different sociolinguistic roles of learners in a multilingual society like South Africa. The writer borrowed the term from Edward de Bono's *Six Thinking Hats* which actually refers to different types of cognitive perceptions but could also according to de Bono, encompass the notion of a metaphoric hat that symbolizes a social role in different cultures (de Bono, 2005:5).

On one level, learners in South Africa adopt many sociolinguistic roles in line with at least two of the eleven official and eight unofficial languages of the countries: Afrikaans; English; IsiNdebele; IsiXhosa; IsiZulu; Sepedi; Sesotho; Setswana; SiSwati; Tshivenda; Xitsonga; Fanagalo; Lobedu; Northern Ndebele; Phuthi' Khoi, Nama, and San. However, all South African learners from primary school level onwards are expected to master English as arguably the *lingua franca* in everyday life, learning and professional contexts.

Eventually and particularly at higher education level, South African learners discover that there are diverse varieties of English used for many different purposes in varying social contexts (Barber, 2005:236). Moreover in a higher education environment, learners may be taught to view English for specific purposes according to the *genre* paradigm as advocated by the Australian linguist David Rose for example (Rose, 1997: 40-72; 2005:127-164).

de Bono's six thinking (hat) strategies in many respects resemble the different textual types that Rose calls *genre*. For example De Bono's *white hat* (blank sheet; objectivity) could be Rose's *report* genre. The *red hat* (intuition, opinion and emotion) could be likened to *personal narratives*; the *yellow hat* (praise) and the *black hat* (negative criticism) could be *textual response*. The *green hat* (creativeness, alternatives, idea generation) and *blue hat* (big picture, metathinking) could be compared to the *argument* genre. The *blue hat* in terms of overall process could be also be viewed as the *procedure* genre (Swart, 2000: 65–7).

2.2 Multilingualism

The term *multilingualism* refers to the following: the ability to use more than one language; the actual use of more than one language and tolerance towards the use of more than one language (Thipa, 2005: 1). In the context of South African society there is a need for institutes of learning to prepare learners to participate fully in a multilingual society, where multilingual proficiency and awareness are essential. On the other hand, South African education as in many other countries in the world, is aware of the need to also commit itself to ensuring that all students and staff have access to effective literacy in English as a world language (Barber, 2005: 235-261).

The language policy of institutions such as the NMMU aims to recognise linguistic diversity as a resource, rather than a problem which may reside in individuals. The policy expressed in the university logo *Diversity Is Our Strength*, aims to recognise the personal, social and educational value of multilingualism as well as English language development. Such a position aims to reflect other goals such as the following: be a player in the global field whilst playing an active developmental and supportive role in a local African environment; ensure meaningful access and success for learners and staff from diverse backgrounds; create an institutional culture where systems, processes, behaviour, symbols and rituals represent a diversity of culture (Kapp, 1998: 21-34).

English is used predominantly at the NMMU as the medium of instruction. However, the South African Department of Education's Language Policy and the Constitution advocate many languages of communication. Thus, the university acknowledges the need to prepare learners to participate fully in a multilingual society, where multilingual proficiency and awareness are essential. It also supports the notion of education to commit itself to ensuring that all students and staff have access to effective literacy in English (Department of Education, 2002).

2.3 Diverse Englishes

In this paper, the researcher used the term *Diverse Englishes* to refer to the various genres or types of English textual conventions that specify a spoken or written text's social purpose and the stages it goes through in relation to other genres in a culture (Rose, 2006b). In a classroom based instructional and structured approach to teaching English for Specific Purposes, such as the program followed by the learners discussed in this paper, learning is mediated via discipline specific tasks.

Depending on their subject or work-related context, specific genres of English textual conventions appropriate to their purpose and suitable stages are taught to learners. These are types of texts with predictable purpose and stages such as narratives, text responses, arguments, reports, explanations and procedures (Rose, 2006a: 24-28).

Learning different genres is a complex task that involves several strata of language elements that all ultimately depend on context. Firstly, there is register (field of learning; written/ spoken mode and objective/ subjective tenor). Secondly, there is discourse (coherence or sequence of meaning and logical connections; clarity of point being referred to and division of text into appropriate phases). Thirdly there is grammar, spelling and punctuation (appropriateness of wording conventions) (Rose, 2005:127-164).

In general, one might say that the aim and assessment standards of genre based language learning support involve the systematic empowerment of learners with regard to communication skills via functional and salient English textual patterns.

3. Conflict between multilingualism and diverse Englishes?

Despite support for English as the lingua franca in South Africa particularly since 1994 (the end of Apartheid and Afrikaner Nationalism) multilingualism has been increasingly supported by the country's government in an attempt to safeguard the rights of all language communities.

The development of African languages, ignored in the past, is an important component of multilingualism (Gough, 1996: xix). This attitude entails a certain antagonism towards what might be termed an *assimilation* approach that is also prevalent in South Africa today (Naidoo, 1996:2; Carrim, 1998: 301-320; Carrim & Soudieneeim, 1999: 153-171; Sekete, Shilubane & Moila, 2001: 93; Chisholm, 2004: 14).

Multilingual learners may feel resistance to dominant hegemonic views and as a result not particularly motivated to master the different Englishes appropriate to academic and professional contexts. According to Alexander (2004: 18):

> "Just as the imposition of English in the early days of colonisation was regarded as form of ensuring the privilege and control of the ruling class (linguistic imperialism), so too is the dominance of English perceived in some quarters to be a way of entrenching unequal power relations today. There is also opposition in terms of …US-style discourses and fashions".

On the one hand, multilingual learners may perceive English as a language of the colonizers and socially privileged. On the other hand however, they may also view it as a passport to social and economic success. A mastery of the complexities of different Englishes also is perceived in a positive light in South Africa for various reasons. Firstly, English is connected with the fight for freedom against Afrikaans rule. Secondly neighbouring countries such as Zimbabwe and Botswana have all opted for English. English is viewed as useful in international contexts. Moreover, the advantage of English over an African language for example is that it is a convenient link language where the option of one of the native languages might be divisive (Finlayson & Slabbert, 1997: 381-421).

The option of a lingua franca made up of a blend of different South African languages is also not considered an option. There is the view that this would result in an English patois devoid of salient universal academic and professional language patterns. Such a hybrid language might simply impede the community from the educational and economic development it sorely needs (Hannekom, 1994).

Viewing the various views regarding language use, policy and needs in South Africa, the question remains whether support for multilingualism should necessarily be conflict with what could be termed *anglicism.* Is retaining one's flair for multilingualism indeed a drawback for learners hoping to master the complexity of English for Specific Purposes? On the other hand, might multilingualism not be perceived as a resource to draw on in the case of learners skilled at and used to wearing what could be termend *different hats?* To answer this question, qualitative research was conducted amongst learners at the Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.

The group investigated mostly consisted of learners whose primary language was isiXhosa, one of the eleven official languages of South Africa. Other primary languages amongst the learners were isiZulu, Setswana and Afrikaans. There were some international students too from Nigeria, Somalia, Zimbabwe and Israel for whom the primary language was not English either.

English, the language of learning and future professional use for these learners was a second or even a third additional language. Yet, urban members of the group and learners from countries like

Zimbabwe fairly fluent in everyday English and adept at basic interpersonal communication skills (BICS) as opposed to cognitively acquired language proficiency (CALP) as first described by Cummins (1979: 121-120). Moreover at high school level, these learners had acquired a good grasp of English grammar rules but had not been taught to use English appropriately according to context as examination entry testing had clearly shown. As a result of these tests, particular students were selected for special ESP support. It is the experience of these students that the researcher describes in this paper.

4. Research plan

4.1 Research aim

The aim of the research project described in this section was to: investigate the experience of multilingual students at the Nelson Mandela Metropolitan University, South Africa, with regard to their experience of learning English for Specific Purposes according to the *genre* paradigm.

4.2 Research problem

The following statement of the problem was formulated in light of the aim of the investigation as stated above: If multilingual South African learners experience genre-based ESP, will they master the textual conventions appropriate to specific academic and professional contexts?

4.3 Research hypothesis

The following research hypothesis was formulated as a possible response to the statement of the problem above: Although multilingual learners may resist what could be termed *anglicistic* linguistic assimilation, their prior knowledge of linguistic pluralism and hybridity may in fact facilitate mastery of diverse and contextually salient English textual conventions.

4.5 Research Method

Qualitative data was collected from three sources. Firstly, the research involved the construction over a period of two months of a regular dialogic space in the form of five focus discussion groups at intervals of two weeks. Six multilingual learners reflected on their experience of language diversity and ESP.

Focus group members were randomly selected from the larger group of nursing/ pharmacy/ science learners. The focus group discussions were aimed at discursively fixing the learners' awareness with nuanced and heterogeneously textured view of language. The researcher noted comments and reflections from the focus groups. .

The first focus group discussions entailed getting to know a little about the members' different primary and additional languages and their general impressions of the ESP course. The second was a discussion about different types of English. The third was a discussion of the possible positive and negative aspects of accessing many languages on the one hand and different Englishes on the other. Focus group four was a general conversation about possible similarities and differences between their multilingual experience and their experience of different Englishes.

Focus group five encouraged the learners to speak about their ESP experience again and reflect whether their perceptions were the same as at the start of the focus group discussion.

Data was also gathered by means of observation during supported classroom based ESP language learning tasks on various topics relevant to nursing, pharmacy and biological sciences learners. In particular, the researcher observed learners during formal oral presentations, group and pair classroom work that involved informal communication as learners completed writing, reading or oral tasks together. The tasks involved the deconstruction of salient written and oral texts in terms of genre, register, discourse and lexicogrammar. The researcher also examined written work samples produced by the 112 learners she taught ESP.

6. Analysis of data

The researcher analysed the quantitative data regarding the experience of multilingual learners during the genre-based ESP classes. In other words, the researcher attempted to discover if learners with multilingual skills did successfully access discourse specific language skills and was there a possible link between these skills. Various themes and sub-themes were discerned with regard to the learners' understanding of their own multilingualism on the one hand and awareness of the complexity of English textual conventions. In the following table, the writer has attempted to succinctly summarise these themes and sub-themes together with a few substantiating examples and remarks.

Table 1: Data analysis: Access to complexity of English language task by multilingual learners.

Theme	Sub-theme	Some substantiating examples	Substantiating remarks
Different context	*Indigenous knowledge *Code-switching *Social roles	*Herbal medicine as topic for reading/ writing tasks. *Conversational hybridity in when doing tasks. *Dramatic mode change in drama activities	"When we explained chemistry and biology of herbal medicine we switched contexts from westernized medicine to traditional/ spiritual therapy" "When we're a mixed group we speak English. But we can just speak Xhosa or Sotswana to our neighbours" "Maybe the different Englishes are clear because of our different languages more than say only English speaking people in England – say or US"
Different genre	*Phases in communication in Xhosa transferred to Enligsh genres" *Procedures a genre in traditional oral.	*Clearly different types of persuasion in debates *Vivid change of mindset in procedural/ discursive/ informative orals.	"There are many ways to persuade in debating topics like cloning or dagga" "We also have to explain the science" "Step by step doing is part of our culture – that's how we learn even language from our parents" "In our culture some topics aren't even discussable e.g. *Circumcision* or *Lobola*. It's a fact"
Different registers	*Field *Tenor *Mode	*Explanations of different areas in same context e.g. chemistry/ biology/ therapy and spirituality of marijuana *Informal dramatic activities clearly use emotive language e.g. AIAI, Eishe, Haibo. * Oral presentations clearly better than written work – African tradition	"Marijuana is for psychotherapy; spirit of high being and even epilepsy because it's God's appearance" "We speak differently in our culture to friends than to our grandmother; body language and Afrikaans has 'u' and 'jy'" "When we write it's hard and oral is better".
Discourse patterns	*Stages in text/ at paragraph *Internal structure	*Follow rules/ follow logical scientific western classification /procedures Difficulty with internal structure	"It's normal to have special stages in a story" "The facts are there in science – just repeat the facts – like causes, symptoms, diagnosis etc." "We don't always explain in our culture. Only women must explain to men – feelings".
Understanding of subtleties of lexicogrammar	Codification all language Different word meanings in context	FFollow syntax rules Clear use of different terms for same ideae.g. hayfever and the medical term	"We know importance of rules because English different to Xhosa – our grammar is a mater of prefixes and suffixes" "In our language we also have different words eg. Izoli=cigarette dagga; *inqotyi*= measure of dagga and *istwiga* =the plant"

7. Interpretation of data

In light of the aim of the research project described in this paper, the writer can generally infer that the research data gathered did investigate the experience of multilingual students at the Nelson Mandela Metropolitan University, South Africa, with regard to the English for Specific Purposes course followed by learners needing strong language support.

The data did provide an answer to the research question that confirmed the research hypothesis. That is to say that although multilingual learners may resist what could be termed *anglicistic* linguistic assimilation, their prior knowledge of linguistic pluralism and hybridity may in fact facilitate mastery of diverse and contextually salient English textual convention.

During the focus discussion groups, learners appeared to know and understand their multilingual situation. Work samples and observation during task completion also supported the researcher's perception of the adroitness of multilingual learners in their mastery of English textual conventions and subject-specific language learning situations. As learner resistance to being immersed in different Englishes and the potential flames of conflict between multilingualism and Anglicism were quenched, learners were open to exercising their freedom to use what Bloom might term higher order thinking skills in their exploration of the intricacies and codes of English as they created new meaning relevant to particular academic and professional contexts (Bloom, 1981: 180). The skill of multilingual learners to wrestle with multiple codes could be described in by Bernstein (1990: 182): "… elaborated orientations, and even more elaborated codes are the media for thinking the 'unthinkable', the 'impossible' because the meanings they give rise to go beyond local space, time, context and embed and relate the latter to a transcendental space, time and context. A potential of such meanings is disorder, incoherence, a new order, a new coherence".

One might say that a being a multilingual learner is particularly useful in South Africa today. Learners in the so-called *Rainbow Nation* have a particular advantage in being able to assimilate different Englishes. These learners will benefit from educational initiatives aimed at making use of their multilingualism as a resource to draw on as opposed to being a drawback.

8. Implications for educational policy practice and research

The integration of multilingualism and the learning of English for Specific Purposes should be specified in the language educational policy frameworks of multilingual and multicultural societies like South Africa. Moreover, specific curricula, subject syllabuses as well as learning material should be consistently developed in accordance with this policy by educational and academic departments at all levels of education. Educational research should also seek further solutions to issues of multilingual learners and subject-specific language support.

A paradigm shift in educational policy towards awareness and acceptance of multilingualism in ESP programmes will serve the interests of learner-centred education. In addition, with the globalization of educational institutions in South Africa in particular, linguistic issues from international perspectives need to be also addressed. In fact, ESP educators in South Africa and perhaps elsewhere need to use techniques that allow learners the freedom to explore their multilingual identity in accessing appropriate discourse-specific English skills.

Further research should be conducted with regard to perceptions and practice regarding multilingualism and the learning of ESP. Moreover, research needs to be done by educators regarding their own interaction with groups of multilingual learners in the interests of their potential to skillfully use discourse specific English in communicating knowledge and in the workplace.

Learning materials need to communicate awareness of the problems of multilingual learners of ESP. Provision should be made in course material, for example, for learners to find their multilingual identity in terms of different linguistic conventions that are comparable to English genres. Learning material that is both sensitive to multilingual ideals as well as English language needs may encourage educators and learners to affect positive changes in classroom practice.

A transformation of perceptions regarding the seeming incompatibility of multilingualism and English as a lingua franca is needed on the part of educators and learners. This paper was an attempt to explain what might be perceived as a paradox and incongruity inherent in a learning situation of contradictory learning paradigms but is in fact, a potential coherence of seemingly different realities. A fresh perception of this issue could lead to a model that gives multilingual learners space to access language skills with a view to their linguistic forging of their own subject-specific meaning in a globally useful language.

9. Conclusion

In this paper, the writer has discussed the topic of ESP support to multilingual learners. Qualitative data supported the hypothesis that mastery of discourse specific English language skills is facilitated when the learners are able to access their inherent multilingual skills and transfer them to the complexity of the English language learning task. The paper has argued that multilingualism is an advantage in the race to master English as a global lingua franca. This is especially if also ironically the case in countries such as South Africa rooted in sociolinguistic diversity where learners are expected to master what they may perceive as foreign and western knowledge like Pharmaceutics for instance in English, also perceived as foreign and western.

Further research may use research techniques such as focus discussion groups as a master key for multilingual learners elsewhere in the world to use in opening the door to different Englishes. This would enable learners to construct a space where they could explore end engage in alternatives to an *assimilationist* or *homogenous* view of learning. Instead of trying to simply "affix the unfamiliar to something established" and maintain notions of separateness, they might be encouraged to see difference as dynamic and fluid rather than fixed. Thus, learners in countries like the so-called *Rainbow Nation* might be inclined to acknowledge the multiple influences of context on representations of linguistic difference and adopt a paradigm of *hybridity* (Bhaba 1994:73).

References

Alexander, Neville. 2004. New meanings of Panafricanism in the era of globalisation. *PeaceAfrika* 8(2), 17-26.

Barber, Charles. 2005. *The English Language: A Historical Introduction.* UK: Cambridge University Press.

Bernstein, B. 1990. *The Structuring of Pedagogic Discourse*. London: Routledge.

Bharba, Homi. 1994. *The Location of Culture.* London: Routledge.

Bloom, Benjamen. 1981. *All Our Children Learning.* New York; McGraw Hill.

Carrim, Nazir. 1998. Anti-racism and the 'New' South African Educational Order. *Cambridge Journal of Education,* 28, 301-320.

Carrim, Nazir & Soudien, Crain. 1999. Critical antiracism in South Africa. In Stephen May, ed. *Critical multiculturalism: rethinking multiculturalism and antiracist education.* London: Falmer, 153-171.

Chisolm, Linda, ed. 2004. *Changing class.* South Africa: HSRC Press.

Cummins, James. 1979. Cognitve/ academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism*, 19, 121-120.

De Bono, E. 2000. *Six Thinking Hats.* Great Britain: Penguin.

Department of Education. 2002. *Language Policy for Higher Education.* Pretoria: Department of Education.

Finlayson, Rosalie & Slabbert, Sarah. 1997. I'll meet your halfway with language – code-switching within a South African urban context. In Martin Putz, ed. *Language Choices: Conditions, Constraints, and Consequences*. Amsterdam & Philadelphia: Benjamins, 381-421.

Gough, David H. 1996. English in South Africa. In Silva, Penny M, Dore Wendy, Mantzel Dorothea, Muller Colin &Wright, Madeleine, eds. *A Dictionary of South African English on Historical Principles.* Oxford: Oxford Unversity Press, 53-78.

Hanekom, Retha. 1994. *The status quo of English in South Africa – results of a tracking study 1989-1993.* Unpublished research paper.

Kapp, Rochelle. 1998. Language, Culture and Politics: the case for multilingualism in tutorials. In S. Angélil-Carter, ed. *Access to Success: Academic literacy in higher education.* Cape Town: University of Cape Town Press, 21-34.
Naidoo, Jordan. 1996. *The racial integration of schools: A review of the literature on the experience in South Africa.* Durban: University of Natal Education Policy Unit.
Rose, David 1997. Science, technology and technical literacies. In Christie, Frances & Martin, James, R (eds). *Genres and Institutions: Social Practices in the Workplace & School.* London: Cassell, 40-72.
Rose, D. 2005, Democratising the Classroom: a literacy pedagogy for the new generation. In *Journal of Education*, 37, 127-164.
Rose, David. 2006a. A systemic functional model of language evolution. In *Cambridge Archaeological Journal*, 16 (1), 24 -48.
Rose, David. 2006b. *Towards a reading based theory of teaching.* Plenary for the 33rd International Systemic Functional Linguistics Conference, Sao Paulo 2006.
Sekete Patience, Shilubane Mmamajoro & Moila Badiri. 2001. *Deracialisation and migration of learners in South African schools: challenges and implications.* Pretoria: Human Sciences Research Council.
Swart, Marieken, 2000. On canons and harlots: repositioning English. *English Academy Review,* 17 (1), 65 -73.
Thipa, Henry. 2005. *D592_05_Draft_Language_Policy_revised_20050906.DOC*, 6 September. Port Elizabeth: Nelson Mandela Metropolitan University.

About the Author

Maureen Klos is currently a permanent Senior Lecturer and Co-ordinator in the Department of Applied Languages and Centre for Extended Studies at the Nelson Mandela Metropolitan University, Port Elizabeth, South Africa. Her particular focus is teaching English for Specific Purposes to Science, Nursing and Pharmacy learners. At NMMU, she is a pioneer in the provision of discourse specific and professional English language support to learners whose sociolinguistic roots most often lie in African traditions, although there are many international learners as well. She actively researches ways to help multilingual learners in South Africa, a country of eleven official and at least eight unofficial languages, to access cognitive skills via contextualised language conventions. Many South African learners are linguistically gifted but also educationally disadvantaged and therefore, challenged when accessing meaningful knowledge housed in discourse specific and professional English. In her search for solutions to foreign language learning issues that inform her teaching philosophy, practice and research, she emphasizes strong language support that aims to empower learners to become autonomous and proficient communicators both locally and internationally.

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(D.23)

Miran Chun Kyungbin Park, Female Middle School Students' Affective Characteristics Related to Science and Technology Career: This study analyzes the causes of the unbalanced sex ratio and the actual conditions through finding the differences between scientifically gifted and non-gifted students. The surveys of attitudes toward science, the peer relationship, the motive for achievements, and the parents' attitude to science have been conducted to 53 scientifically gifted and 120 non-gifted students. The findings from the analyses suggest that there exist few meaningful differences in the attitude toward science, the motive for achievements and the peer relationship except in the parents' attitude to the gifted student education. This means that the recognition and the attitude of the parents have great influences on non-gifted students especially female students in the process of resolving to take future directions to science fields and choosing the gifted education center. Accordingly, we are in dire need of the changes in the social recognition of science and it is strongly recommended to seek for the ways of promoting science and supporting engineering graduates at the level of nation, thereby establishing legal and institutional foundations to make effective human resource arrangements.

(D.24)

How the First Class Students in the Department of Computer Education and Instructional Technology at Dokuz Eylul University are Learning English During the 2007-2008 Academic Year

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Abstract

This paper deals with the English courses which are taught to the 1st class students in the Department of Computer Education and Instructional Technology in the Faculty Of Education at Dokuz Eylul University in Izmir in Turkey. What kinds of course-books are used, the methods, approaches, and their classroom applications, the aims of the courses, the individual differences of the students, the macro and the micro skills of the English courses and the questionnaires which are used to improve the students' motivation and learning skills will be told. The feedback of the students of these courses will be highlighted.

Keywords: Methods, approaches, individual differences, course materials, macro and micro skills, questionnaires.

1. Introduction

Teaching effectively differs in different classes. In order to understand the student needs and expectations, different kinds of teaching methods and approaches must be used. Most of the instructors in Turkey are working for their students too much in order to teach effectively. We, the instructors, are working too much to understand the needs of our students and therefore we attend so many workshops, seminars and symposiums which are related with our jobs or professions. We share our ideas and talk about our issues or our problems during these academic meetings.

In this study, how the English courses are taught to the 1st class students in the Department of Computer Education and Instructional Technology in the Faculty of Education at Dokuz Eylul University in Izmir in Turkey will be told.

There are two departments in the School of Foreign Languages at Dokuz Eylul University. These departments are Preparatory Classes Department and Modern Languages Deparment. In most of the departments at Dokuz Eylul University, students have to take the compulsory courses in the Preparatory Classes Department in the School of Foreign Languages at Dokuz Eylul University before starting their first classes in their own departments at Dokuz Eylul University or they have to pass the English proficiency examination which is administrated by the School of Foreign Languages or the international English proficiency examinations such as the TOFEL, IELTS or TOEIC. The national examinations UDS and KPDS examinations which are run by the Turkish Higher Educational Council are also acceptable.

The first class students who can pass the English proficiency examinations can take the compulsory advanced English courses which are taught by the instructors of the School of Foreign Languages at Dokuz Eylul University. This rule is also valid for the first class students of the Department of Computer Education and Instructional Technology.

This paper will help the listeners how the advanced level English courses can be conducted after the preparatory class education for the first class students at any university.

The first year English courses given in the Department of Computer Education and Instructional Technology, titles of the courses, the name of the course books, examples of the course book activities, examples of the games played during the course hours, aims and objectives of the courses, the intended outcomes, macro skills options menu, micro skills options menu will be told. The contributions of the international conferences, seminars and workshops will also be explained in detail.

2. The Names of the Coursebooks, The Titles of the Courses and Their Aims

The titles of the courses in the Department Of Computer Education and Instructional Technology in the Faculty Of Education are YD 101 Foreign Language 1 and YD102 Foreign Language 2. The course books which were used during the 2007-2008 academic year were the following:

- O' Dell, F., and MacCarthy, M. (2005). *English Vocabulary in Use-Advanced.* (6th Printing) Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo: Cambridge University Press.
- O' Dell, F., and MacCarthy, M. (2005). *Test Your English Vocabulary in Use-Advanced.* (6th Printing) Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo: Cambridge University Press.

For supplementary books, the following books were used during the 2007-2008 academic year:

- Mascull, B. (2006). *Business Vocabulary in Use-Advanced.* (4th printing). (6th Printing), Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo: Cambridge University Press.
- Walter, P. (2000). *Advanced Level Six Way Paragraphs.* (3rd edtition). Illinois-USA: Contemporary Publishing Group.

Dictionaries which were suggested to the students in this course are as follows:

- Collins Thesaurus, The Ultimate Wordfinder 2002.
- Word Finder with Collins English Dictionary & Thesaurus 2008.
- Cambridge International Dictionary of English.

The broad aims of the courses, entitled YD 101 Foreign Language 1 and YD102 Foreign Language 2 are to develop listening, speaking and pronunciation skills of Turkish and foreign learners. The specific aims of the courses YD101 and YD102 are as the following:

1. To use as much English as possible;
2. To increase the vocabulary knowledge;
3. To encourage students make conversations on the subjects given every week; and
4. To help the students of English develop some understanding skills while talking English.

3. Course Objectives

This course is for the upper-intermediate and advanced level of students of English. Its aim is to enable students of English to speak English fluently and to develop their understanding skills. During the course, students develop their English by means of some enjoyable vocabulary games. They learn many new web-sites and vocabulary.

4. The Course in Outline

The first week of the course, entitled YD101 Foreign Language 1 was the meeting week. I always pay attention to meet my students. I wanted them to introduce themselves with 5 or 6 sentences to me orally. After introducing themselves, I wanted all of them to write short compositions about them including their hobbies, interests, activities and expectations from the English courses during the academic terms. I also wanted them to answer the questions of a multiple intelligence questionnare which had many personal questions. I used this questionnnare in order to learn their likes, dislikes, pleasures and interests better. I handed out the photocopies of the course syllabus to all of the students in the class, read the steps in the syllabus, and ask them if they have and questions about the syllabus. When they had questions, I answered them. They were not responsible from all of the topics from their course book. I told them they would be responsible from the topics I chose for them and from the only topics written on their syllabuses.

In the second week of the course, I asked them if their books and materials were ready or not. As soon as I received the answer "Yes, I wanted all of them to do skimming and scanning on the information parts of their textbooks. After they finished reading those parts,

I selected some of the students from the class and let them read loudly the same parts to their class friends.

As a principle, I checked their pronunciation while they were reading. If they made any mistakes, I always finished them reading the information on their course books and corrected their mistakes and let them repeat the same word or words twice or more.

I did the exercises on the course boook every week. I warned them not to miss any sessions. We finished three chapters from the course book every week. After finishing the exercises given on their course books, I wanted them to do the exercises I had prepared for them. I gave worksheets and wanted them to answer my questions in 20 or 30 minutes and after 20 or 30 minutes, I invited 3 of them to come next to the class board and started to play vocabulary games with them. They studied too much before attending my courses and this vocabulary game session in order to compete with their classmates better.

Students of this course were shown a documentary film every term. They were also asked questions about the documentaies they had watched.

Students of this department took 2 quizzes, 1 mid-term examination and a final test during the first term. They also wrote 2 essays as a writing homework.They had to attend my courses regulary. Because the 1st class English courses were compulsory courses. Students needed to meet these requirements in order to be successful in the course. The same requirements were required for the second term of the course.

5. Macro and Micro Skills Options Menus

Before starting the academic terms, students were given menus and they made their own decisions.

Macro Skills Options Menu:

Students in this course had to do a selection of the following, depending on their needs:

- Speak English fluently;
- Make conversation on the given topic at the advanced level;
- Read and understand the passages which are advanced level;
- Select and order information;
- Use appropriate verb tense according to section type; and
- Use accurate English.

Micro Skills Options Menu:

Students in this course had to do a selection of the following, depending on their needs:

- Understand what they hear or listen of a native speaker's talk;
- Use effective pronunciation;
- Use the appropriate preposition when it is needed; and
- Participate the games during the class hours and compete with his/her classmates.

Conclusion

In this study, the current practices in the Department of Computer Education and Instructional Technology in the Faculty of Education at Dokuz Eylul University in İzmir, Turkey are explained. The names of the course books, the titles of the courses and their aims, the outline of the course, course objectives, the course in outline, macro and micro skills options menu for the students of English, sample coursebook activities, examples of the games played during the course hours, questions I used for my students in order to get feedback from my courses were the subtitles of my paper. I tried to find solutions to get my students' language skills one step further than the skills of the prep class education.

This paper has revealed the needs of the university teachers while teaching in the prep classes or the freshman units. It has also helped to find solutions how the courses can be done effectively with the findings of the macro and micro skills which the instructors use in these units.These findings have provided positive outcomes for both teachers and students.

From my own observation, each activity which is administrated during the class hours helps learners to expand their lexicon and activate their passive knowledge on vocabulary and grammar. Students have an opportunity to make revision of the lessons in the prep class period and add some more vocabulary and phrases to their background. They are also encouraged to speak orally every class hour and their fluency in pronunciation are improved gradually day by day. If anyone wants to have a look at the course sylllabus, he/she can understand that these courses will also be able to teach students to use many useful skills while they are working in an international environment and give some ideas on how the student homework papers and exams are graded.

As a result, it is hoped that this paper will provide the teachers to practise with new ways of teaching listening, speaking, reading and writing, and demonstrate how to strengthen the students' language ability. Since all of the macro-skills and micro-skills pertaining to four basic skills are being tested beginning with 2007-2008 academic year, the results mentioned here are reliable and potentially beneficial for the students and teachers.

References

Cambridge International Dictionary of English

Collins Thesaurus, The Ultimate Wordfinder 2002

WordFinder with Collins English Dictionary & Thesaurus 2008

Mascull, B. (2006). *Business Vocabulary in Use-Advanced.* (4th printing). (6th Printing).
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo:
Cambridge University Press.

O' Dell, F., and MacCarthy, M. (2005). *English Vocabulary in Use-Advanced.* (6th Printing). Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo: Cambridge University Press.

O' Dell, F., and MacCarthy, M. (2005). *Test Your English Vocabulary in Use-Advanced.* (6th Printing). p. 123. Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, Sao Paulo: Cambridge University Press.

Walter, P. (2000). *Advanced Level Six Way Paragraphs.* (3rd edtition). Illinois-USA:
Contemporary Publishing Group.

Yagcioglu, O. (2006). Teaching English As an International English at Dokuz Eylul University in Izmir in Turkey. *Proceedings of The 1 world Congress on the Power of*
Language: Theory, Practice and Performance . Bangkok, Thailand. (will be published).

(D.25)

How can we develop creative potential when we are told creativity is magical?

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Abstract

Understanding how to enhance and utilise human creativity has become an important goal for academics and higher education professionals. Critical to this goal is the ability to recognise creative contributions and actualise creative potential. However, these goals are arguably hampered by the existing conceptual framework for creativity studies. This framework and the conventional definition of creativity advocated within it, serve to check the realisation of these goals. This is because creativity is commonly defined through the recognition of produced and valued novelty. This definition can obscure all that is unrecognised, un-actualised, unexercised and currently in potential from being considered as creativity. This paper reports on research (Martin 2007) which attempts to unpick these problems and enable the goals of understanding and enhancing creativity to be further enhanced. The paper proceeds in two parts. First, a critical realist inspired ontology of creativity is presented, with a nuanced understanding of creative potential as well as a proposed solution to the problem of ex nihilo creativity, or magical creativity. Secondly, the validity of this ontology and definition is explored through empirical work which, in part, explored the attitudes creative workers hold towards their higher education creativity training. It will be argued this framework provides higher education professionals with the ability to further conceive of creativity in ways conducive to the aims of developing creative potential. It is concluded that this approach enables research into new and previously obscured areas through clearing some of the meta-theoretical fog currently restricting attempts to understand creative potential. References: Martin, L,D. (2007). Creativity in (and out of) work. Doctoral thesis. Lancaster University Management School, Department of Organisation, Work and Technology, Lancaster University.

Introduction

It is increasingly argued that, in order to face the challenges of globalisation, managers within organisations need to facilitate innovation by encouraging and utilising the human capacity for creativity. A seductive rhetoric promoting the importance of creativity in the workplace is ever growing (e.g. Bommer & Jalaja 2002; Dewitt 2003; Sternberg 2003; Mumford 2000; Williams & Yang 1999; Amabile 1997; Cummings and Oldham 1997; Proctor 1991) and has arguably led to an increased interest in creativity research as well as a focus on how to enhance the creativity of workers through higher education (HE) teaching practices. Therefore HE professionals are being urged to enhance the creativity of those who join our courses. Such a position requires that creativity and creative thinking are suitably defined and an understanding of how they are to develop made explicit.

Here we run into difficulties with many authors recognising that the definition of creativity and creative thinking, as well as the techniques with which to develop them, are problematic (e.g. Compton, 2007; Bleakley 2004; Cowdroy & De Graaf 2005). It is therefore incumbent upon anyone interested in the development of creative potential to understand and tackle these issues so we can be sure we are, in fact, actually developing a person's creativity. This paper provides an interim report on theoretical research which attempts to bring clarity to these issues. A brief description of the definitional issues and a possible resolution to them, in the form of an ontology of creativity (guided by the rapidly emerging philosophy of critical realism), is proposed which. The primary concern of this paper is meta-theoretical ground-clearing with the implications of this ground-clearing briefly explored for higher education practice.

Creativity research appears to utilise a conventional definition of creativity which can be roughly summarised as the 'recognised production of something useful, appropriate and novel[xvii]'. Whilst the conventional definition has enabled researchers to advance our understanding of creativity, it contains within it a paradox for educators. Simply put, if creativity is defined through the *recognition* of something produced that is both useful and novel, then how can we conceive of creativity before it is recognised as such? Indeed, what can we ask about creativity that goes completely unrecognised? This paradox becomes clear if one considers the objectives of higher education, for how are we to develop a student's creativity if we cannot conceive of creativity in potential - i.e. prior to its recognition?

Seemingly then, research into creative potential, using this conventional definition of creativity, contains a conceptual contradiction. Runco (2006) maintains that it can introduce a selection bias into creativity research as, whilst we can study those who have actualised their potential, we can say little about those who have not. Rather than merely being an irritation to our method, in the form of selection bias, this tension can have fundamental consequences for creativity theory and subsequently also for attempts to develop creative potential within higher education.

These tensions between the conventional definition and notions of creative potential arose from the answers offered to two problematic questions: Where does novelty come from? And how do we differentiate valuable novelty from mundane novelty? (Boden 2004) Creativity researchers have claimed that creativity can be defined through what can be considered novel, adaptive and/or valued, and what is valued is a function of what is recognised to be novel and adaptive. Through these steps, and perhaps inadvertently, our entire approach to defining creativity becomes dependant upon the recognition or judgement of others. This means, in effect, creativity is collapsed into this recognition; it therefore becomes problematic for researchers to conceive of creativity prior to its recognition. To progress our understanding of creative potential, we must either develop a criteria of novelty independent of values or recognition, or perhaps accept that Epstein (1991) was correct to argue that novelty does not give us the power to differentiate creative from non creative acts in the sense creativity research suggests is possible.

(Mis)Understanding Creative Potential

A potential is defined by the Universal Dictionary as something that is 'possible but not yet realised or capable of being, but not yet in existence'. Studying potential creativity therefore instantly brings one into conflict with the conventional definition, because it suggests that recognition or judgement of the creative act is a necessary condition of the label 'creative'. However, one can think of theoretical instances, and draw on empirical examples, of creativity existing prior to recognition (e.g. the importance of hand-washing before surgery and the efficacy of hypnosis discovered by Mesmer are now regarded as creative discoveries and yet both were rejected as such by contemporaries: Koestler 1964: 240).

By limiting the conception of potential to that of the abilities of already creative people, one is both creating a selection bias (more people may be potentially creative than actually become creative) and emphasising the importance of empirical data when the object of enquiry is not always capable of empirical existence, as it is with potential. The problem of understanding potential isn't therefore limited to theory; the underlying philosophy of science is actually influencing the way in which we define creativity and research creative potential. How we come to theorise creative potential is therefore restricted not just by theoretical issues but also by meta-theoretical problems. Runco (2003) demonstrates this further as his position is to accept that creative potential exists but that only after it is manifest can we discover whether the potential existed in the first place. When considering how we come to *know* potential, he explicitly recognises tensions within his meta-theory[xviii]:

> I am fully aware that my position on potential does not lend itself to an entirely objective science. However, it may be that we have to modify our methods such that they aren't maximally objective but are as objective as possible and still cover the topic at hand, namely, creativity. *(Runco 2003: 138)*

Whilst he may recognise the tension, he struggles to deal with it and proposes we 'temporarily' suspend objectivity in order to understand the nature of creativity. The emphasis on empirical data and the lack of a conception of potential within his meta-theory has left him in a position whereby he recognises the importance of potential but attempts to explain it are obstructed by the assumptions held about how we come to know it. Potential creativity, it appears, is presumed, and presumed to be meaningful, but we appear not to know how to access it.

Critical Realism

Rather than reflect upon issues contained within the philosophy of science used to inform existing creativity studies[xix], the application of a unique set of ontological commitments, found within critical realism will be applied to creativity research in an attempt to resolve the issues identified. Critical realism has been used successfully within other fields of social science (e.g. Ackroyd & Thompson

1999) but has yet to see widespread application to the study of creativity. The rest of this paper will briefly report on an attempt to rectify this for the study of creativity and therefore offers a critical realist inspired ontology of creativity. First, some features of the philosophy of critical realism, relevant to creativity studies, will be sketched. This will include the notions of causal powers, stratification, emergence and conceptions of absence.

Causal Powers

The notion of causality that underpins a great deal of social science, especially that rooted in positivism and empiricism, derives from the British Philosophe Hume, for whom causality is synonymous with regularity between events. If event x and event y are regularly conjoined, it is presumed that one causes the other. Bhaskar (1998) rejects Hume's notion of causality and argues that the concept of causal powers is more consistent with the ontology of the natural and social world. He argues that the real basis of causality lies in the independence of the generative mechanisms from the events they generate… and they (the generative mechanisms) endure when not acting *(Ibid: 34)*.

For Bhaskar, the causal power of something like gunpowder exists as a result of its necessary internal relations, its essential qualities. These qualities are dependant upon external relations for them to be exercised but these external relations are contingent – on the presence of a spark for gunpowder to explode for example. Furthermore, even if we succeeded in observing some pattern in the flux of events, some co-varying events perhaps, this does not constitute an explanation. Sayer (1992: 107) argues 'merely knowing A causes B is not enough, we want to know the continuous process by which A causes B'.

Stratification and Emergence

This notion of causality provides the means to theorise about the existence of properties and powers without having seen them act, providing a basis for suggesting that reality can be considered stratified into the levels of the *deep,* the *actual* and the *empirical*. This in turn enables us to generate emergent theories of reality. Language use provides a good example of the assumptions contained within notions of a stratified reality. When speaking, the ability to speak becomes observable and audible and therefore enters the *empirical* level of reality. When not speaking, the ability to speak still exists, but it exists at the level of the *actual*, it is an actual ability but un-exercised empirically. The potential for human beings to learn language represents the category of the 'deep'. This ability exists in potential and the majority of new born infants possess it but at birth the ability to use language has not reached the level of the actual or the empirical[xx].

In keeping with this, Margaret Archer (1998) argues a naturalist[xxi] and realist method is possible because of some of the basic principles accepted by critical realism. These being (i) the *intransitive* nature of world (i.e. things exist independent of our knowledge of them); (ii) these things are *trans-factual* in that they are relatively enduring (across space and time); (iii) they have powers that determine what they are (despite outcome variability in open systems); and (iv) that reality is stratified into the *deep*, *actual* and *empirical*. These distinctions mark a significant point of departure between critical realism and other philosophical positions.

Absence and novelty

Bhaskar's (1993) work *Dialectic: The Pulse Of Freedom* contains a detailed discussion of the nature of absence and its importance to critical realist philosophy. Through this discussion he explores how the social sciences can become emancipatory in their nature. It also contains reference to the *ex nihilo* paradox of novelty, the question of where novelty comes from. If from novelty comes from nowhere how can we explain this ex nihilo production without reference to magic? If from somewhere, how can we claim anything is novel? Through examining this paradox with the lens of critical realist philosophy, we can question the argument that creativity should be defined, as a first principle, through the production of novelty.

For Bhaskar, the existence of *ex nihilo* creation follows from his arguments concerning the nature of absolute nothing. He claims that 'if we can conceive of the absolute positive then this, through dialectical argument, enables us to sustain the concept of total void or literally absolute nothing and

that if this is accepted and if one accepts an absolute beginning, then this could only come about through auto-genesis or *ex nihilo* creation, creation from nothing' (*Ibid:* 46-47). Let us accept his premise that the universe came from absolute nothing and ask: 'What are the necessary conditions for this to occur?' One answer to the question would be that the potential for a universe to come into being from absolute nothing must have existed. If this potential is accepted, the potential would, by definition, have to pre-exist the coming into being of the universe.

In other words the potential of that creation must have pre-existed its actualisation. So, to say there was nothing before the universe would in fact be to say that there was no actualised universe, merely the possibility or potential for an actualised universe to come into being from absolute nothing. As critical realism regards potentials as existing at the *deep* level of existence, the concept of absolute nothing becomes problematic to sustain within this philosophy. Generalising from this logic, the possibility of the creation of a new entity must pre-exist its actualisation, whether from absolute nothing or otherwise.

It can therefore be argued (in agreement with Christensen (2002) that *ex-nihilo* creation (in the sense described by Boden (2004) and Perkins (1988) is not sustainable within critical realist meta-theory. Indeed to be consistent with the ontological pre-suppositions of critical realism one must reject the *ex-nihilo* and accept that *potentials* and *possibilities* pre-exist the actual. With this argument it is also possible to reject a definition of creativity as dependent on *ex-nihilo* creation and novelty and if we pursue this logic, we might say that a necessary, but not sufficient condition, for a creative act to occur must include the *potential* for it to occur. Therefore the first ontological principle of creativity becomes not the production of novelty but *discovery* of possibility[xxii]. On the basis of this a new and more nuanced definition of creativity, consistent with the idea of creativity as the discovery of possibility, can be proposed[xxiii].

Creativity Defined

Utilising the meta-theoretical insights developed, and drawing upon some of the ideas captured in the existing literature on creativity, the following stratified definitions of creativity are offered which build sequentially to form an ontology of creativity. With this definition, it is argued higher education practitioners can begin to conceive of creative potential consistently. An ontology of creativity consistent with critical realism presupposes that:

> Creativity is the human potential, power or capacity to make discoveries about the pre-existing potentials and powers of the world and to bring those discoveries into being through the *actualising of a potential* or the *revealing of a power,* or a combination of both.

This definition underpins *all* forms of creativity. Significantly it places discovery, not production of novelty, as the core defining feature of creativity. It is also consistent with this definition to recognise Boden's (2004: 43) contribution to the understanding of creativity and accept that personal and historical creativity have different outcomes by adding:

> These discoveries can *actualise a potential* and/or *reveal a power* for the first time in human history, or merely *actualise* and/or *reveal it* for the first time to the individual or individuals concerned.

This recognises the importance society places on historical contributions but does not reduce creativity to such contributions. Finally, to include the role that personal and societal recognition plays (Amabile 1996; Csikszentmihalyi 1996) in the uptake of creativity, one further addition can be made:

> These discoveries may (or may not) be recognised by the individual and subsequently communicated. If recognised and communicated the discoveries may (or may not) gain individual, group, organisational, community or global recognition and that this process of recognition can be influenced by many factors including[xxiv] economic, political and power processes.

This implies that whilst recognition has an important role, creativity need not be reduced to such recognition. If they are personally recognised and communicated, the discovery can go on to gain wider recognition (or not) and this process can be influenced by many factors. For example, it can involve many processes not necessarily directly involved with creativity itself such as psychological conditions, communication skills, and power and political influences (e.g. Adarves-Yorno *et al* 2006; Fonseca 2002; Latour 1999).

The Ontology of Creative Potential

It is the power or capacity of human beings to be creative that underpins all human creativity. One can recognise the enabling and constraining effects that wider aspects of society has on these human powers and capacities but creativity ought not to be reduced to the existence of those enabling and constraining effects (for example, group recognition). This means we can theorise about the human powers for creativity at a number of levels, including:

(i) As an un-actualised power or capacity and therefore a *potential* power or capacity.
(ii) As an actualised but not necessarily exercised power or capacity.
(iii) As an actualised and exercised power or capacity but not necessarily resulting in a discovery.
(iv) As an actualised and exercised power or capacity that results in a discovery.[xxv]

Level (iv) is perhaps already explicable through existing research and therefore available to scholars already but (i) - (iii) are of importance and are arguably obscured by the existing conceptual framework. Levels (i) and (ii) refer to the development of *creative potential* into an actual skill, ability or in these terms a power or *capacity*. Level (iii) recognises that even if this capacity is in operation, countervailing powers in the environment and self can prevent the capacity resulting in a discovery. The role of education theory becomes, at least in part, to explore each of these levels and offer understanding and explanation of the interactions between them. This ontology may help inform practise by considering at what stage an individual may have reached in the development of their creative potential and what interventions are required to actualise their abilities.

Ideation provides a good example of the distinctions. Ideation, or our ability to come up with ideas, can be seen as a potential power at birth. To actualise this potential requires contact with the structures of society (e.g. Food, shelter, education). Once actualised, we may not necessarily use this power within any given context. An intervention at level (i) would involve helping the development of these powers of ideation. A Level (ii) intervention may be concerned with asking why an individual is not using their powers for ideation, for example, poor motivation or time constraints. At level (iii) a person's power for ideation may be inappropriate to the context; they may be producing unsuitable ideas. Intervention at this level would be different to the other levels as the power would exist but would either require tuning or questions would need to be asked about the structural conditions preventing appropriate use of these powers. Finally, at level (iv) an intervention may be required if discoveries were not being communicated or recognised.

Recognition is still regarded as important to the uptake of creativity but creativity is not reduced to its recognition. Some discoveries have been made and brought into existence without their significance being understood by their discoverers. Contemporary folklore suggests that Edison thought the telephone would only be of limited use, and inventors at IBM did not think there was a market for computers. By recognising this, it enables researchers to explore what it is in the relationship between discoverer, discovered and society that prevent the powers of a thing from being recognised as important. Creativity, by this definition, is not reliant on recognition, but the power of human creativity to affect *change* requires recognition.

Conclusion

A full-blown theoretical model of the causes and processes involved in creative activity is beyond the scope of this paper. The aims of this paper are more limited and are essentially related to reporting on some meta-theoretical ground clearing or under-labouring. Utilising the meta-theory of critical realism a definition of creativity consistent with the notion of creative potential is presented but it is

recognised further research is required, especially to explore the relationship of discovery to creativity. This model suggests there should be no instances of creativity without a moment of discovery and this claim is possible to explore within an educational setting. Importantly, research into the barriers to creativity can progress without the need for a recognised creative product. The conceptions of creative potential presented provide social theorists with the ability to research structural conditions surrounding creativity without introducing the selection bias of researching already creative people.

For now, I'd like to speculate on the consequences of this ontology for education. If creativity can exist as a potential, unrecognised and unexercised, then the fact that we rarely see creative activity displayed should not (mis)lead us into believing that millions of people simply lack creative potential. This should lead us to ask far more searching questions, not just of people *qua* agents, but of the social structures, institutions and organisations within which people find themselves interacting. If people are potentially creative we should enquire more deeply into what it is about these social structures, institutions and organisations that not only prevent people's creative powers being exercised and actualised, but also prevent their exercised and actualised creativity from being recognised. Rather than suggest people lack creative potential if they do not seem to act creatively, we should first explore whether it is something in the nature of the wider social structures that actively prevents them not only from being able to be creative, but also from wanting to be creative.

References

Ackroyd, S. & Thompson, P. (1999). *Organizational Misbehaviour.* Sage Publications.

Adarves-Yorno, I., Postmes, T. & Haslam, S. A. (2006). Social identity and the recognition of creativity in groups. *British Journal of Social Psychology.* 45, 3, 479-498

Amabile, T, M. (1996). *Creativity in Context.* 2nd edition Oxford: Westview Press.

Amabile, T, M. (1997). Motivating creativity in Organisations: On doing what you love and loving what you do. *California Management Review,* 40, No 1, PP 40.

Archer, M. (1998). Introduction: Realism in the Social Sciences. In Archer, M., Bhaskar, R. Collier, A., Lawson, T., & Norrie, A. (Eds) *Critical Realism: Essential Readings.* London: Routledge pp189-205

Barrow, J. D. (1998). *Impossibility: the limits of science and the science of limits.* Oxford: Oxford University Press.

Bhaskar, R. (1993). *Dialectic: The pulse of freedom.* London: Verso

Bhaskar, R. (1998). Philosophy and Scientific Realism. In Archer, M., Bhaskar, R. Collier, A., Lawson, T., & Norrie, A. (Eds) *Critical Realism: Essential Readings.* London: Routledge pp16-47

Bleakley, Alan. (2004). 'Your Creativity or mine?': A typology of creativities in higher education and the value of a pluralistic approach. *Teaching in Higher Education.* 9, 4, 463-475

Boden, M. A. (2004). *The Creative Mind: Myths and Mechanisms.* 2nd Edition. London: Routledge.

Bommer, Michael & Jalajas, David. (2002). The innovation work environment of high-tech SME's in the USA and Canada. *R & D Management 32 5 PP379-386*

Christensen, B. T. (2002). *The creative process and reality: An analysis of search and cognition in the creative process and a call for an ecological cognitive framework for creativity studies*. Doctoral Dissertation, Udgivet PA Psykologisk Institut, Denmark.

Compton, Ashley. (2007). What does creativity mean? *Education* 35, 2, 109-116

Cowdroy, Rob., & De Graff, Erik. (2005). Assessing highly creative ability. *Assessment and Evaluation in Higher Education.* 30, 5, 507-518.

Cummings, A. & Oldham, G. R. (1997). Enhancing Creativity: Managing Work Contexts for the High Potential Employee. *California Management Review,* 40, No 1, PP 22-38

Csikszentmihalyi, M. (1996). *Creativity: flow and the psychology of discovery and invention.* London: Harper Collins

Dewitt, Todd. (2003). Understanding the relationship between Information Technology and creativity in organisations. *Creativity Research Journal, Volume 15, No's 2 & 3 PP 167-182*

Epstein, R. (1991). Skinner, creativity and the problem of spontaneous behaviour *American Psychological society,* Vol. 2 No 6 362-370

Fleetwood, S. (2005). 'The Ontology of Organisation and Management Studies: A Critical Realist Approach' *Organization, Vol. 12, No. 2, 197-222.*

Fonseca, J. (2002). *Complexity and Innovation in Organisations*. London: Routledge.
Koestler, A. (1964). *The Act of Creation.* 1st Edition Hutchinson.
Latour, B (1999) *Pandora's Hope: Essays on the reality of Science Studies*. London: Harvard University Press.
Perkins, D. N. (1988). The possibility of invention. In Sternberg, R. J. (ed), *The nature of creativity.* Cambridge University Press.
Proctor, R. A. (1991). The importance of creativity in the management field. *British Journal of Management.* Vol. 2 223-230
Runco, M. A. (2003). Commentary on personal and potentially ambiguous creativity: You can't understand the butterfly unless you (also) watch the caterpillar. *Creativity Research Journal.* 15, 2&3, 137-141
Runco, M. A. (2006). Everybody has creative potential. In Sternberg, R. J. Grigorenko, E. L., & Singer, J. L. (Eds). (2006). *Creativity: from potential to realisation.* London: American Psychological Society.
Sayer, A. (1992). *Method in Social Science: A Realist Approach.* London: Routledge.
Sternberg, R, J. (2003). WICS: A Model of Leadership in Organisations. *Academy of Management Learning and Education.* Vol 2, No 4, 386 – 401.

Mumford, M. D. (2000). Managing Creative People: Strategies and Tactics for Innovation. *Human Resource Management Review.* 10, 3, 313-351.
Williams, W. M. & Yang, L. T. (1999). Organisational creativity. In Sternberg, R. J. (1999) (ed). *Handbook of Creativity.* Cambridge University Press.

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(D.26)

Christer Johannesson, Weekend Courses for Children: Universities and university colleges have sometimes Open House activities for visitors but very seldom practical and interesting activities for children. Science demonstrations are very rare. At The Royal Institute of Technology (KTH) a further step was taken about 10 years ago. In order to deliver something more Saturday courses for children was invented. The idea was to stimulate children to study science and technology with more enthusiasm at school. At the same time the course satisfy creative thinking, ability to find solutions to problems, working together with other children, dexterous skills etc. The course has meetings on ten Saturdays with a new theme every Saturday. At the meeting there is first a short introduction and then experiments are performed. The children also build things to bring home. The themes are air, sound, water, light, electricity and magnetism etc. The introduction at the meeting is rather short. The dialog between the children and assistant is more important than a long introduction. The children put questions, assistants explain and together with experiments a base for learning is made. When a child put a specific question he/she is interested to hear the answer and listen carefully. There is an ultimate pedagogical occasion when a small group of children sit together with an assistant doing experiments, discuss and talk about science and technology. Learning by doing is a key point in this course.

(D.27)

The role of creative music activities in Greek compulsory education: An investigation of Greek music teachers' perceptions

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Abstract

Creativity's enhancement through education is being widely discussed and promoted, especially in the past few decades and tends to be at the core of contemporary educational systems. In the music domain, teaching philosophy and practice seems to focus on ways that can encourage children to learn and apply their knowledge through creative music activities. This paper reports on the outcomes of a research undertaken in 112 general music teachers of different ages and scientific backgrounds, who teach in 235 primary and secondary schools in Greece. Since it was the first time that such a research is conducted in Greece, the main aim of the study was to reveal how Greek music teachers think, feel about, and influence students' creativity and the teaching conditions that may enhance or inhibit it. It is believed that such a study may contribute to our knowledge of the educational reality for any future development of creativity enhancement projects through music teaching. The findings suggest that creativity is associated by Greek music teachers with a natural gift that cannot be addressed in all students, and can only be partly taught in music classroom. They also indicate that teachers do not have explicit understanding of music creativity as well as creativity assessment, since most of them tend to assess students' creative performance on the basis on non musical criteria (i.e., participation, eagerness e.t.c.). Results also show that creative musical activities are more often applied in primary education, while in secondary education are successively replaced by music theory and history. Finally, a negative view about the music curriculum, textbooks and number of teaching hours is identified. Such findings lead to the suggestion for numerous changes in music teachers' education, setting training in teaching for creativity as a fundamental priority.

Introduction

In the past few decades, creativity has been one of the primary concerns of educational policy. In recent years especially, an intense trend in educational planning of many countries for the recognition of creativity and its inclusion in the aims and the objectives of the curricula (Sharp, 2004), may be observed. Amid the rapid social changes, the competition of the economies, and the continuous technological achievements, it has been gradually realised that schools need to produce people capable for innovation and originality. This comprised the beginning of the attempt for the encouragement of creativity in schools (Cropley, 1997).

In current times, many states, with Greece among them, attempted to change their curricula, often focusing on the development of creativity in education. In the Greek educational curriculum, (Law 1566/85 (art. Par.1, for the "Structure of the Primary and Secondary education") it is mentioned that "the aim ……is to contribute to the overall harmonic and balanced development of the cognitive pscycho-physiological abilities of the pupils, so that, regardless of their gender and origin, to be able to develop into fully grown personalities and to live creatively; while one of the basic principles which should be promoted through all educational subjects, is according to DEPPS (2003, par. 3) the ability for creative conception.

According to the report of NACCCE (1999, Chapter 2, par. 27): "all people are capable of creative achievement in some area of activity, provided that the conditions are right and they have acquired the relevant knowledge and skills". This view is close to the current research orientation that focuses on any person's and not only geniuses' creativity, which develops in the social system rather than within one person, and whose existence does not depend solely on its connection to new original products (Craft, 2005). Creativity is an innate characteristic of all humans but, a combination of circumstances is needed for it to emerge. Everyone has creative potential, because everyone can understand and appreciate her/his experiences (Runco 2003, 2006). The necessary elements may be inherent in some people, while some other need help, encouragement and support to operate creatively. Especially children whose creative potential has not been expressed yet, are the ones who need education and the creative conditions that education may offer to them.

Sharp (2004), as well as a number of other researchers (eg Amabile 1996; Cropley 1997; Sternberg, 2003; Mahboub et al. 2004; Lindström 2005; Jeou-Shyan et al. 2005) think that childrens'

creativity can be enhanced in education in three perspectives: The creative learning environment, the creative educators and the creative teaching.

Creativity in music education.

Defining Music Creativity.

Creativity related to the art of music is still covered with mystery, ambiguity and, at the same time, charm. Music is a phenomenon which cannot be experientially isolated, (Williamon et al., 2006). Even composers, who have experienced and are familiar with creative process, find it hard to describe it with clarity (Haroutounian, 2002; Lapidaki, 2007). The difficulty of the definition and the exact depiction of music creativity however, in no case should it dispute its existence and importance. Some researchers, attempting to define the meaning of music creativity, have described a process which, according to Webster (2002), is active, constructed and aiming at the production of something which is new to the person. Gordon (1988) argues that the person, consciously or unconsciously, organises known music constructs and materials in new or unknown ways. Others (Webster, 2002; Hickey & Webster, 2001) claim that during the creative process people have to activate both divergent and convergent thinking, as they have to conceive many musical ideas and then to select some of them and combine them in such a way so that they make music sense.

The conception of Csikszentmihalyi and Custodero (2002) for the term music creativity is broader. They argue that it may appear in a number of human music expressions, such as the expression of a young child with spontaneous melodies and rhythms, or the conversion of an object into a musical instrument. The active relationship of people with their internal and external world, at the emergence of creativity is being stressed by Reybrouck (2006), who describes musical creativity beyond the narrow limits of composition and performance, as "coping with the sonic world" (:42). Besides, since people are in constant interaction with their environment, Haroutourian (2002) mentions that music creativity is the creative process of communication of ideas and feelings through sounds, "the creative interpretation" as she names it.

Although the above definitions emphasise on different elements of music creativity, they converge to the fact that it concerns an "interactive relationship" of a person with the sound, by which the person goes through some cognitive processes, either consciously with a specific aim in predefined framework, or not.

Implications for teachers.

In the past decades, important theories and models were stated, which attempted to discuss music creativity and the framework in which it appears and develops (Swanwick & Tillman, 1979; Webster, 1988, 1991, 1994, 2002; Elliott, 1995; Csikszentmihalyi, 1996; Sheridan & Byrne, 2002). Researchers have been concerned with the processes by which people -and especially pupils- go into musical creative activities of composition (e.g. Burnard & Younker, 2002; Burnard, 2006), and improvisation (e.g. Kratus, 1996; Tafuri, 2006). This research, in combination with the research concerned with creativity in education, may lead to useful conclusions about the role of the educators in creative teaching, especially in music teaching.

The term creative teacher implies the teacher who reinforces and promotes creativity of his/her pupils (Craft, 1997). This effort is continuous, everyday and flexible to modifications depending on the existing circumstances. Sternberg, (Sternberg 2003, Sternberg & Grigorenko 2004) defined the creative teachers as the ones who promote their pupils to create, invent, discover, imagine what would happen if, suppose that, and foresee. Teachers who can develop pupils' creativity are those who first of all identify the creative skills of pupils, (Jeffrey & Craft, 2004), the factors that affect them, and the ways by which they can intervene so that they can be improved. Understanding creativity by the teacher is a necessary condition (Cropley, 2002), since it is the only way to recognise the creative abilities of pupils, in order to generate the conditions which are necessary for the development of such skills.

The acceptance of pupils' creative elements leads to an adoption of relevant teaching approaches and to the formation of school classes, in which mistakes, doubts, curiosity, free expression of ideas, and non expected answers by pupils are all accepted (Cropley, 2002).

It is also essential that teachers themselves manifest characteristics of creative persons, such as: to draw satisfaction by the nature of their work and not by the financial income or any distinctions it may provide; that is, to be motivated by intrinsic and not extrinsic motivation; to be easily susceptible to external feelings; to express their thoughts and ideas easily (Jeou-Shyan et al., 2005); to look for ways, means and materials; to plan interesting teaching and creative experiences for their pupils (Sharp, 2004), considering, at the same time, their creative personalities not to overshadow the initiatives and the efforts of their pupils (OFSTED, 2003). It is also part of teachers' work to use the appropriate strategies, so that they are the accommodators of learning, the co-operators and co-creators (Dineen & Collins, 2005), as well as the classroom managers where the strict hierarchy of traditional teaching is absent and all views are freely heard (Belkin, 2002). It is important that by no means, in the name of an ill defined creativity, a deep knowledge of the subject by the teacher is overlooked (Sternberg, 2003). Creative teachers' curiosity, willingness for exploration and spiritual flexibility, all consist a continuity of the secure subject knowledge and the constant knowledge renewal, and cannot –nor should they- be separated, because in such a way creativity looses its essence (OFSTED, 2003).

Finally, as far as pupils' assessment is concerned, teachers' attitude that support pupils' creativity, is the provision of constant and immediate feedback, the systematic use of formative assessment in the school class (Hickey & Webster, 2001), the training of pupils in peer assessment practices, and the motivation of teachers and pupils to self-assessment (Cropley, 2002). Creative activities need qualitative assessments, in which the emphasis is placed not that much on the final product or the final performance, but rather on the process that has preceded (Runco, 2003; 2006). In any case, there is a need for clear criteria and methodology which derive from teachers' knowledge of pupils' musical perception, as well as from creative activities (Wiggins, 2002). Teachers should know the most appropriate activities for each occasion, so that they choose the ones which correspond to pupils' needs, interests, and level (Wiggins, 1999).

The main music creative activities are the composition and the improvisation, but pupils' creativity can be expressed by a large number of other music activities such as performance, experimentation with musical instruments and sounds, as well as the exploration of sound sources.

Music teachers' beliefs about creativity have not been extensively investigated. Odena (2001) studied music teachers' views about creativity and its expression in music teaching. He was led to the conclusion that teachers interpret creativity in a personal and subjective way. In a later study (Odena, 2006), attempting to find the factors that differentiate teachers' views, he concluded that they (the views) were affected significantly more by the kind of their music studies than their educational studies and the years of experience in education. It seems, therefore, that the sense of creativity is rather vague, and hard to be defined by teachers.

Music teaching in Greek compulsory education

In Greece, the subject of music is being taught once a week in the last four grades of the Primary school, and in all three grades of the lower Secondary School (Gymnasion). Specialised music schools also operate in secondary education, which are not at the focus of the present study. Music teachers may be graduates of one of the four Music Departments of state Universities, or alternatively, they may hold certificates of study (theoretical or of musical instrument[55]) of private Conservatories or Music Schools. The selection of qualified teachers for education in recent years happens through a written examination that takes place every two years.

The educational material is designed by the Institute of Pedagogy of the Greek Ministry of Education. In Primary education music textbooks (student book, workbook, teacher book) were first introduced in the academic year 2007-2008, while in secondary education, the existing textbook (student book) has not been modified, renewed or replaced since its first year of introduction, namely, in 1985. The music curricula on the other hand, have been modified in 2003, without however, the simultaneous introduction of new teaching material. Criticism has been exercised about the position of

[55] [In Greek private conservatories one can hold degrees in *theoretical studies* (Degree in *Odiki*, *Harmonic Theory*, *Counterpoint*, *Fugue* and *Diploma in Composition*) and/or *instrumental studies* (first degree –*ptychion*- and second degree –*diploma*- in a certain musical instrument.]

creativity in music curricula, which, although it is often mentioned as one of the primary aims of music teaching (DEPPS, 2003), a clear definition of it is not given.

Research

Subject, Aim, Research questions.

The subject of the present paper is the music teachers' perceptions about the role of creativity and creative music activities in Greek compulsory education. In Greece such a research has never been conducted before. It is aimed that results could serve as a basis of discussion, reflection and initiatives. Additionally, needs, difficulties and limitations that affect creativity music education, are aimed to be presented.

Methodology

Research instrument.

An anonymous questionnaire was administered to music teachers. The questionnaire attempted to investigate the following issues:

- Frequency of creative music activities' implementation.
- Music teachers' beliefs about creativity's role in teaching.
- Music teachers' understanding of music creativity.
- Music teachers' efficacy beliefs about teaching and assessing pupils' creativity.
- Music teachers' attitudes towards Music curriculum, teaching time and music textbooks.

Reliability.

Cronbach alpha reliability was 0,840, explaining 70,56% of the total variance. Overall it may be argued that questionnaire met the reliability standards.

Sample.

The sample consisted of 112 music teachers, (graduates of Music Departments of University -PE 16.01- or of Private Conservatories -PE 16.02-), that taught in 232 primary and secondary schools.

Eighty nine participants (79.5%) were female (Table 1) and 23 (20.5%) male. Most of them (60.7%) were under 40 years old, as shown in Table 2.

Table 1: Gender.

GENDER	N	%
MALE	23	20.5%
FEMALE	89	79.5%
TOTAL	112	100.0%

Table 2: Age.

AGE	N	%
22-30	4	3.6%
31-40	68	60.7%
41-50	32	28.6%
>50	8	7.1%
TOTAL	112	100%

Participants' academic qualifications are described in Table 3. More than two thirds of the sample (68.8%) did not hold a University degree in Music, as they had graduated from private Conservatories.

31.3% of participants had a first degree in Music and 5 of them held a master degree. Two of them possessed a Ph.D.

Table 3: Academic qualifications.

University studies	N	%
None	77	68.8%
Faculty of Music Studies	35	31.3%
TOTAL	112	100.0%

Most of participants (90.2%) held a music degree from a private music conservatory. The majority of music degrees of all teachers (University graduates and non graduates) were in Harmonic Theory and Counterpoint (57 and 61% respectively). Less than half of the participants had a Degree in Counterpoint (23.2%) and a Diploma in Composition (23.2%), as shown in Table 4.

Table 4: Highest music qualifications (music conservatory degrees).

Theoretical studies in Conservatory	N	%
None	11	9.8%
Degree in "Odiki"	8	7.1%
Degree in Harmonic Theory	33	29.5%
Degree in Counterpoint	26	23.2 %
Degree in Fugue	26	23.2%
Diploma in Composition	8	7.1%
TOTAL	112	100.0%

No important differences were observed in age and years of professional experience distribution. Nevertheless, 6 out of 10 respondents belonged to the age group "31-40 years old" (Table 5).

Table 5: Age and Years of professional experience.

AGE	YEARS OF PROFESSIONAL EXPERIENCE					TOTAL
	1-5	6-10	11-15	16-20	>20	
22-30	4	0	0	0	0	4
31-40	19	28	16	5	0	68
41-50	1	2	6	17	6	32
>50	0	0	0	2	6	8
TOTAL	24	30	22	24	12	112

Table 6 shows that 55.4% of music teachers reported that, at the time of the study, taught in Primary education, while 46% in Lower Secondary School (Gymnasion).

Table 6: Educational level.

Educational Level	N	%
Primary	62	55.4%
Secondary	46	41.1%
Both	4	3.6%
TOTAL	112	100.0%

As shown in Table 7, teachers who belonged to "above 40" age groups, taught mainly in secondary education (58.2%), while younger ones ("40 or under") taught in primary education. This differentiation can be explained by the fact that the Subject of Music has only recently been included in Primary School Curricula, while in Secondary Education is being taught for several decades.

Table 7: Age and Educational Level distribution.

Educational Level		AGE				TOTAL
		22-30	31-40	41-50	>50	
Primary	N	3	48	11	0	62
	%	4.8%	77.4%	17.7%	.0%	100.0%
Secondary	N	1	18	20	7	46
	%	2.2%	39.1%	43.5%	15.2%	100.0%
Both	N	0	2	1	1	4
	%	.0%	50.0%	25.0%	25%	100.0%
TOTAL		4	68	32	8	112
		3.6%	60.7%	28.6%	7.1%	100.0%

Music teachers in Greece are obliged to work in more than one schools, as music lessons are taught only once a week. In primary education half of the music teachers reported that they were required to teach in 3 different schools, while most of teachers in Gymnasion (58.7%) taught music in one school and 40% of them in 2 schools. As shown in Table 8, 11% of teachers in primary schools had to teach in 4 or even in 5 schools.

Table 8: Educational Level and Number of Schools.

Number of schools		Educational Level			TOTAL
		Primary	Secondary	Both	
1	N	9	27	3	39
	%	14.5%	58.7%	75%	34.82%
2	N	15	18	1	34
	%	24.2%	39.1%	25%	30.4%
3	N	31	1	0	32
	%	50%	2.2%	.0%	28.6%
4	N	6	0	0	6
	%	9.7%	.0%	.0%	6.9%
5	N	1	0	0	1
	%	1.61%	.0%	.0%	0.9%
TOTAL		62	46	4	112
		100.0%	100.0%	100.0%	100.0%

Data Collection

Questionnaires were delivered in music teachers of Greek primary and secondary schools from September to December 2007. Of 148 questionnaires, 112 (75.68%) were returned completed.

Results

Implementation of Music creative activities

The first part of the questionnaire included fourteen statements referring to music activities that may occur in a music lesson. The first six of them described general music activities (singing, listening, music analysis, performance, music theory/history, music dictation), and the rest 8 statements referred to creative music activities (composition, improvisation, experimentation, instrumentation, all with instruments or/and musical sources). Teachers were asked to mark the

frequency of activities' employment in their music class. Answers ranged from 1 (*never employed*) to 5 (*employed in every lesson*). The results (see Table 9) showed that teaching time in Primary school was mainly devoted in *singing* (M=4.11, SD=.749) and *instrumental performance*, solo or orchestra (M=3,45, SD=1,097). Teaching in secondary schools, on the contrary, included *music theory and history* in almost every lesson (M=4.22, SD=.987) and quite often *singing* (M=3.72, SD=1.089) and *listening and evaluating* (M=3.63, SD=.853). Music dictation was the least implemented general music activity in both primary (M=1.85, SD=.786) and secondary (M=1.89, SD=1.120) music teaching. Additionally, it was found that *singing* and *performing* were replaced in secondary education by music theory and history.

Table 9: Implementation of music activities.

	EDUCATIONAL LEVEL							
	PRIMARY		SECONDARY		BOTH		Total	
	M	SD	M	SD	M	SD	M	SD
SINGING	4,11	,749	3,72	1,089	4,50	1,000	3,96	,929
THEORY/HISTORY	3,08	,836	4,22	,987	3,75	,500	3,57	1,046
AUDITION	2,90	,762	3,63	,853	3,50	,577	3,22	,867
PERFORMANCE	3,45	1,097	2,74	1,324	3,50	1,732	3,16	1,256
ANALYSIS	2,03	,789	2,80	1,003	2,75	1,258	2,38	,969
DICTATION	1,85	,786	1,89	1,120	2,50	1,732	1,89	,971

The second set of questions (quest.7-14) was related to creative music activities, such as composition, improvisation, instrumentation and improvisation. As seen in Table 10, creative activities were less frequently employed in all educational levels. No participant reported that s/he employed any creative activity "very often"(value *4*) or "in every lesson" (value *5*). All means were below the middle value "sometimes" (*3*). The least implemented creative music activities seemed to be *composition*, either vocal or instrumental (see Table 10).

Table 10: Implementation of creative music activities.

	EDUCATIONAL LEVEL							
	PRIMARY		SECONDARY		BOTH		Total	
	M	SD	M	SD	M	SD	M	SD
EXPLORATION OF INSTRUMENTS	2,79	,994	2,54	1,242	3,25	,500	2,71	1,096
IMPROVISATION INSTRUMENTAL	2,65	1,118	2,22	1,348	2,25	,957	2,46	1,222
EXPERIMENTATION	2,65	1,057	2,13	1,166	3,00	,816	2,45	1,122
IMPROVISATION VOCAL	2,66	1,086	2,11	1,197	2,25	,500	2,42	1,144
INSTRUMENTATION	2,58	1,095	2,11	1,215	2,25	1,258	2,38	1,163
EXPLORATION OF SOUND SOURCES	2,42	1,049	1,91	1,029	2,00	1,155	2,20	1,064
COMPOSING VOCAL	2,13	,839	1,80	,957	2,25	1,258	2,00	,910
COMPOSING FOR INSTRUMENTS	2,02	1,063	1,76	1,037	2,00	,000	1,91	1,036

Overall, creative music activities appeared to be less frequently implemented than general music activities, such as singing or music audition. Composition seemed to be the least frequently implemented activity both in primary and secondary education.

The years of professional experience appeared to differentiate music teaching (Table 11). The mean frequency of creative music activities in teaching was found to be significantly bigger in teachers with less professional experience, than in more experienced ones, who appeared to teach mainly music theory and history ($F(110)=11.829$, $p=.000$). A post-hoc analysis showed that significant differences lie mainly between groups "1-5 years" and "more than 20 years".

Table 11: Differences in music activities' (general and creative) implementation with regards to Professional Experience

	Professional Experience (in years)												
Activity	1-5		6-10		11-15		16-20		>20		F	df	sig
	M	SD	M	SD	M	SD	M	SD	M	SD			
Theory/History	2.88	1.076	3.27	.828	3.45	.858	4.33	.868	4.42	.669	11.829	110	.000
Composing for instruments	2.50	1.319	1.87	.860	1.68	.839	1.75	.989	1.58	.900	2.845	110	.028
Improvisation with instruments	2.83	1.204	2.73	1.230	2.14	1.167	2.38	1.245	1.75	.965	2.489	110	.048
Experimentation with sounds	3.17	.816	2.43	1.006	2.23	1.232	2.21	1.179	1.92	1.084	4.018	110	.004
Sound exploration	2.83	1.129	2.03	.890	2.36	1.177	1.79	.779	1.83	1.115	4.089	110	.004
Improvisation with voice.	3.00	.978	2.63	1.159	2.18	1.220	2.21	1.103	1.58	.669	4.311	110	.003
Instrumentation	3.00	1.142	2.53	1.224	2.23	1.066	2.04	1.083	1.67	.778	3.941	110	.005

Finally, teachers appeared to differ significantly with regards to the instrument degree they held ($F(110)=3.51$, $p<.05$, see Table 12). Post-hoc analysis showed that those with no instrument degree tended to include composition in their teaching significantly less than teachers who possessed first or second degree in a musical instrument

Table 12: Differences in music activities' (general and creative) implementation with regards to Instrument Degree.

ACTIVITY	**Degree in certain instrument**								
	NONE		1st Degree (Ptychion)		2nd degree (Diploma)		F	df	sig
	M	SD	M	SD	M	SD			
Composing for instruments	1.58	.881	1.84	.938	2.27	1.206	3.507	110	.033

Teachers' beliefs about creativity's role in teaching.

It is interesting that participants tended to believe that creativity is an innate characteristic which can be promoted only up to a certain degree through education, since it can not be taught to all children (Table 13). What teaching can do, according to teachers' views about creativity, is to motivate pupils to be creative. About 1 in 3 participants (30.8%) thought that it can be promoted with proper methodology, while 4.4% of the teachers reported to believe that creativity is a solely personal attribute that can not be taught.

Table 13: Teaching creativity.

Do you believe that creativity can be taught? Please justify your answer.			
	Ntotal[2]	**N**	**%56**
It's an innate talent; it can be promoted as long as it exists.	91	34	37.4
Yes, with proper guidelines and methods.		28	30.8
It can not be taught, it can only be motivated.		13	14.3
Yes.		7	7.7
Yes to a certain degree.		6	6.6
No, it depends on imagination and inspiration.		4	4.4

Music teachers' understanding of music creativity.

The next four statements were concerned with participants' understanding of creativity manifestation. Four statements (two describing creative situations and two non creative) were presented to music teachers, asking them to mark their opinion on a five-point Likert type agreement scale (1= *I strongly disagree* to 5=*I strongly agree*). Their answers are presented in Table 14. It is notable that a large percentage of teachers (46.3% and 40.9%) seemed to perceive non creative situations as creative.

Table 14: Frequencies of teachers' perceptions of creative situations.

Music creativity occurs when pupil…						
	1 Strongly disagree	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 Strongly agree**	**Total**
	%	%	%	%	%	%
…transforms an object to a musical instrument.	0.9	0.9	11.8	33.6	52.7	100
…composes a musical piece.	0.9	8.1	18	41.4	31.5	100
…performs correctly a rhythm pattern.	2.7	25.5	24.5	30.9	16.4	100
…answers correctly to a posed question.	12.7	20	26.4	30.9	10	100

[56] %= Percentage of all answers reported.

In the following open-ended question (Table 15), participants were asked to report a case in which pupils' creativity was manifested in music teaching. Most of them mentioned *rhythmic improvisation with percussion* (40%) and *instrument construction* (15%). *Pantomime*, *sound story* and *melodic improvisation in existing lyrics* were also among most frequent answers. Interestingly enough, music composition was not mentioned at all.

Table 15: Music creative activities.

Describe a music class activity, in which pupils were able to express their creativity.			
	Ntotal	**N**	**N%**
Improvisation with percussion.	80	32	40
Instrument construction.		12	15
Pantomime / Choreography.		8	10
Improvising short melodies in existing lyrics.		7	8.8
Sound-story.		7	8.8
Painting based in musical piece.		6	7.5

Music teachers' efficacy beliefs about teaching and assessing pupils' creativity

Participants expressed a high level of self-efficacy in teaching and assessing music creative activities on a five-point Likert type agreement scale[57] (Table 16).

Table 16: teachers' self-efficacy beliefs about teaching and assessing creativity.

	N	**Min**	**Max**	**M**	**SD**
I know how to assess…					
…music performance.	108	2	5	4,15	,783
…improvisation.	107	2	5	3,91	,830
…composition.	108	2	5	3,82	,863
I am adequately trained for creative music activities.	111	1	5	3,44	1,150

Private conservatories' graduates appeared to feel significantly more efficacious in assessing composition than their colleagues who held a University degree ($t(106)=3.189$, $p<.01$), as shown in Table 17.

Table 17: Differences in teachers' self-efficacy in assessing composition, with regards to their music studies

	Degree	**N**	**M**	**SD**	**t**	**df**	**sig**
I know how to assess a music composition.	University	35	3.46	.886	3.189	106	.002
	Conservatory	73	4.00	.799			

Teachers were asked by an open-ended question to name criteria they used for assessing creativity (Table 18). The most commonly mentioned one was *originality* (23.4%). The ones that

[57] [1= *I Strongly disagree*, 2= *I Disagree*, 3=*I am neutral*, 4= *I Agree*, 5= *I Strongly Agree*].

followed, however did not describe creative behaviours, but rather social skills, such as *eagerness* (18.2%), *co-operation* (16.9%) and *pupil's effort* (13%). *Imagination* was mentioned in 11.7% of all answers, while 9% of music teachers reported that they assessed creativity taking into account the degree to which pupils follow given rules and directions. It is also worth stressing that 35 teachers (31.2%) found it difficult to mention any specific assessment criteria.

Table 18: Assessment criteria of music creative activities.

In your opinion, on which criteria should assessment of music creative activities be based?			
	Ntotal	**N**	**N%**
Originality	77	18	23.4
Eagerness		14	18.2
Cooperation		13	16.9
Effort		10	13
Imagination		9	11.7
Following of rules		7	9

This finding strengthens the idea that teachers did not have explicit idea about what creativity consisted of, how it was expressed and by which criteria it could be recognised and assessed. It must be mentioned however, that even in the official Music Curriculum no criteria, standards or guidelines are specified to music teachers; the only clarified thing is that "assessment criteria must be understood and accepted by all" (Music Curriculum, 2002:352).

Music teachers' attitudes towards Music curriculum, teaching time and music textbooks.

As far as teaching time is concerned, all participants appeared to believe that it should be increased (M=4.82, SD=.506), while 76.8% though that the lesson's duration was not long enough for creative music activities. Teachers also expressed negative attitudes towards the music curricula, as shown in Table 19.

Table 19: Teachers' opinion about teaching material/ time.

	N	**Min**	**Max**	**M**	**SD**
More teaching time is needed.	112	2	5	4,82	,506
The music textbook is helpful.	112	1	5	2,75	1,189
The music curriculum is helpful.	111	1	5	2,51	,980
I must teach according to textbook.	112	1	5	2,47	1,031
The duration of the teaching period is sufficient.	112	1	5	1,97	1,111

Primary school music teachers appeared to be significantly more satisfied by the music textbooks as far as creativity is concerned, than secondary ones (t(106)=7.551, p=.000, see Table 20). Such a difference sounds logical, since primary school textbooks were introduced in school year 2007-2008, while secondary school textbooks were first introduced nearly 25 years ago, and still have not been replaced or modified.

Table 20: Differences in teachers' opinions about music textbooks with regards to Educational Level.

	Educational Level	**N**	**M**	**SD**	**t**	**df**	**sig**
Music textbooks are helpful	Primary	62	3.37	1.012	7.551	106	.000
	Secondary	46	1.93	.929			

Finally, Table 21 demonstrates the major difficulties in implementing creative music activities, according to music teachers. Participants mentioned as major difficulties the lack of music classroom (25.2%), the lack of teaching material and instruments (23.8%), the small number of teaching hours (21.6%), the large number of pupils in music classes (8.6%), the lack of discipline (7.9%), and attitudes of parents and pupils towards the subject of music (7.6%), which is often considered to be a teaching subject of minor importance.

Table 21: Difficulties of implementing music creative activities.

Which are the major difficulties in teaching creative activities in music class?			
	N total	**N**	**%**
There is no separate music classroom in my school.	139	35	25.2
Lack of materials (musical instruments, supporting material)		33	23.8
Short teaching time (once a week).		30	21.6
Two many pupils in the classroom.		12	8.6
Lack of discipline		11	7.9
Parents' / Pupils' attitudes towards music discipline.		10	7.6

Implications for pedagogy

The present study demonstrated a picture of Greek schools' music reality, which differs a lot from what the Music Curricula describe, in relation to the development of creativity in the classroom. The emerging implications of this can be divided in two major areas: one related to teaching and the other related to teachers.

Teaching

Music creativity may be enhanced only through practice, personal action and pupils' active participation, exploration, experimentation and a "creative dialogue" with the sounds. In this sense, the characterisation of the subject of music as "laboratory" is absolutely correct; Greek reality however belies intentions, as in the majority of schools there is no access to any music rooms, music instruments, technological means etc. The time spent for teaching music in Greek schools, (20-25 hours per year in secondary, 25-30 hours in primary education), is far less in comparison with other European countries. All the above were revealed in this study as factors which inhibit teaching of creative music activities.

The introduction of teaching material (student book, workbook and teacher book) in Primary Education seems to have helped teachers. On the contrary, the depreciation of the secondary school textbooks, which have not been revised in the past 20 years, by music teachers, necessitates either the introduction of a new textbook which will be in accordance with the modern theories and practice of music education, or the allowance to music teachers to use textbooks of their choice. The change of the curricula which took place in recent years did not seem to be enough for teachers, who appeared to be frustrated and helpless, especially in secondary education, where they are obliged to teach music without musical instruments, without books, without rooms, in classes of 25-30 pupils for 40 minutes a week.

Teachers

Teachers are considered to be the most important factor for the development of creativity in education. As analysed in the introduction of this paper, it is necessary for the educator to be able to recognise, understand and support pupils' creativity, so that s/he teaches accordingly.

The present study demonstrated teachers' difficulties in understanding creativity, and most important in distinguishing between creative and non creative elements of teaching. Especially as far as music creativity is concerned, it became evident that teachers may recognise creative activities, more through their instinct and common sense, than through their knowledge and experience. This resulted to their view that music creativity is something unclear and subjective, an inherent characteristic which cannot be taught, it does not refer to all pupils, and thus, it is difficult –or even unethical- to be assessed.

All teachers should receive substantial training about creativity in general and music creativity in particular, and also they should be provided all the valid methodology and practical advice for its teaching and assessment. Moreover, training should not be offered only to newly appointed teachers, but also to the experienced ones, as years of professional experience appeared to be strongly related to creative activities' implementation.

Finally, the general conclusion of this study is that creativity is considered to be important and desired, a primary aim of music teaching, but at the same time, something vague, mysterious and personal, so that its enhancement and development is almost infeasible in the current Greek School.

References

Amabile, T. M., (1996). *Creativity in Context*. Westview Press.

Burnard, P., (2006). Reflecting on the creativity agenda in education. *Cambridge Journal of Education*, 36, 3, pp.313-318.

Belkin, A., (2002). *Encouraging Musical Creativity*, Université de Montréal, Faculté de Musique, available in http://www.musique.umontreal.ca/personnel/Belkin/creativity.html

Boyle, J. D., (1992). Evaluation of Music Ability, *Handbook of Research on Music Learning and Teaching*, Shirmer Books, pp. 247-265.

Burnard, P. & Younker, B.A., (2004). Problem-solving and creativity: insights from pupils' individual composing pathways, *International Journal of Music Education*, 22, 1, pp.59-76.

Craft, A., (1997). Identity and Creativity: educating teachers for postmodernism?, *Teacher Development,* 1, 1, pp.83-96.

Craft, A., (2003a). The limits to creativity in education: Dilemmas for the educator *British Journal of Educational Studies,* 51, 2, pp.113-127.

Craft, A. (2003b). Creative Thinking in Early Years of Education, *Early years,* 23, 2, pp.143-154.

Craft, A. (2005). *Creativity in schools. Tensions and dilemmas.* London & New York, Routledge.

Cropley, A. J., (1997). Fostering Creativity in the Classroom: General Principles, in: Runco, M. (Ed) *The Creativity Research Handbook – Volume One*, Cresskill, New Jersey: Hampton Press.

Cropley, A. J., (2002). Creativity and Education, available in: creativitycentre/com/cropley.htm.

Csikszentmihalyi, M., (1996). *Creativity: Flow and the Psychology of Discovery and Invention.* New York: Harper Collins.

Csikszentmihalyi, M. & Custodero, L., (2002). Foreword in: Sullivan, T. & Willingham, L. (eds.) *Creativity and Music Education*. Toronto: Canadian Music Educators' Association.

D.E.P.P.S. (2003). *Cross-curricular Single Framework for Curricula*. Athens: *Institute of Pedagogy*, Ministry of Education.

Dineen, R. & Collins, E., (2005). Killing the Goose: Conflicts between Pedagogy and Politics in the Delivery of a Creative Education, *JADE* 24,1, pp.43-52.

Elliott, D., (1995). *Music Matters – A new philosophy of music education*, Oxford University Press.

Gordon, E., (1988). *Learning sequences in music: Skill content, and patterns.* Chicago, IL: GIA Publications, Inc.

Haroutounian, J., (2002). *Kindling the Spark – Recognizing and developing musical talent.* Oxford University Press.

Hickey, M., (2001). An Application of Amabile's Consensual Assessment Technique for Rating the Creativity of Children's Musical Compositions. *Journal of Research in Music Education*, 49, 3, pp.234-44.

Hickey, M. & Webster, P., (2001). Creative Thinking in Music, *Music Educators Journal*, 88, 1, pp.19-23.

Jeffrey, B. & Craft, A., (2004). Teaching creatively and teaching for creativity: distinctions and relationships, *Educational Studies,* 30, 1, pp.77-87.

Jeou-Shyan, H., Jon-Chao, H., Lih-Juan, C., Shin-Hui, C. & Hui-Chuan, C., (2005). Creative teachers and creative teaching strategies, *International Journal of Consumer Studies*, 29, 4, pp.352-358.

Kratus, J., (1996). A developmental approach to teaching musical improvisation. *International Journal of Music Education*, 19, 1, pp.35-50.

Lapidaki, E., (2007). Learning from masters of music Creativity. Shaping compositional experiences in music education. *Philosophy of Music Education Review,* 15, 2, pp.93-117.

Lindström, L., (2005). Creativity: What Is It? Can You Assess It? Can It Be Taught? *The Author. Journal Compilation*, 25, 1, pp.53-66.

Mahboub, K. C., Portillo, M. B., Liu, Y. & Chandraratna, S., (2004). Measuring and Enhancing Creativity, *European Journal of Engineering Education*, 29, 3, September 2004, pp.429-436.

Music Curriculum, (2002). *Analytiko Programma Mousikis.* Institute of Pedagogy, Greek Ministry of Education.

National Advisory Committee on Creative and Cultural Education (NACCCE), (1999). *All our Futures: Creativity, Culture & Education*, available in http://www.culture.gov.gr.

Odena, O., (2001). How do secondary school music teachers view creativity? A report on educators' views of teaching composing skills. *Paper presented at the Annual Conference of the British Educational Research Association,* University of Leeds, 13-15 September.
Odena, O., (2006). Musical creativity and the teacher. An examination of data from an investigation of secondary school music teachers' perceptions of creativity. *Proceedings of 9th International Conference on Music Perception and Cognition*, Alma Mater Studiorum University of Bologna, August 22-26.
Office for Standards in Education (OFSTED) (2003) *Expecting the unexpected – Developing creativity in primary and secondary schools*, E-Publication, Document Reference Number: HMI 1612, Web site: www.ofsted.gov.uk
Reybrouck, M. M., (2006). Musical creativity between symbolic modeling and perceptual constraints: The role of adaptive behaviour and epistemic autonomy. In: Deliège, I. & Wiggins, G., (eds) *Musical Creativity. Multidisciplinary research in theory and practice* (pp. 42-60), Sussex, Psychology Press.
Runco, M., (2003). Education for Creative Potential, *Scandinavian Journal of Educational Research*, 47, 3, pp.317-324.
Runco, M., (2006). Creativity is Always Personal and Only Sometimes Social, in: *Howard Gardner Under Fire – The Rebel Psychologists faces his critics*, Schaler, A. J. (edit.), pp.137-150
Runco, M., (2007). *Creativity. Theories and themes: Research, development and practice*. London, Elsevier Academic Press.
Sharp, C., (2004). Developing young children's creativity: what can we learn from research? *Topic*, Autumn 2004, Issue 32, pp.5-12.
Sheridan, M. & Byrne, C., (2002). Ebb and flow of assessment in music. *British Journal of Music Education*, 19, 2, pp.135-143.
Sternberg, R. J., (1998). Teaching and Assessing for Successful Intelligence, *School Administrator*, 55, 1, pp.26-27.
Sternberg, R. J., (1999). *I noimosini tis epityhias (Successful Intelligence)*, Athens: Ellinika Grammata.
Sternberg, R. J., (2003). Creative Thinking in the Classroom, *Scandinavian Journal of Educational Research,* pp.325-338.
Sternberg, R. J., (2005). WICS: A model of Positive Educational Leadership: Comprising Wisdom, Intelligence and Creativity, synthesized, *Educational Psychology Review,*17 (3), pp.191-262.
Sternberg, R. J. & Grigorenko, E. L., (2004). Successful intelligence in the classroom, *Theory Into Practice,* Autumn 2004.
Sternberg, R. J. & Lubart, I. T., (1999). The concept of creativity: Prospects and Paradigms. In Sternberg, R. J. (Ed) *Handbook of Creativity* (pp. 3-15), Cambridge University Press.
Swanwick, K. & Tillman, J., (1979). *A Basis for Music Education*, NFER/Nelson. Swanwick, K., (1988). *Music, Mind and Education.* London: Routledge.
Tafuri, J., (2006). Processes and teaching strategies im nusical improvisation with children. In: Deliège, I. & Wiggins, G. (eds) *Musical Creativity. Multidisciplinary research in theory and practice* (pp. 134-158). Sussex: Psychology Press.
Webster, P., (1992). Research on creative thinking in music. In Colwell, R. (Ed), *Handbook of Research on Music Teaching and Learning* (pp.266-280). N. York: Shirmer - MacMillan.
Webster, P., (1994). *Measure of creative thinking in music. Administrative guidelines.* USA: Peter Webster.
Webster, P., (2002). Creative thinking in music: Advancing a model, in: Sullivan, T. & Willingham, L. (eds.) *Creativity and Music Education.* Toronto: Canadian Music Educators' Association.
Webster, R. P., (2003). Asking music students to reflect on their creative work: encouraging the revision process. *Music Education Research,* 5, 3, pp. 243-248.
Wiggins, J., (1999). Teacher control and creativity, *Music Educators Journal,* 85, 5, 30-35.
Wiggins, J. (2002) Creative process as meaningful musical thinking. In: Sullivan, T. & Willingham, L. (eds), *Creativity and Music Education.* Toronto: Canadian Music Educators' Association.
Williamon, A., Thomson, S., Lisboa, T. & Wiffen, C. (2006). Creativity, originality and value in music performance. In: Deliège, I. & Wiggins, G. (eds) *Musical Creativity. Multidisciplinary research in theory and practice* (pp. 161-180). Sussex: Psychology Press.

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(D.28)

Logical games as additional method by teaching algorithm

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Abstract

One of the objectives of teaching informatics is to help students develop and cultivate an algorithmic and logic way of thinking by providing them with typical algorithmic processes. Today this objective is achieved by teaching programming (in various program languages). In the article we offer various logical games that can help us achieve these goals in high schools. Logical games are helpful in learning the principles of algorithmization, without focusing on the syntax of the various program languages.

Keywords: Algorithm, algorithmization, logical games.

Introduction

There are 66 classes of Informatics in a week in secondary grammar schools which have 8 grades. These classes are taught in the grades of prima through quinta. There are 26 classes of Algorithmization. 14 classes of Algorithmization are in grades of quinta and octava. There are 20 classes if work on the computer in elementary schools. The subjects of algorithm and algorithmization are taught mostly in the first grade of the secondary grammar school and in some other kinds of secondary school which specialize in Informatics in the subject of Informatics that is compulsory in these schools. The contents of the subject of Informatics is divided in 12 moduls and each modul is further divided in some lesser topics. The teacher has to arrange these moduls into a most appropriate list and amount according to the level of the students, the specialization of the school, school equipment which consists in computer sets, software and the number of classes.

The topic of Algorithm does not require any special knowledge and skills of the student. This subject is not a part of Informatics in many schools. Many times the subject of Programming is taught prior to teaching Algorithmization and Algorithm. The teaching of programming starts with a creation of programs in a given programming language. This system leaves the students unable to write the solution to a problem in a programming language. If the student is unable to analyze the problem and determine the order of its solution, he is not able to create such an order in the programming language.

The teaching of the subject of Algorithm starts with a definition of Algorithm, which is followed by a search for algorithms in everyday life situations and a definition of the attributes of an algorithm and finally concluded by a programming language. Commands and assignments, goto branches, sequences and cycles are defined in the programming language after having learned the syntax. In the end more complex structures are taught like procedures, functions, libraries

In the subjects of Algorithm and Algorithmization we focus on these objectives of education: understanding the notions of algorithm and algorithmization, to be able to show examples of algorithms, to create algorithms and give reasons why it can be called an algorithm, to analyze problems, write and optimalize the solution to a given problem, to show an algorithm that solves the problem generally, not only some special cases.

Among the objectives of education are included the development of the ability to solve problems, to algorithmise, a development of creativity, perseverance, the logical thinking, to work individually, to be able to cooperate with others.

There are more ways of writing an algorithm. An algorithm written in natural language can be informal. Since man is therein expected to think and find conclusions individually, that kind of algorithm may include vague or ambiguous notions and, therefore, may not be strict in its syntax. In algorithms written for computers there may never occur any such mistakes. Algorithms can also be demonstrated graphically – by a "development diagram", structurogram or by pictures. (Figure 1)

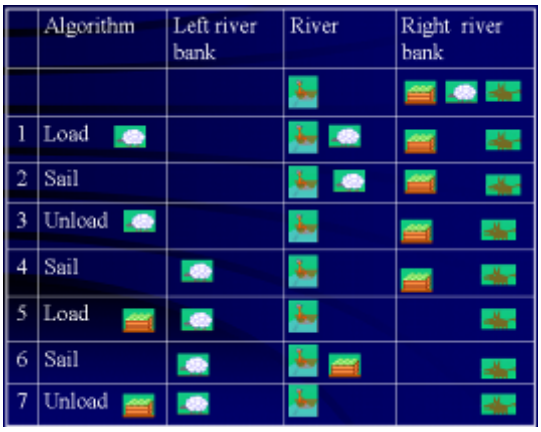

Figure 1: An example of the algorithm for the game Ferryman.

Other ways of writing algorithms are done by the use of decision boards, data oriented diagrams (HIPO), and a formalized description of the sequence of work in the form of a text divided into paragraphs

We have decided to choose a rather untraditional way of teaching algorithms – we tried to use logical games for teaching algorithms. We have tried this idea in a pedagogical experiment on the secondary grammar school of St. Andrew in Ružomberok with students in the grade quinta from February to May, 2008. The students were separated into 4 groups with 8 students in each group. Each of them had a computer.

Logic tasks in teaching algorithms

As an example, we present two computer games from the Internet and a flash game that the students had on their hardisks. The students could find out its principle even if it had been written in English.

The first task was to move the wolf, the sheep and a pack of cabbage to the opposite side of the lake. In case the ferryman is missing the wolf eats the sheep, the sheep eats the pack of cabbage. Some students could hardly solve this problem even if it had been a well known task.

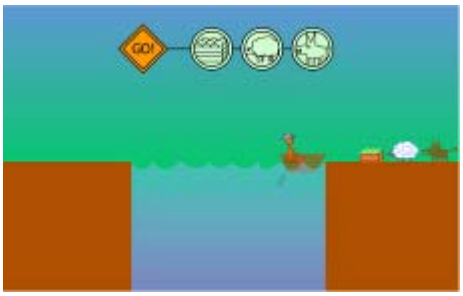

Figure 2: An example of the inernet game Ferryman.

All the students succeeded in solving it in a short time. Students, working with their teachers, could determined the initial conditions, commands and objects of the game. Having solved the

problem, they wrote the algorithm of the ferry in natural language with the help of defined commands. We could also write algorithm with the help of pictures. (Figure 2)

The next task was to solve the problem of transporting missionaries and cannibals. The principle of solution is the same, which is to transport all of them to the other side of the river. In case the cannibals outnumber the missionaries on the river bank, the cannibals will eat the missionaries.

Figure 3: An example of the game "Missionaries and cannibals"

This task proved to be more difficult (with more objects) and some students had given up any attempts to solve its problem. However, we could succeed in solving this problem together too. Both of these tasks were solved within two classes.

The last task was to solve a Japanese problem of transportation of eight people. The number of initial conditions were raised as well as the number of objects to be transported. The father was not supposed to be left alone with his daughters, the mother with her sons and the burglar with anybody without a police guard. The students were solving this problem individually and they had to write the algorithm for transportation.

Figure 4: An example of the Japanese game.

Solving this task, the students had to be divided into the groups of those who could solve the problem in 15 minutes and those who could not solve it at all. However, all of them did their best to solve it and they were thrilled by that problem immediately from the beginning. All of them first tried to solve the problem on the computer eventhough they were warned to write the algorithm from the beginning and thus they found it difficult to solve the problem again. A student succeeded in solving the problem in 10 minutes but could not write it subsequently or he repeatedly erred when writing it. In average, half of the students could solve the problem (3 to 4 students) while in one of the groups all of the students could solve it. The students had an hour for solving this problem.

We have used these games for teaching sequences. We had also prepared tasks for cycles like the game "hanging" (the player guesses the letter for a previously chosen word as long as he finds the right letter. For every wrong letter a part of gallows is drawn on a paper). Then we had also prepared the game 'Man do not be angry'. We could create the algorithm for the game gallows in a cooperation

with the students. Then we had to recommend an algorithm for the game 'Man do not be angry'. The average success of students in solving this problem was 80 %. The majority of them tried to cover all the possible situations that can occur in this game.

Other examples for teaching algorithms can be found in the work of the author of this article that can be read in the archive of Slovak Academy of science and also on the author's website http://fedu.ku.sk/~ortancikova/.

Conclusion

One of the main objectives of teaching algorithms is a development and cultivation of algorithmic and logical way of thinking of students by way of teaching algorithmic processes. Today this is being done by subjects of programming where students learn to write programs in programming languages. Teachers of this subject should focus on solving problems rather than on teaching its theory. Students like to study by playing games and therefore we recommend to teachers to make a good use of the many free download games on the internet. Teachers can choose from among the many kinds of games according to the age, knowledge, skills and interests of the students.

Solving logical problems in the classes of informatics can help develop a logical and algorithmic thinking. The various tasks have various levels of difficulty and so we have to devote much time for choosing the right tasks. They have many advantages: a visualization of algorithms, interactivity and a higher motivation of the student. This pedagogical experiment has shown that this kind of teaching is appropriate to students and support and develop their creativity.

References

[1] http://www.plastelina.net

[2] Štátny pedagogický ústav. Pedagogická dokumentácia (on-line). Available at http://www.statpedu.sk/buxus/generate_page.php?page_id=276>

[3] BRANDOBUROVÁ, J.: Tvorba interaktívnych animácií a hier a ich využitie pri výučbe algoritmizácie, Diplomová práca, Vedúci diplomovej práce Mgr. Ján Guniš, Prírodovedecká fakulta, Ústav informatiky, UPJŠ Košice **Error! Reference source not found.**

[4] KALAŠ I.: Informatika pre stredné školy. 1. vyd. 2002, ISBN 80-08-03443-2

[5] MAJHEROVÁ, J., ORTANČÍKOVÁ, H.: Vizualizácia algoritmov a modelovanie vo vyučovaní informatiky. In: Konferencia DIDINFO 2007. s. 21. Banská Bystrica: UMB Banská Bystrica 2007. ISBN 978—80-8083-367-1

[6] ŠNAJDER, Ľ.: Vykonávatele (procesory algoritmov, Matematika, Informatika a Fyzika – č. 21, didaktický časopis učiteľov matematiky, informatiky a fyziky, 1. vyd. 2003

[7] CÍRUS, L.: Rozvoj klíčových kompetencí v tématickém celku Informační a komunikační technologie na primární škole In: Zborník z 3.ročníka konferencie s medzinárodnou účasťou Informatika v škole a praxi, 10.9.-12.9.2007. Ružomberok : Katolícka univerzita v Ružomberku, Pedagogická fakulta, CD-ROM, ISBN 978 – 80 – 8084 – 222 – 2.

[8] ČERNÁK, I. – POLČIN, D.: Didaktika informatiky 2. Multimediálna učebnica na DVD 2008, Ružomberok: Pedagogická fakulta KU, ISBN 978-80-8084-278-9

[9] ČERNÁK, I. – POLČIN, D.: Didaktika informatiky 1. Multimediálna učebnica na DVD 2007, Ružomberok: Pedagogická fakulta KU, ISBN: 978- 80-8084-174-4.

[10] OLEJ, V. - LEHOTSKÝ, M. - CHMÚRNY, J.: Skúsenosti s výučbou procedurálneho prístupu k programovaniu prostriedkami jazyka PROLOG. In: Zborník z celoštátneho seminára Výpočtová technika vo vysokoškolskej výuke. STO-4, VA, Brno: 1991. s. 70-73.

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(D.29)

Open Source Code and Informatics in Enhancing the Teaching of Mathematics

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Abstract

College students attending departments offering undergraduate courses associated with informatics technology and computer science, in comparison to those of different subjects, develop learning skills that mainly depend on the use of computers, the internet and the web, since the majority of their courses are computer related. The designation of the appropriate teaching material and software, in order to take advantage of the digital technology in a contemporary pedagogical methodology of difficult subjects, such as mathematics, is closely related to the scientific and learning background of the students. At the Department of Telecommunication Systems and Networks, of the Technological Educational Institute of Messolonghi, through the four year program, the students are obliged to attend and successfully pass a number of mathematical subjects including linear algebra, calculus and statistics. The lectures in these courses are 4 hours per week, all of which take place in the classroom and are divided into a 2-hour theoretical teaching and a 2-hour practice and problem solving. It has been observed, however, that the majority of the students face great difficulties in attending and successfully performing in the final exams of their mathematics courses. In this work we present an alternative method of teaching undergraduate mathematics in Higher Education Institutions, through the use of hardware and software systems, so as to enhance and supplement the pedagogical process, in order to agree with the academic background and learning styles of the students. Last semester, at the beginning of the academic year 2007-08, we introduced a new methodology, which was experimentally applied to the linear algebra course, taught at the first semester of our Department. We asked the newly registered students to voluntarily participate in the program and of those that showed interest a sample of 30, a quarter of all freshman, was randomly selected. They were each given access to a personal computer, where they took part in web-based quizzes that were created by using open source code through our internal network system. During the process of completing the quizzes, the participants were able to enter supportively in a sophisticated, yet easily used mathematical software, in order to be assisted in responding correctly to the questions. Taking into consideration the Department's curriculum and the above, we tried to discover whether the aid of hardware and software systems in teaching mathematics to students whose majority of subjects are mainly based on the extensive use of computers, could increase their interest as well as their overall performance in such fields. Up until now the outcome of the program is quite encouraging and we hope to further improve and apply the methodology to other mathematics related subjects.

1. Introduction

The subject of mathematics is a fundamental one and its use has in recent years been growing rapidly in many scientific fields such as finance, informatics, computer science and technology, engineering etc. However, because of its abstract nature, mathematics is a difficult subject to be comprehended and coped with by students attending undergraduate programs in non-mathematics major college departments. The designation of the appropriate teaching material and software, in order to take advantage of the rapidly growing digital technology in establishing a contemporary teaching process for difficult subjects, such as mathematics, is closely related to the scientific and learning background of the students. It has been observed that students who attend departments offering undergraduate degrees associated with informatics technology and computer science, in comparison to those of different subjects, develop learning skills and habits that mainly depend on the use of computers and the web, since the majority of their courses are computer related.

At the Department of Telecommunication Systems and Networks, of the Technological Educational Institute of Messolonghi, through the four years of studies, the students are obliged to attend and successfully pass a number of mathematical subjects including linear algebra, calculus and statistics. The lectures of these courses are 4 hours per week, all of which take place in the classroom and are divided into a 2-hour theoretical lecturing and a 2-hour practice and problem solving. A serious and growing problem, however, is that the majority of the students face great difficulties in attending and successfully performing in the final exams of the mathematical courses, resulting in overcrowded classes and long duration of studies.

The purpose of this work is to investigate ways and present an alternative methodology in the teaching of undergraduate mathematics related courses in Higher Education Institutions, through the use of hardware and software systems, so as to enhance and supplement the learning process, in order to agree with the learning styles and academic background of the students.

Last semester, at the beginning of the academic year 2007-2008, we introduced a program of a new teaching methodology, which was experimentally applied to the linear algebra course, taught at the first semester of our Department. We asked the newly registered students to voluntarily participate in the program and of those that showed interest a sample of 30, a quarter of all freshman, was randomly selected. They were each given access to a personal computer, where they took part in web-based, self-assessment quizzes that were created by using an open source code through our internal network system. During the process of completing the quizzes, the program participants were able to enter supportively in a sophisticated, yet easily used mathematical software, in order to be assisted in responding correctly to the test questions.

The main incentives for our research stem from: a) the inability of some students to comprehend simple mathematical notions, b) the high percentage of failure in the final exams of the mathematics courses, c) the EU declaration of Bologna concerning the use of new technologies in the teaching and learning process, d) the possible connection between the Department's curriculum and the teaching of mathematics with the aid of computers and the web, in specially equipped labs and e) to measure the possible increase of interest on behalf of the students towards mathematics, motivated and encouraged through the use of computers in their learning effort. Taking into consideration our Department's curriculum and the above, we tried to discover whether the aid of hardware and software systems in teaching mathematics to students whose majority of subjects are mainly based on the extensive use of computers, could increase their interest, as well as their overall performance in such fields.

So far the results obtained are very optimistic and encouraging, giving us further motivation to continue, and even apply the methodology to the rest of the mathematical courses taught at the Department. Of the students, who participated in the program, the great majority performed successfully in the final exams of the linear algebra course and a good number of them achieved marks over 65%, whereas the non-participants were not so successful. Moreover, those engaged in the program found the methodology extremely helpful and they became far more interested in the subject than the rest of the class. The great majority of them admitted that they could learn mathematics a lot easier through the use of computers and web-based materials, and, they all agreed that similar methods should be applied to all mathematics courses. In the final stage of our research we shall attempt to propose and establish a pedagogical methodology for teaching mathematics and related subjects founded on a combination of web-based, self-assessment lab sessions and theoretical classroom lectures.

This article consists of six more sections as follows. In section two we analyze the motivation and the need to impose changes in the teaching and learning process of mathematics. Section three is devoted to the description of the proposed methodology. In section four we present the pros of web-based, self-assessment materials and their role in pedagogical processes. In section five the technique, known as learning through inquiry and its support by information and communication technologies, is briefly analyzed. In section six the outcomes of our methodology and research, up until now, are presented. Finally, concluding in section seven, we discuss future work and further improvements in the teaching and learning of mathematics and related subjects.

2. The need for reform

Some of the most common education related problems occurring in many Central and Eastern European countries are [4]:

r. very low student pass rate in mathematics;
s. high drop out rate; and
t. long duration of studies.

The Bologna Process that begun with the Bologna Declaration signed by the Education Ministers of the EU country members in 1999, among others, imposed reforms concerning European Higher Education, based on [19]:

> *'The need to establish a more complete and far-reaching Europe, in particular building upon and strengthening its intellectual, cultural, social and scientific and technological dimensions'.*

The principal aim of the Bologna Process was to establish, by the year 2010, a unified European Higher Education Area (EHEA) and, furthermore, to promote it to the rest of the world, by emphasizing on the objective to increase the international competitiveness of the European higher education [21]. The responsibility for achieving the goals of the Bologna Process lies within the countries themselves and it involves reforms of the higher education system in each and every country of the EU, and, in particular, within every Higher Education Institution; the significance of the role they must play towards the implementation of the Process was stressed in the Berger Communiqué in 2005 by the EU Ministers of Education, through the following words [20]:

> *'We welcome a clear commitment of higher education institutions across Europe to the Process, and we recognize that time is needed to optimize the impact of structural change on curricula and thus to ensure the introduction of the innovative teaching and learning processes that Europe needs'.*

In ensuring the success of the Bologna Process, a project called Tuning Educational Structures in Europe that consists of 10 different subprojects regarding various academic areas has been developed, by the European University Association (EUA). One of these subprojects concerns the subject of mathematics, in undergraduate, as well as graduate level [4]. Likewise, similar projects have been introduced in the USA, over the years, by the Research in Undergraduate Mathematics Education Community (RUMEC), pursuing too, the improvement of the teaching and learning process of mathematics [9].

The one, which is of main concerns to us, the European project, dedicated to mathematics, states that [13]: the teaching and learning process includes, and should include:

- lecture courses;
- exercise sessions;
- projects;
- written and oral expression;
- search of bibliography;
- use of the computer; and
- Dissertation (in master degree programs).

At our Institution, and in the majority of the Technological Educational Institutions in Greece, it has been observed that a good number of students face difficulties in comprehending basic mathematical notions and operations, thus, being unable to learn and successfully perform in their mathematical courses. It seems that the traditional way of teaching, i.e. class lectures and problem solving sessions are not that effective, resulting in high percentage of failure in the final exams, overcrowded classes and long duration of studies. It was also noticed that students whose academic field is closely related to computer science and informatics, develop learning skills that mainly depend on the use of computers. They tend to believe that good computer knowledge suffices to enable them continue their studies without encountering further problems. What is more, they feel that all the non-computer related courses are not of great significance and of no practical use.

Linear algebra, a fundamental mathematical course in most college departments, ours too, usually taught in the first semester and is a prerequisite for many other subjects, such as calculus, discrete mathematics, computer programming etc. Innovative methods, based on the use of computers, have been presented recently, serving the purpose of improving the teaching and learning of this basic course.

An alternative and complementary methodology to the traditional way of teaching is discussed in [7], concerning the course of linear algebra at college level, aiming at, firstly, reacting to the

recommendations of the Linear Algebra Curriculum Study Group [2] and secondly, help college students learn better and easier the subject. The project proposed there involves learning mathematics through the use of computers, by programming in a mathematical-oriented programming language, making extensive use of cooperative learning and developing alternatives to the lecture method. In [10] the MS Excel software is used to illustrate ways of teaching and learning certain topics of linear algebra, such as matrix inversion problems, solving systems of linear equations and linear programming problems. A software packet, called Stack CAA [16], which makes use of a computer algebra system, was employed recently to help assess students' answers to elementary algebra questions.

Motivated by the above, we begun developing an innovative methodology for the teaching undergraduate mathematical courses, starting first with the subject of linear algebra. Our main objective being that of enhancing and complementing the existing pedagogical processes, through the use of new technologies, so as to agree with the academic skills and background of the students.

3. Description of the methodology

Since our Department is Informatics orientated and it mainly offers computer related courses, we assumed that the students who have chosen to attend such a curriculum can learn better with the aid of hardware and software systems. Thus, we firstly created a laboratory of 15 workstations, in order to accommodate, in two sessions, the group of the 30 participating in the program students.

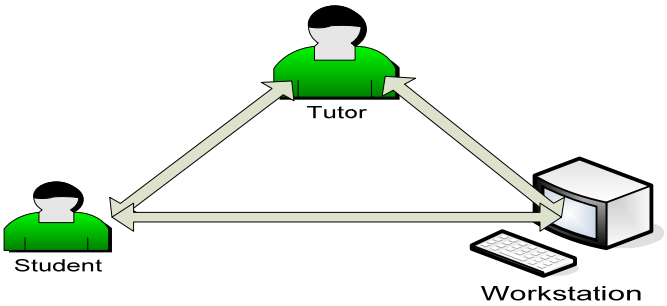

Figure1: Interaction between student-workstation-tutor.

In each personal computer of that lab, a sophisticated, yet simple in its use mathematical software, such as Maple, was installed. By using a web browser, the internet explorer or the firefox, the students had access to a self-assessment quiz written in open source code and in php language.

The overall procedure was the following. The participating students, after having attended a two hour lecture in class, were taken to the laboratory where, through their web browser entered an internal IP address (e.g. 10.0.0.10/exams) and a quiz related to the lecture they had previously attended appeared on their screen. In their effort to answer the questions correctly, they could use their class notes, paper and pencil, as well as, supportively, the mathematical software.

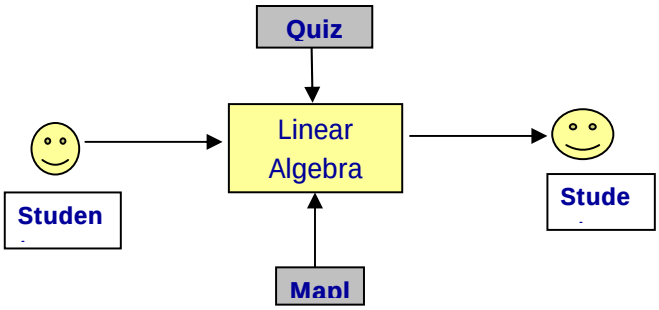

Figure 2: Students' state before and after the lab session.

Every quiz included 10 questions and for each one there were two possible answers, one of which was correct. For every successful response the students got one mark whereas, half mark was deducted for each incorrect answer, in order to discourage them from answering at random. In their effort to complete the quiz the students searched their class notes, books or the internet.

Open source environments, such as mysql, php and apache server, were used to create the web-based quizzes, which contained linear algebra related questions on the left-hand side and the possible answers on the right-hand side. The students could check one of the two given answers and at the end, after having submitted the whole quiz they could get information on their performance. Moreover, in cooperation with the lab assistant (fig 2), they engaged into a constructive discussion concerning the test, the correct answers, the supportive mathematical software and, generally, the difficulties they might have encountered. The main goal of the procedure was to inspire students engage in meaningful learning by doing and inquiring. When completing the quiz they test their knowledge, explore and enhance it through the mathematical software.

The figure below shows part of a web-based, self-assessment quiz.

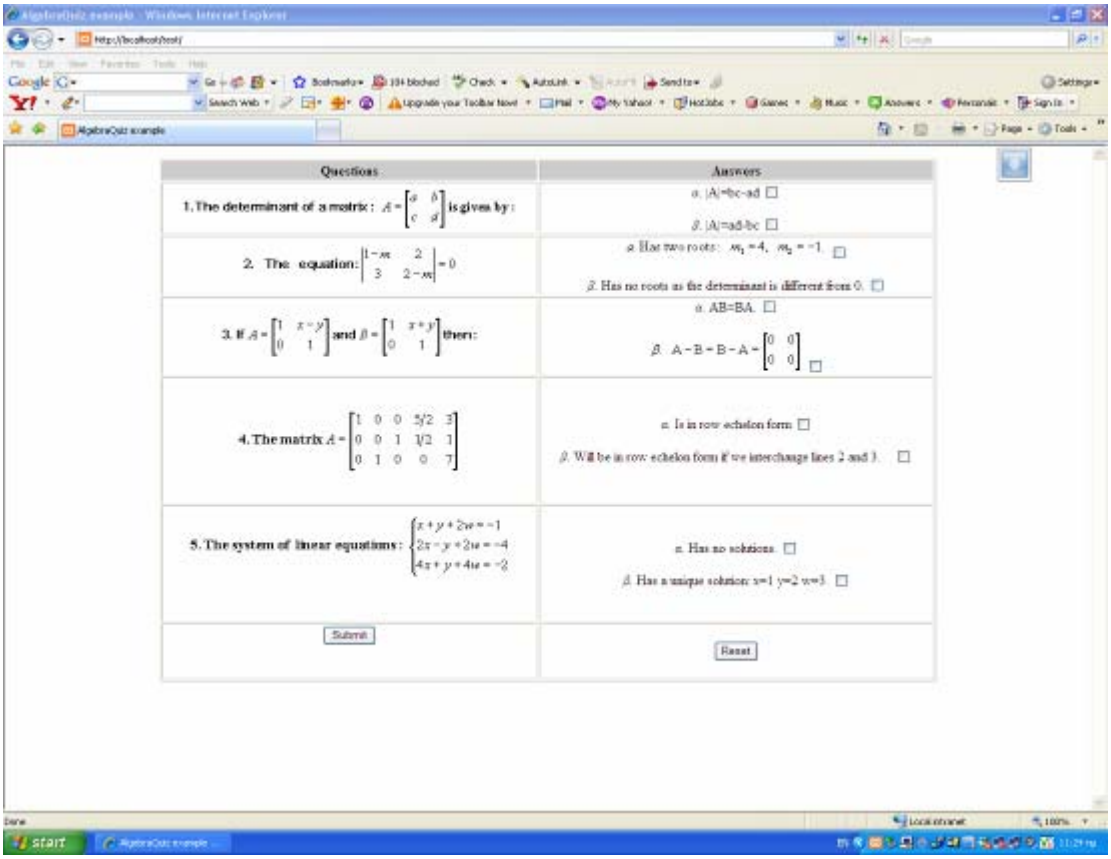

Figure 3: Web - page of a self-assessment quiz.

Should the students seek aid in the mathematical software Maple, for instance in responding to question 2 (Figure 3), they could either make use of the command *"solve"* for the equation:

$$\begin{vmatrix} 1-m & 2 \\ 3 & 2-m \end{vmatrix} = 0$$

And thus get the answer 4 and -1, which are the actual roots of that equation, i.e.

$$> solve\left(LinearAlgebra[Determinant]\left(\begin{bmatrix} 1-m & 2 \\ 3 & 2-m \end{bmatrix} \right) = 0 \right)$$ "return"

$$4, -1.$$

Alternatively, they could expand the determinant: $\begin{vmatrix} 1-m & 2 \\ 3 & 2-m \end{vmatrix}$ and then make use of the command *"roots"* for the resulting polynomial: $m^2 - 3m - 4$, i.e.

$$> roots\left(m^2 - 3\,m - 4 \right)$$ "return"

$$[[4, 1], [-1, 1]],$$

which also shows that its roots are 4 and -1, both of multiplicity one.

4. Web-based, self-assessment materials as educational tools

Web-based parameterized quizzes are a good source in providing teachers and students with several advantages, the main one being the technology for self-assessment, the effect of which, however, will be drastically reduced if the students are not aware of their progress during the course [1]. Self-assessment materials aim at drawing together related parts of the course and promoting a deeper learning strategy, while, at the same time, they provide an enjoyable feedback and reinforcement session. Science teachers with overcrowded classes are constantly facing the problem of how to provide sufficient feedback, in order to improve students' awareness of their abilities and weaknesses. Web-based, self-assessment materials could provide a good solution towards this problem; by offering students such materials, we help them identify, not only their level of knowledge and understanding of the areas that they might need to concentrate on, but also help their academic development and, indirectly, their self esteem. Thus, when designing web-based, self-assessment materials, we should carefully consider the diversity of students' learning styles, so that they are presented with opportunities ensuring their maximum participation [15].

Since the development of the first web-based educational materials, a good number of successful technologies for online knowledge evaluation have been proposed [1, 14]. It is, however, web-based quizzes that have always been playing a leading role in this type of pedagogical process. Firstly, it is rather easy to organize the three main stages of the question "life cycle" [14], (i) authorization, (ii) delivery/presentation and (iii) assessment/feedback generation, in comparison to other types of web-based systems, such as, online simulation, collaboration support system and web-based ITS. Secondly, this technology stems from traditional in-class quizzes and, thus, it is natural for teachers and students to use it for knowledge assessment in contemporary web-based, web-enhanced educational processes [17].

By converting questionnaires to web-based materials, the context of using quizzes as self-assessment of student knowledge, has taken on special significance. Web-based technologies, used for self-assessment, such as web-based quizzes enable students to gain meaningful information about their progress throughout the course and, what is more, to detect their potential weakness and areas that they must pay attention to. Another strong point of such quizzes is the self-motivation that students gain. Thus, the main goal, when using self-assessment, web-based quizzes, is to help the participants evaluate their knowledge and, also, take all the necessary feedback from their answers [17].

In our research, the web-based, self-assessment quizzes that we created, attempt to assist students in evaluating their knowledge on various areas of the subject. The learning environment, Linear Algebra Learning Environment (fig.2), aims at helping the participants learn by testing themselves. Moreover, the engaging students broaden their learning experience through new information and communication technologies (ICTs).

5. Learning through inquiry

ICTs are being used to support what is referred to as learning through inquiry, which is thus turned into an increasingly complex part of higher education student learning experience. In a wider sense, learning through inquiry is a significant aspect of the college student experience and it promotes forms of learning that, when implemented wisely, are most likely to lead to qualitative learning results, such as problem-solving, learning in authentic contexts through case-based reasoning, constructing knowledge, active and deep learning, and reflection [12].

The technology of learning through inquiry, however, may not lead to qualitative learning and teaching results if we do not investigate in depth the ways through which students conceive of and approach pedagogical activities that are based on inquiry, so that we may be able to evaluate how they can be helped in achieving their learning outcomes. Research, based on evidence, must be carried out in order to minimize the risk of facilitating and designing inquiry-based learning activities which are most likely to be guided either by intuition or guesswork; thus, resulting in many hours been spent, by teachers, conducting those activities for teaching purposes, and wrongly believing that it will eventually lead to quality learning [12].

In case ICTs are used whenever teachers design inquiry-based learning, most of the times a significant amount of student learning experience moves from face-to-face to on-line environments, which is known as blended learning experiences [3,11]. However, careful alignment between the two contexts, face-to-face and online, both of which are supporting the situation we examine here, must be ensured, so that the students will not experience a separation between the two, which, in turn, will impede their capability to engage in holistic meaningful learning [12]. In such a case, they will not comprehend the relation between online materials/activities and face-to-face activities, a situation that could, either inhibit learning or result in total learning failure.

According to our research, when learning mathematics, the majority of students prefer to combine lab sessions, as well as class lectures. In order to enhance their learning experience, through inquiry, such web-based, self-assessment quizzes must be created that will involve students in educational activities that require some sort of research conducted by them. The design of challenging,

effective and efficient web-learning environments assists the pedagogical process through inquiry and leads to qualitative holistic learning.

6. The program outcome

So far the results obtained, in our research, are very optimistic and encouraging. Of the students, who participated in the program, 80% received a passing grade and 47% of them achieved a mark of between 65 and 100, whereas the equivalent percentages for the rest of the class were 48% and 23% respectively. Moreover, the participating students found the method extremely helpful and they became more interested in the subject. They all agreed that similar methodology should be applied to other mathematical courses and the majority of them admitted that they could learn mathematics better and easier by using computers.

Table 1 and figure 1 below show the grades obtained in the final examination of the linear algebra course, in the Fall Semester 2007-2008, by the whole class and the participating in the program students.

Table 1: Final exam grades of the linear algebra course for fall semester, 2007-08.

GRADING	WHOLE CLASS	PROGRAM PARTICIPANTS
0-30 (LOW)	32%	11%
31-49 (FAIL)	20%	9%
50-54 (PASS)	13%	15%
55-64 (GOOD)	12%	18%
65-84 (VERY GOOD)	14%	30%
85-100 (EXCELLENT)	9%	17%

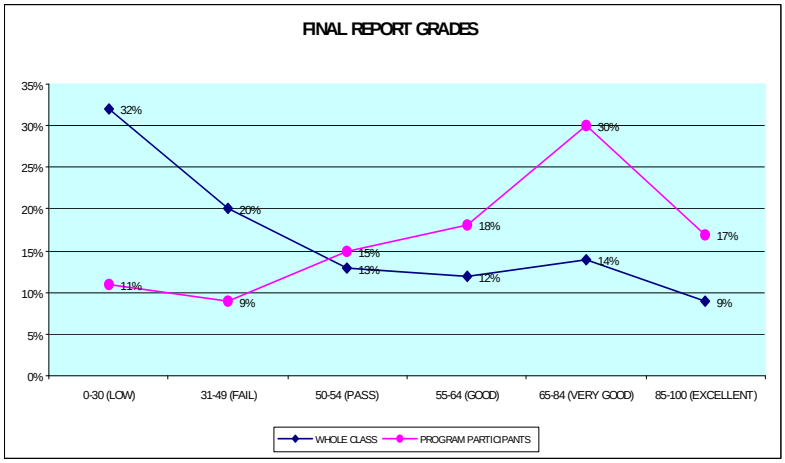

Figure 1: Final exam grades of the linear algebra course for fall semester, 2007-08.

In this evaluation study, at the end of the linear algebra final exams, winter semester 2007-08, a web-based questionnaire was also created, through which the students were able to evaluate the self-assessment quizzes they had participated in, as well as the whole program and the overall procedure. Also, they provided us with useful information concerning their previous experience on computer use for educational purposes.

Table 2: Students' response to the methodology.

What the students thought of the program?

		Yes	No	Yes	No
1	Did the High School you graduated from have labs with computers?	30	0	100,0%	0,0%
2	Have you been taught any courses with the use of software before?	13	17	43,3%	56,7%
3	Have you been taught Mathematics with the use of software before?	3	27	10,0%	90,0%
4	Were there any activities in your curriculum that used software?	3	27	10,0%	90,0%
5	Before entering this Department did you use computers for learning purposes?	15	15	50,0%	50,0%
6	Do you believe that your knowledge in computers is sufficient to attend a mathematics course with the use of particular software?	18	12	60,0%	40,0%
7	Is this the first time you learn mathematics with the aid of software?	27	3	90,0%	10,0%
8	Did the particular software help you to learn or answer better the questions of the quizzes?	22	8	73,3%	26,7%
9	Did you have difficulties adjusting to the new learning environment?	8	22	26,7%	73,3%
10	Do you believe that the new process made it easier for you to respond to the quizzes than the mere use of paper and pencil?	20	10	66,7%	33,3%
11	Did any of the computer knowledge you gained from the Department helped you adjust to the new learning procedure?	23	7	76,7%	23,3%
12	Would you like the mathematical courses to be taught with the aid of computers?	26	4	86,7%	13,3%
13	Would you like your evaluation or the exams to be conducted by a similar process?	17	13	56,7%	43,3%
14	Is the nature of the Department such that the teaching and learning process of mathematics should be done using computers?	21	9	70,0%	30,0%
15	Is it difficult to learn with the use of a computer and be evaluated by writing on paper?	22	8	73,3%	26,7%
16	In your opinion, this new process adjusts better to the "learning culture" of today's student?	27	3	90,0%	10,0%
17	Does this new process help students with learning difficulties?	28	2	93,3%	6,7%
18	Would you recommend the program to other students?	30	0	100,0%	0,0%
19	Do you believe that better conditions of learning were created?	28	2	93,3%	6,7%
20	Did the program help you successfully perform in the final exams?	21	9	70,0%	30,0%

The results of this research show that the majority of the students are very satisfied by their participation in the program. They strongly believe that better conditions of learning were created, even for those with learning difficulties. The proposed methodology attempts to cover all the contemporary learning technologies: (i) the use and combination of traditional pedagogical objects, such as books, class notes, paper and pencil, blackboard and digital objects, software and web-based materials; (ii) the direct, face-to-face, as well as indirect, face-to-computer participation of the involved, teacher/students; and (iii) present knowledge activities, self-assessment and inquiry. The main assumption, when introducing the program presented here, was that students in informatics related fields learn easier through software-based materials and web-based environments. Students' responses, table 2, confirm that this particular educational technology adjusts better to their "learning culture".

7. Conclusion – future work

The use of the computer, towards providing extra help to undergraduate college students, in teaching and learning mathematics is not new. In the last two or so decades, many researches of the field have worked upon and published numerous articles on the subject, providing useful information and results that show how the hardware and software systems can be used wisely by teachers and students in order to make the so thought difficult, by the majority of the later, subject of mathematics more comprehensible and, even, enjoyable [5-9, 17]. However, merely the use of the rapidly growing digital technology is not enough [8]. It is widely believed that the traditional blackboard, paper and pencil in a classroom can be complemented and supported by the use of the PC, laptop and web applications through the internet, in order to aid teachers to be more effective and students to learn mathematics and, thus, perform successfully in their homework, midterm tests and final exams.

In this work we tried to overcome the thinkable limits that existed until today, between the two scientific fields, Informatics and Mathematics. We combined strengths of both sciences; the precision of Mathematics and the flexibility of Informatics, in order to improve and enhance the teaching of mathematical courses in our Institution through an alternative and innovative methodology.

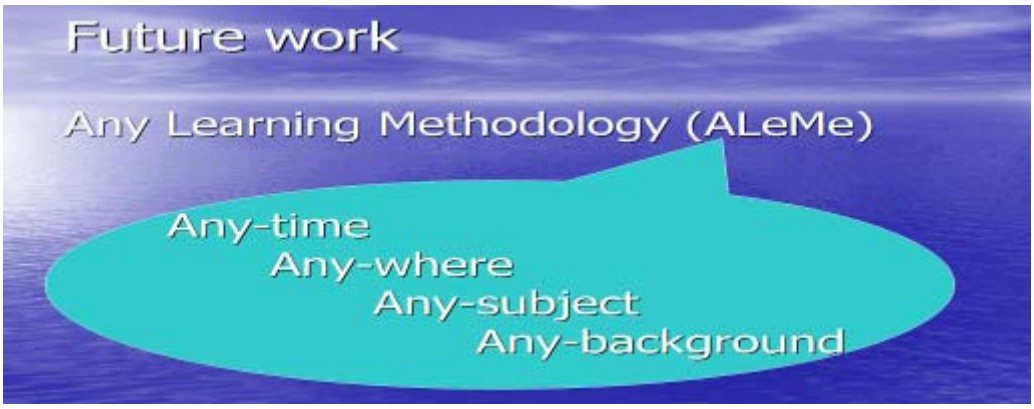

Figure 4: Future work, Any Learning Methodology (ALeMe).

The pedagogical methodology suggested here involves the user, in our case the student, as the main contributor of the learning process. It may be considered as a continuous information flow from the student to the student, in the sense that any student can improve his/her knowledge about a specific subject, through the process of self–assessment, which this methodology proposes and with the appropriate use of the provided educational resource that can be ether the teacher, the computer, or both. We are optimistic that the methodology can be extended and improved in order to use the overlapping knowledge from different scientific fields and it can be considered as a process in which a student of any background will be able to learn any subject like mathematics, physics, etc. Any student could test himself/herself at any time, before class or after class and anywhere, at home, at the office or public wifi hotspots (Figure 4).

Note:
(Interested readers can visit our website: http://noc.tesyd.teimes.gr/kartesios).

References

- Brusilovsky, P. and Miller, P., (2001), Course Delivery Systems for the Virtual University, (in Tschang and T. Della Senta Eds), *Access to Kowledge: New Information Technologies and the Emergence of the Virtual University,* Amsterdam, Elsevier Science, 167-206.
- Carlson, D., Johnson, C., Lay, D. and Porter, A. D., (1993), The Linear Algebra Curriculum Study Group recommendations for the first course in linear algebra, *College Mathematics Journal* **24** 1, 41-46.
- Cox, G., Carr, T. and Hall, M., (2004) Evaluating the Use of Synchronous Communication in two Blended Courses, *Journal of Computer Assisted Learning*, **20**, 183-193.
- Divjak, B. and Erjavec, Z., (2008), Enhancing Mathematics for Informatics and its Correlation with student pass rates, *International Journal of Mathematical Education in Science and Technology*, Vol. **39**, No. 1, 23-33.
- Dubinsky, E., (June, 1985), The Use of Computers in Mathematics Education, SIAM Newsletter.
- Dubinsky, E., (1995), A Programming Language for Learning Mathematics, *Comm. In Pure and Applied Mathematics*, 48, 1-25.
- Dubinsky, E., (1997), Some Thoughts on a First Course in Linear Algebra at the College Level, (in D. Carlson, C.R. Johnson, D.C. Lay, R.D. Porter, A. Watkins, and W. Watkins, Eds), *Resources For Teaching Linear Algebra,* MAA Notes, 42, 85-106. http://www.math.kent.edu/~edd/LinearAlgebra.pdf.
- Dubinsky, E., (2000), Computers in Teaching and Learning Discrete Mathematics and Abstract Algebra. http://www.math.kent.edu/~edd/NATOArt.pdf.
- Dubinsky, E., (2005), Research on Undergraduate Mathematics Education: A Way to Get Started, MAA, (Online, edited by Fernando Q. Gouvka). http://www.maa.org/features/rumec.html.
- El-Gebeily, M. and Yushau, B., (2008), Linear Systems of Equations, Matrix Inversion, and Linear Programming Using MS Excel, *International Journal of Mathematical Education in Science and Technology*, Vol. **39**, No. 1, 83-94.
- Ellis, R. A. and Calvo, R. A., (2004), Learning through Discussion in Blended Contexts, *educational Media International,* **40**, 263-274.
- Ellis, R. A., Marcus, G. and Taylor, R., (2005), Learning through Inquiry: student Difficulties with Online Course-based Material, *Journal of Computer Assisted Learning,* **21**, 239-252.
- EUA, (2005), Tuning Educational Structures in Europe. http://www.let.rug.nl/Tuning Project/intex.html.
- Hooper, M., (1998), Assessment in WWW-Based Learning Systems: Opportu-nities and Challenges, *Journal of Universal Computer Science,* Vol. 4 no. 4, 330-348.
- Peat, M., (February, 2000), Online Assessment: The Use of Web Based Self Assessment Materials to Support Self Directed Learning. In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the *9th Annual Teaching Learning Forum*. Perth: Curtin University of Technology. http://www.lsn.curtin.edu.au/tlf/tlf2000/peat.html.
- Sangwin, C. J., (2007), Assessing Elementary Algebra with STACK, *International Journal of Mathematical Education in Science and Technology*, Vol. **38**, No. 8, 987-1002. http://www.stack.bham.ac.uk/.
- Sosnovsky, S, (August, 2004), Adaptive Navigation for Self-assessment Quizzes, Adaptive Hypermedia and Adaptive Web-Based Systems. Proceedings of the *Third International Conference*, AH 2004, Eindhoven, The Netherlands, 365-371.
- Tall, D., (1996), Advanced Mathematical Thinking & The Computer, Proceeding of the *20th University Mathematics Teaching Conference*, Shell Centre, Nottingham, 1-8.
- The Bologna Declaration, (1999), Joint declaration of the European Ministers of education. http://ec.europa.eu/education/policies/educ/bologna/bologna_en.html.

- The European Higher Education Area – Achieving the Goals, (May, 2005), *Communiqué of the Conference of European Ministers Responsible for Higher Education,* Bergen. http://www.dfes.gov.uk/londonbologna/index.cfm.
- van der Wende, Marijk C., (2000), The Bologna Declaration: Enhancing the Transparency and Competitiveness of European Higher Education, *Higher Education in Europe*, Vol. **XXV**, No. 3, 305-310.

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(D.30)

Mi-Ja Nam; Heesook Yoon; Dae Hong Jeong; Hee K. Chae, Comparison between Textbooks' Description and Teachers' Conception of Chemical Reaction Rates and Improvement of an Experiment Condition On the Reaction between HCl (aq) and Mg (s): In this study we analyzed the reaction between hydrochloric acid and magnesium ribbon as the experimental activities introduced in the high school science and chemistry II textbooks and improved the experiment considering the learning task. We examined the 11 science textbooks, 8 chemistry II textbooks and 11 teacher's manuals including concrete contents and surveyed teachers' comprehension of the chemical reaction rate. The description of the chemical reaction rate in teacher's manuals and teachers' responds presented "The reaction rate generally decreased through the time" as well as most textbooks. But there was ten times excess of the concentration of HCl in the textbooks, and it means the concentration of H+ had no effect on the chemical reaction rate and the reaction rate is constant by the time until the reaction is ended. This experimental result cannot explain to students decreasing the reaction rate by time as a consequence. We improved the experimental condition to solve this disagreement between the description in textbooks and an experimental result, and then we compared of improved experimental result and theoretical prediction data. The improvement experiment corresponding to learning task in the chemical reaction rate unit is helpful for students to understand the chemical reaction rate.

(D.31)

Michael F. Shaughnessy, Marcel V.J. Veen, Meta-Cognition- A Review of Recent Research and an Examination of it's Importance in Gifted Education: This presentation will review some of the leading scholarship and theories regarding metacognition. The authors will discuss theory, practice and innovative uses of metacognition in teaching, thinking, reading research and other domains.

(D.32)

Hanna David, The Talented Arab Girl: Between Tradition and Modernism: The talented Arab girl has gone through a rapid educational advancement in the last century. While in the Ottoman period education of women was still quite rare, the 1904-2936 transition years, until the beginning of the British mandate, were characterized by the emergence of organizations dedicated to the status of women in general and their education in particular. The British mandate nurtured private institutions for girls and young women, but the majority of Arab females had no access to education. Since 1948 Arab females were the main benefactors of the law of mandatory education. The following table will demonstrate it: Table 1: Persons aged 18 and over, years of schooling, age and gender, 2003 AGE 18-24 25-34 35-44 45-54 55-64 65+ TOTAL Men 11.9 11.7 11.4 9.5 7.7 5.2 11.2 Women 12.4 11.6 10.2 7.2 4.9 0.8 10.9 * Processed from Statistics, Israel, 2007, table 8.3 However, Arab girls tend to enlarge their education while observing the rules of tradition and acting inside social norms (David & Khalil, in preparation). In the Muslim society educational aspirations are not perceived as contradicting religion; the young educated woman is judged solely by her behaviour. As long as she does not behave against the strict laws of \"family honour\" she is encouraged to achieve highly even in mixed-sex programs and make her family proud of her high intellectual abilities (Abed-el-Kader Yichya, 1995, David, 2002, 2007), good grades and higher degrees. In the following lecture I will show a few areas where Arab girls have excelled: in school, in the professions and in social achievements. I will also analyze their hardships and offer potential ways to overcome them. References Abed-el-Kader Yichya, N. (1995). Attitudes in the Arabic family towards the gifted child. M.A. Thesis, Tel Aviv University (Hebrew). David, H. (2002). A minority within a minority: Mathematics, science and technology studies among Israeli and Arabic female students. In L. Maxwell, K. Slavin & K. Young (Eds), Proceedings of The Gender and Science Conference, Brussels, 8-9 November, 2001 (pp. 248-255) Brussels: The European Commission. David, H. (2007). Mentoring high ability females in the Israeli College. Proceedings of the Conference: Contemporary issues in higher education: Pedagogical Aspects of Emerging Methodologies in Higher Education (pp. 97-115). Ariel: Israel, Ariel University center of Samaria. David, H. & Khalil, M. (in preparation). The Arab gifted child. Tel Aviv: The Mofet Institute (Hebrew and Arabic). Statistics, Israel (2007). Yearbook of Statistics, 58. Jerusalem, Israel: The Central Bureau of Statistics (in Hebrew). Available online: http://www1.cbs.gov.il/reader

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(D.33)

Global Action Learning: In and Out of the Classroom

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Abstract

Actively involving learners in 'real life' problems, questioning assumptions and actions, and reflecting on one's learning in order to gain insight for future actions-- and improved performance- -are the tenets of Action Learning. While this educational process has been widely used in the UK and USA for training and development within public organizations, the authors have applied it outside these settings--specifically in global, not-for-profit, and educational organizations. Our findings involve adaptations of this method to accelerate learning in a broad range of experiences, both in and out of the traditional classroom. Application within graduate management courses for adults in the US, Scandinavian countries, and Asia; felon parolee life skills development programs; religious organizations; municipal and educational settings will be discussed. We will provide specific examples of the modifications made to the Action Learning process, learners' responses and progress, and evaluation of the effectiveness of 'learning by doing' in these varied settings. For instance, public service employees experienced a parameter shift when asked what they could learn from their mistakes, leaders began questioning the value of striving for perfection, and graduate students struggled with the application of concepts of change to 'real life' situations. Members of the audience can expect to gain a clear understanding of how Action Learning may be used in wider than normal venues.

Actively involving learners in ‘real life’ problems, questioning assumptions and actions, and reflecting on one’s learnings in order to gain insight for future actions, and improved performance, are the tenets of Action Learning. Since Action Learning is a ‘real time’ learning experience, educators may shy away from it, in the unfounded notion that it is too complex to actually implement. However, as Dotlich and Noel (1998) note, “Action learning is magical, at least in the sense that it kills two birds with one stone. The process helps organizations respond to major business problems and opportunities and at the same time develops key people so that they have the capacity to lead organizations in the desired strategical direction.” While this educational process has been widely used in the UK and USA for training and development within for-profit organizations, the authors have applied it outside of these settings—specifically in global, not-for-profit, and educational settings.

Each member of our group has selected an example of specific adaptations of this method to accelerate learning in a broad range of experiences, both in and out of the classroom. Deborrah Himsel explains that one of the action learning tools she has found to be most effective for developing both global teams and global leaders is paradox management. Leaders today are increasingly called upon to manage paradoxes—holding two apparently contradictory ideas or concepts simultaneously. Whether it is decentralization vs. centralization; short term vs. long term; global vs. local or investment vs. cutbacks, leaders all over the world naturally want to ‘dig in their heels’ to advocate for one side or the other. They often fail to realize that one must recognize both sides at the same time.

A great example of this in action was a recent project with a global consumer products marketing group. The corporate group was arguing that they needed to centralize product development because they could produce higher quality products at a lower cost. The local marketing groups argued they should develop their own products because they were better at understanding their customers’ needs and faster at responding to competitive threats. Both groups were right! The corporate group had lost touch with the local customers and the local markets were all developing their own products and driving up total company costs.

The first step with the two ‘factions’ was introducing the concept of a paradox — right vs. right. The next step was to have the groups articulate their common overreaching goal—something the entire group could rally around and buy into. For this group it was high quality products that met the

customer's need at the lowest cost for the organization. She then pulled out the trusty flip chart and had members articulate the upsides and the downsides of both a centralized and a local product development process. Knowing that success involved balancing both, the groups looked for a middle way where they would maximize the strengths of each approach.

The solution required process and behavior changes. They decided on a council, comprised of corporate and local marketing staff, to make decisions on products. The local markets used better market research tools and the list of agreed upon actions continues. They also set up early warning signals if it looked like there was starting to be a tilt too much toward corporate or local.

Sure, all the process changes were helpful, but what helped them most of all was just acknowledging that this tension between corporate and local was natural and normal and would always exist. Each needed the other. Finding a unifying purpose and using some tools and methodology to help manage the inherent paradox reshaped their dialogue and helped reframe their thinking, mindset and results.

Victoria Davis notes that Action Learning can be adapted to situations where the learner is in an isolated working environment, such as learning how to perform with little/no instruction. She has worked with participants who have been hired into replacement positions, where they must 'pick up' where the last person left off—usually with little/no time to 'learn the ropes'. Age, gender, and formal schooling seem to have little impact on the learner's ability to quickly assess the situation and transfer the necessary skills to become proficient. What appears to make a difference is the learner's ability to step back and reflect on what has worked in similar situations.

Vicki recounts one client who was hired to replace the administrative assistant of a small church. While she (the learner) had previous experience in several other office environments, she had no experience with church administration. The action learning tools that were most helpful were reflection, questioning, and asking for feedback. Vicki led the assistant in reflecting on what skills she had used in other office settings, questioning what was similar and what was different about this one, and routinely asking for feedback from those with whom she interacted. Through this process, the assistant quickly discovered that many of the software programs had common components; the processes she had developed for processing requests in a legal office could apply in this—and other—settings; and that asking questions of others helped them be more specific with the information they provided.

For instance, in reflecting on similarities the assistant realized that most of her interactions with 'customers' involved problem solving in one form or another. Her active listening skills and empathy for the plight of those who were asking for help applied in the church setting as readily as they did in a legal office or when working as a customer service representative. There was a great deal of overlap—and, thus, transfer of skills.

An interesting learning for lone workers was to make no assumptions, but rather to allow the situation to unfold and not attempt to 'make it like another'. Recognizing similarities is one thing. Trying to work one environment into the mold of another is something else—and often fatally wrong. This insight led to another—the importance of patience in learning a new environment. Thus the action learning process of questioning assumptions, reflecting on learning, and gaining insight on how to apply these learning to new situations seems 'tailor made' to helping lone workers transfer from one situation to another.

Even though it was designed to use group interactions as an integral aspect of the process, Vicki has adapted the concept to assist those who work alone in developing the insight to solve the problems associated with that state—whether it be a legal, educational, customer service or other such setting..

Lisa Martin and Jerri Frantzve faced a unique opportunity to apply Action Learning to a group of very different learners---felons paroled and needing to adjust to a new way of operating in their old environment. As instructors in a program to assist a select group of felons in gaining 'new life skills', they have had an opportunity to adapt some of the principles to a group looking for a 'quick and dirty' way to function in a lawful manner within society

One of the key requirements of admission to this state funded program is a strong commitment to change—old ways of believing, thinking, and acting are some of the key reasons these individuals broke the law. So, new patterns must be formed in order to 'reframe' life out of prison. While some of the distrustful underlying patterns are addressed through addiction programs while incarcerated, this

program builds new ways of addressing everyday activities like working for wages, budgeting and managing money, proper hygiene, and building effective family relations.

Lisa notes that, throughout instruction, one must walk a fine line between reflecting on past actions and allowing 'regression' toward excuses for many of those past actions. In most situations, the participants have no basis for understanding what it takes to operate in a lawful society—because their environments have always been at least 'on the fringes'. Reflection on past skills is often unproductive. So, "we had to go down to the basics"—structuring exercises in such a way that these learners could develop the basic skills (like figuring out how much time it takes to travel to a new job on a bus; setting an alarm clock; and motivating oneself to arise and prepare for a whole day of work) that they DID NOT learn before incarceration. Only then, could we move to questioning assumptions and gaining insight. By adapting the

Action Learning model, we were able to help these learners move to a more productive—and lawful---life style. Lisa has also combined her Six Sigma training and skills (as a certified green belt) with the Action Learning model and tools. She cites the example of training a group of public service employees from varied backgrounds, educational levels, and levels of management in providing service for a municipal call center. Modifying Revans' L = P + Q (Learning requires

Programmed knowledge (routine knowledge in use) and Questioning insights),she designed interactive sessions that included cause and effect analyses; Plus/Delta analysis; brainstorming; workout sessions; specific knowledge acquisition; and identification of opportunities.

This design allowed her learners to: identify and move on areas of expectations of business stakeholders; identify and move on areas that were critical to the quality of the business; prioritize tasks based on risk to the business; and develop a clear understanding of their next moves. Thus, this inclusive total process allowed the group of learners to quickly move on areas of opportunities to improve their customer service experience—"magical"!!!

Jerri Frantzve's examples tend to focus on developing broader competencies among more technically oriented learners (engineers, accountants, IT executives, etc). The challenge here has often been a combination of occupational and cultural expectations and assumptions about how things should be done and organizational demands for rapid change.

In times of change, especially when faced with much ambiguity, it is natural to hold tightly to those things which seem secure—especially skills and behaviors which have been previously rewarded, and are comfortable. So,

Action Learning must build on this foundation at the same time its structure helps the learners prepare for a broader view—and new skills. Not an easy task!

One class of international MBA students (focused in finance) expected that a course in Organizational Change and Development would be 'reading the book and taking a test'. Imagine their shock when they were expected to APPLY what they learned to a real organization facing real threats. (To their credit, they persevered). Jerri used a combination of experiential exercises (like de Bono's 'bottles and knives puzzle') to demonstrate that there were several situations that, at first glance, seemed to be beyond one's previous learning; relatively unstructured Q & A sessions where students 'discovered' underlying principles while working on real problems; and providing tools to implement change in a variety of settings (using a force-field analysis to decide the focus of their group projects). In reflecting on the total experience, one student noted that "it seemed that we were guided to discover principles for the very first time in history—and they were OURS!!!" That's Action Learning at its best!!!

As you have seen, Action Learning has been successfully adapted to a very broad range of learners, global locations, and organizational settings—from an individual working along in a church office; to a global marketing organization; to a group of paroled felons; to a diverse group of public

service employees; and to a 'traditional' group of MBA students. Regardless of the setting, learners were helped to reframe, question assumptions, recognize old patterns of behavior, and acquire new ones in solving 'real world' problems.

While our instructional designs differed in some ways, they all included the core tenets of Action Learning: use of relevant knowledge, questioning assumptions and reflection.Thus, demonstrating that Action Learning can be successfully applied around the world—both in and out of the classroom.

About the Author

Jerri L. Frantzve is a managerial consultant who specializes in individual and organizational change and development. For more than two decades, Dr. Frantzve has worked with leaders and leadership teams from Fortune 500 companies, not-for-profit organizations, and government agencies. Dr. Frantzve also teaches graduate courses in Organizational Change at the University of New Mexico's Anderson Schools of Management, introducing students to cutting edge issues in the field and preparing them to develop into consummate professionals. Jerri has published two books, over twenty-five articles in professional journals, and given numerous presentations at international and national conferences. She participates in many professional organizations, including the American Psychological Association and the American Society for Training and Development. Dr. Frantzve has held senior positions in management, training & development, human resources, and research with E.I. DuPont de Nemours & Co.--Conoco Oil Division, Quaker Oats, and the College of New Rochelle. She earned a Ph.D. in Industrial/ Organizational Psychology from the University of Georgia, a M.S. in Counseling and Organizational Psychology from George Williams College, and a B.A. in Psychology and History from Marian College.

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(D.34)

Identifying Turkish Students' Learning Style Preferences and the relationships between their Gender, Class level and Culture

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Abstract

Cognitive researchers suggest that people differ considerably from each other in their preferences of learning and acquiring knowledge, because they have different ways of perception, levels of motivation, and attitudes towards teaching and learning. Since there are a lot of ways of acquiring knowledge, there should also be various methods of teaching it. For example, some instructors lecture, others lead students to self-discovery and critical thinking. The more instructors understand the differences, the better chance they have of understanding and meeting the diverse learning needs of their students. The present study has been conducted to investigate Turkish students' learning style preferences in ELT Departments regarding gender and age factors in order to see if there is any relationship between achievement and learning style preferences. For the purposes of the study, Wintergerst and DeCapua's (1999) learning style indicator (LSI) was administered to 249 English teacher trainees. To investigate the differences between male and female students in terms of learning style preference, t-test was utilized. The results indicate that Turkish students are mostly project-oriented learners and learn best through when they are involved in 'hands-on' activities or when working with materials. Current study revealed that gender varies according to three orientation areas. The relationship between culture and learning style of Turkish students were also studied. This study may contribute to the limited existing pool of learning style studies of Wintergerst & DeCapua's (1999) Learning Style Indicator (LSI). Key words: learning style preferences, gender, culture Turkish EFL teacher trainees.

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Oya Büyükyavuz received MA and Ph.D degrees from The Ohio State University, Columbus, OH USA. Her dissertation is on foreign language teacher preparation and research interests include foreign language teacher preparation, professional development, teacher empowerement and learner autonomy. She has published articles in TESOL matters, English Language Teaching Forum and local journals. Currently, she works as the director of School of Foreign Languages at Suleyman Demirel University, Isparta Turkey.

(D.35)

Teacher Trainees' Educational Software Development Self-Efficacy with respect to Different Variables

Aynur Yürekli; Gülriz İmer

Abstract

Teachers are the most important factor in bringing about changes and supporting development in education. Because, the main factor making education meaningful, functional, effective and efficient are teachers. In terms of the modern approaches, teachers are people who are expected to apply and use the information technologies, and establish the connection between students and information technologies. There are many factors affecting the types of behavior that teachers display to achieve the goals set in educational environments. A crucially important one among such factors is "teacher self-efficacy". According to the theory of social learning, teacher self-efficacy is a concept framed in consideration of teacher training. It is viewed as one of the concepts that could make significant contributions to teacher training and be used when trying to analyze teacher behavior and explain the individual differences between the ways teachers act. Generally speaking, the recent studies on teacher self-efficacy tend to focus on teacher self-efficacy in some specific fields (e.g., science self-efficacy, computer self-efficacy, mathematic self efficacy). It is important to determine a teacher's self-efficacy in a specific field as well as his or her self-efficacy in general sense. With new studies to be conducted on teacher trainees' self-efficacy, it is possible to collect accurate data on learning and teaching processes. Benefiting from the results of such studies, teacher trainees could be given better in-service and pre-service training. The areas in which teacher trainees are supposed to be self-efficacious could be put on a long list, and one of those areas is developing educational software. The present study aims to determine the self-efficacy in developing educational software of the teacher trainees studying in the Computer Teaching and Technologies Departments of Education Faculties. The sample comprised 250 teacher trainees drawn from the students in the departments in question. It specifically aims at finding out whether teacher trainees' educational software development self-efficacy changes with respect to a) the secondary school they graduated from (their previous educational institution) and b) the geographical area they live in. The data collected from the teacher trainees using a scale of self-efficacy in developing educational software is still being analyzed.

Introduction

The perception of self-efficacy is based on Bandura's social cognitive learning theory. One of most important competencies of the social cognitive learning theory is the individual's ability to think about the self, make judgements and reflect on self . According to this theory, individuals record their views on their self-efficacy and their ability to carry out tasks, thus arrive on judgements (Sanemoğlu, 2001). With all these jugdements, the individual forms his view about the degree of own success regarding any kind of task. Bandura (2001) terms the judgements of an individuals ability as "self-efficacy". According to Bandura, self-efficacy is the belief that one is capable of performing in a certain manner or attaining certain goals (Wikipedia, 2008). It is a belief that one has the capabilities to execute the courses of actions required to manage prospective situations.

Self-efficacy perceptions influence the goals people set for themselves, the amount of effort they will spend to achieve these goals, the exposure time they will be able to spend to achieve their goals in case of difficulties and their reactions to failures (Bıkmaz, 2004, 183; Alabay, 2006, 1). An individual's perception regarding his self-efficacy may not reflect his real efficacy. However, the perceived efficacy has an important role in arranging his/her behaviours. Efficacy not only plays a key role in individuals' developing their lives, but also it determines the level of individuals' evaluating their skills and abilities and transferring them (Bandura, 2001, 6). The assumption is that the beliefs that individuals create and develop and hold to be true about themselves form the very foundation of human agency and are vital forces in their success or failure in all endeavors (Pajares, 2001).

In recent years, the studies made on self-efficacy have inclined toward determining self-efficacies in specific fields (e.g., science self-efficacy, computer self-efficacy, mathematics self-efficacy) as well. One of these fields is the teacher self-efficacy. Teacher self-efficacy is defined as teacher beliefs regarding their possibility of exhibiting necessary behaviours in order to perform their teaching function successfully (Atıcı, 2000). Parallel to all these definitions, it can be stated that a teacher's realizing an effective and successful teaching-learning process depends on his own self-efficacy perception (Önen and Öztuna, 2005). For as much as this perception of a teacher's is expected to ensure students' adopting specific attitudes by influencing both them and others, and finally these

attitudes are expected to show themselves in the form of positive or negative behaviours. The environments in which this is most clearly observable are the classroom and school environments where the teacher-student interaction is the most intensive (Ünlü, 2003). No matter how knowledgeable a teacher is in his field, he is not expected to become efficient in his lessons if he/she lacks self-efficacy. For this reason, it becomes rather important to determine teachers' self-efficacy perceptions (Önen and Öztuna, 2005).

Ashton (1984, 30) denotes that since self-efficacy perceptions of teachers are closely related to their capacity to influence the student performance in teaching-learning process, no other teacher efficacy exhibits such a consistent relationship with student success.

According to Chambers and Hardy (2005, 4), the academic performances of students of teachers with high self-efficacy perceptions appear to be higher compared to those of students of teachers with lower self-efficacy perception. In addition to this, it was found that teachers with high self-efficacy perceptions are less critical of the errors that students make during in-class activities, spare more time for the students having learning difficulties, and have more enthusiastic attitudes toward teaching (Henson and Stephens, 1999, 6, 7). On the other hand, it was determined that teachers with low self-efficacy perceptions spare less time on giving instructions to students, are not insistent that students shall accomplish a task, which is difficult for them, spend less effort on motivating their students toward the activity, and behave reluctantly during teaching (Palmer, 2006, 656).

Schmitz and Schwarzer (2000,14) specify that efficacy expectancy of a teacher is a protective factor against his professional stress and also explain that self-efficient teachers are more committed to their professions and have higher satisfaction levels. Teachers' fulfilling the requirements of the teaching profession is directly related not only to their taking a good education but also to their belief that they can perform their teaching duty and fulfill the required responsibilities (Yılmaz et al., 2004, 67).

Above researchers reported that teachers' beliefs of self efficacy affect their instructional activities, their orientation toward the educational process and their expectations from the students. On the other hand, the development of teacher efficacy beliefs among prospective teachers has generated a great deal of research interest because once efficacy beliefs are established; they appear to be somewhat resistant to change (Tschannen-Moran et al., 1998).

Therefore, studies to be made on this matter will also be an extremely important source of data in terms of curriculum development studies of teacher education programs. As Gerçek et al. (2006) specified, based on the data to be obtained from these kinds of studies, that a prediction can be made regarding the performance that teacher trainees will exhibit and the level of effort they will spend in their professions in the future; and the education programs can be revised in a way that will include rearrangements concerning teacher development in this direction. In this context, the present study aims to determine the self-efficacy perceptions of the teacher trainees, studying at the English Language Teaching Departments of Education Faculties, about the development of educational softwares.

Purpose

This study aims at identifying the Education Faculty, English Language Teaching Computer Teaching teacher trainees' self-efficacy level regarding educational software development. Based on this aim, the following research questions were asked:

1. What is the level of self-effcicay of the teacher trainees in terms of educational software development?
2. Do teacher trainees' level of self efficacy regarding educational software development change based on their education year?
3. Do teacher trainees' level of self efficacy regarding educational software development change based on the secondary education institution they graduated from?

4. Do teacher trainees' level of self efficacy regarding educational software development change based on the geographical location of their secondary school?

Methods

This study was carried out with 296 teacher trainees studying at the Computer Teaching and Technologies Departments of Education Faculties of the universities located in four different geographical regions during the 2007–2008 academic year. 105 of the teacher trainees were female and 191 of them were male students. To assess the self-efficacy perceptions of the teacher trainees regarding the development of education softwares, the "Education Software Development Self-Efficacy Perception Scale" developed by Aşkar and Dönmez (2002) and the "Student Information Collection Form" were administered. The scale, prepared to measure different stages of the education software development process, and including 22 items, is a five-point Likert-type scale. The obtained score for each item ranged from 0 (I never trust) to 100 (I trust very much). The reliability coefficient of the scale calculated using Chronbach's alpha was found to be. 92. The Student Information Collection Form included the questions inquiring about the gender and grade levels of the students, the class they are studying at, their secondary school institution, and the region of their secondary school institution. In the analyses of the data obtained from the study, frequency and percentage, arithmetic mean, standard deviation, t-test and variance analysis were used. To analyze the data, SPSS 11.0 program was used.

Findings and results

1. The Self-Efficacy of the Teacher Trainees Regarding Education Software Development.

In the study, the first aim was to determine the level of education software development self-efficacies of the teacher trainees in four different dimensions. First of these dimensions was related to the "Project Management and Instructional Design". The results obtained from the measurement tool regarding the education software development self-efficacies of the teacher trainees toward project management and instructional design were given in Table 1.

Table 1: The Education Software Development Self-Efficacies of the Teacher Trainees Toward Project Management and Instructional Design.

Items	N	x	sd
I can plan all the stages of an education software project (analysis, design, development, application, evaluation).	296	54,3851	31,7474
In an education software project, I can determine the project team considering the aim and the requirements of the project and generate solutions regarding the duties and responsibilities of this team.	296	59,9257	29,8527
In an education software project, in case of any problem, I can solve it or lay down the action steps necessary to solve the problem.	296	54,4155	30,7892
In an education software project, I can set the aims of the project and determine what pieces of information, ways, means, and materials I need to reach these aims.	296	60,2534	29,6431
In an education software project, I can arrange the contents given to me in accordance with the learner characteristics and needs.	296	59,6216	29,6317
I can design the necessary information, skills, and attitudes in a teachable way.	296	59,2534	29,5735
In an education software project, I can form the scenario template and arrange the prepared contents according to this template.	296	56,8412	30,1607
In an education software development project, I can make the materials to be prepared compatible with the standards (such as SCOM, AICC).	296	41,9966	30,4600
In an education software, I can determine the kinds of assessments to be used to test the success of it in the direction of learner characteristics (such as pre-post test, exercises).	296	58,7230	29,8684
In an education software, I can determine the kind of the assessment to be used to test if the given contents are understood or not.	296	58,5068	29,7926
PMIDMEAN	296	56,3922	27,4619

Table 1 shows the results regarding the education software development self-efficacies of the teacher trainees toward project management and instructional design. According to these results, the item "In an education software project, I can set the aims of the project and determine what pieces of information, ways, means, and materials I need to reach these aims" is the one that the students trust themselves most about the matter of education software development (X=60,2534). The item that the students trust themselves least is the item "In an education software development project, I can make the materials to be prepared compatible with the standards (such as SCOM, AICC)" (X=41,9966). According to these results, it appears that teacher trainees trust themselves more about what they need in education software development projects, but they do not trust themselves much about the matter of the compatibility of the materials to be developed in these projects with the standards. Moving from these results, it can be concluded that teacher trainees must acquire more knowledge and skills concerning the standards to be applied in material development.

In the study, secondly, the education software development self-efficacies of the teacher trainees were determined in accordance with the dimension of graphic design. The results obtained from the measurement tool regarding the education software development self-efficacies of the teacher trainees toward the dimension of graphic design were given in Table 2.

Table 2: The Education Software Development Self-Efficacies of the Teacher Trainees Toward Graphic Design.

Items	N	X	sd
In developing education software, I can design the screen interface in the direction of the instructions given to me.	296	56,7196	33,5087
In developing education software, I can design the side menu by using navigation information in the direction of the instructions given to me.	296	54,8311	33,6017
In education software project, I can draw any character approved by the team using any kind of graphic design program (such as Adobe Photoshop, Macromedia Fireworks).	296	50,9358	34,8150
GDMEAN	296	54,1622	32,2819

Table 2 shows the results regarding the education software development self-efficacy perceptions of the teacher trainees toward graphic design. According to these results, the item "In developing education software, I can design the screen interface in the direction of the instructions given to me" is the one that the students trust themselves most about the matter of education software development (X=56,7196). However, the item that the students trust themselves least is the item "In education software project, I can draw any character approved by the team using any kind of graphic design program (such as Adobe Photoshop, Macromedia Fireworks) (X=50,9358). From these results, regarding the education software projects, it appears that the teacher trainees trust themselves more in designing screen interface in the direction of the instructions given, but they do not trust themselves much in using the graphic design software programs. Moving from these results, it can be concluded that the teacher trainees must acquire more knowledge and skills in using graphic design software programs.

In the study, thirdly, the education software development self-efficacies of the teacher trainees were tried to be determined considering the dimension of animation and sound-video design. The results obtained from the collected data using the measurement tool regarding the education software

development self-efficacies of the teacher trainees in relation to the dimension of animation and sound-video design were given in Table 3.

Table 3: The Education Software Development Self-Efficacies of the Teacher Trainees in Relation to the Dimension of Animation and Sound-Video Design.

Items	N	x	sd
The adjoining figure was extracted from an animation about a car traffic under the guidance of a traffic policeman. I can animate a two-dimensional animation of the above-mentioned kind by using any kind of animation program (such as Macromedia Flash).	296	47,4966	35,7010
The adjoining mechanism was extracted from an animation explaining about an experiment on electric current passing. When the switch in "On" position, the bulb lights because the circuit is closed. When the switch is in "Off" position, the bulb does not light because the circuit is open. I can animate a two-dimensional animation of the above-mentioned kind by using any kind of animation program (such as Macromedia Flash).	296	52,4831	36,9631
The adjoining figure was extracted from a three-dimensional animation design. Firstly, the Earth rotates around itself together with the latitudes and longitudes shown on it. After this, the animation approaches to the geographical region where Turkey is located and then the latitudes and longitudes of Turkey are shown in the form of a three-dimensional animation. I can animate a three-dimensional animation of the above-mentioned kind by using any kind of animation program (such as 3D Max, Maya).	296	27,0608	28,3855
17. I can add or delete new sounds to a sound file using sound arrangement programs (such as SoundForge) and edit them in a required way.	296	45,8953	35,7314
18. I can take the required pictures with a video camera and then edit them and also I can add effects on the present and newly-taken pictures by using a video program (such as Adobe Premiere, Ulead VideoStudio).	296	44,6284	35,9099
19. I can convert a present picture file into various video files (such as Mpeg1, Mpeg2, Avi).	296	55,0676	39,4259
ASVDMEAN	296	45,4386	30,1579

Table 3 shows the results regarding the education software development self-efficacies of the teacher trainees in relation to the dimension of animation, sound-video design. According to these results, the item indicating that the teacher trainees trust themselves most in developing education software is the item "I can convert a present picture file into various video files (such as Mpeg1, Mpeg2, Avi)" (X=55,0676). However, the item indicating that they trust themselves least is the item "I can animate a three-dimensional animation of the above-mentioned kind by using any kind of animation program (such as 3D Max, Maya" (X=27,0608). From these results, it appears that the teacher trainees trust themselves more in converting a picture file into various video files, but they do not trust themselves much in animating a three-dimensional animation by using a software. Moving from these results, it can be concluded that the teacher trainees must acquire more knowledge and skills in using animation softwares.

In the study, fourthly, the aim was to determine the education software development self-efficacies of the teacher trainees in relation to the dimension of programming. The results obtained

from the measurement tool concerning the education software development self-efficacies of the teacher trainees concerning the dimension of programming were given in Table 4.

Table 4: The Education Software Development Self-Efficacies of the Teacher Trainees Concerning the Dimension of Programming.

Items	n	x	sd
20. In an education software, using the given database, I can write codes regarding registrations like students' user registrations, and their performance levels in any programming language (such as Visual Basic, C++).	296	37,2973	32,2063
21. In an education software, using the database, I can write codes in any programming language (such as Visual Basic, C++) to learn about what subjects students can enter or can not enter.	296	34,4088	31,0287
22. In an education software, using any authoring language program (such as Macromedia Authorware, Macromedia Director), I can combine the text, sound, and animations formed by other units so as to be arranged in pages.	296	39,1892	33,9743
PMMEAN	296	36,9651	29,7544

Table 4 shows the results concerning the education software development self-efficacies of the teacher trainees in relation to the dimension of programming. According to these results, regarding the education software development, the item indicating that teacher trainees trust themselves most is the item "In an education software, using any authoring language program (such as Macromedia Authorware, Macromedia Director), I can combine the text, sound, and animations formed by other units so as to be arranged in pages" (X=39,1892). However, the item indicating that they trust themselves least is the item "In an education software, using the database, I can write codes in any programming language (such as Visual Basic, C++) to learn about what subjects students can enter or can not enter" (X=34,4088). From these results, while it appears that the teacher trainees trust themselves more in using an authoring language, they do not trust themselves much in using database and in writing codes in any authoring language. Moving from these results, it can be concluded that teacher trainees must have more knowledge and skills in using the database while developing education software and in writing codes in any programming language.

2. The Self-Efficacy of the Teacher Trainees Regarding Education Software Development and their Class Year

This section of the study looked at whether teacher trainees' self efficacy regarding software development changes based on which class they are. The results are shown in Table 5.

Table 5: T-test Results of The Self-Efficacy of the Teacher Trainees Regarding Education Software Development and their Class Year.

	YEAR	N	x	S	t	*p*
PMIDMEAN	1st Year	139	36,6101	25,64839	-15,856	,000**
	4th Year	157	73,9064	13,66732		
ASVDMEAN	1st Year	139	24,3645	25,89668	-15,008	,000**
	4th Year	157	64,0966	19,50796		
GDMEAN	1st Year	139	28,8369	26,27862	-18,831	,000**
	4th Year	157	76,5839	16,80365		
PMMEAN	1st Year	139	18,9448	25,31536	-11,920	,000**
	4th Year	157	52,9193	23,70105		

**$P<0,01$

In Table 5, we can see the t-test results conducted to identify whether teacher trainees' self-efficacy level changes based on their class year. Based on these results, it can be claimed that there are meaningful differences between 1st and 4th year students in all dimensions. While in Project Managements and Instruction Design (PMIDMEAN), the mean of first year students is (X=36,6101) whereas it is (X=73,9064) for forth year students. The difference between these scores is (t:-15,856;p<.000) . For Animation and Audio-video (ASVDMEAN) dimension, first year students' mean is (X=24,3645), whereas it is (X=64,0966) for forth year students. The mean difference between these is (t: -15,008;p<.000) dir. For Graphic Design (GDMEAN), first years' mean is (X=28,8369), forth years' mean is (X=76,5839). The mean difference is (t: -18,831;p<.000). In the Programming dimension (PMMEAN), first years scored a mean of (X=18,9448), whereas the forth years scored a mean of (52,9193)dır. The difference between those is (t:-11,920;p<.000)dir. In all four dimensions, the difference is in favour of the forth class trainees.

3. The Self-Efficacy of the Teacher Trainees Regarding Education Software Development and the Secondary School they Graduated from

In this section, the focus is on the secondary school the trainees graduated from and whether this has an effect on their self-efficacy level of education software development. The results are demonstrated in Tables 6 and 7.

Table 6: T-test Results of Teacher Trainees' Sel-Efficacy and the the Secondary School they Graduated from.

	Institution	N	x	ss
PMIDMEAN	State Secondary Scholl	63	50,8714	26,91446
	Vocational Secondary School	80	66,9863	21,86817
	Anatolian Secondary School	89	52,8483	29,03959
	Super Secondary School	52	49,7692	30,46413
	Science Secondary School	12	69,7333	12,82883
	Total	**296**	**56,3922**	**27,46192**
ASVDMEAN	State Secondary Scholl	63	41,5847	29,44868
	Vocational Secondary School	80	56,1875	27,98017
	Anatolian Secondary School	89	41,9569	30,14174
	Super Secondary School	52	37,2756	31,85792
	Science Secondary School	12	55,2083	21,54724
	Total	**296**	**45,4386**	**30,15793**
GDMEAN	State Secondary Scholl	63	46,2540	34,49241
	Vocational Secondary School	80	68,3708	23,25762
	Anatolian Secondary School	89	49,9438	33,07518
	Super Secondary School	52	46,7308	35,69106
	Science Secondary School	12	64,4444	18,78014
	Total	**296**	**54,1622**	**32,28190**
PMMEAN	State Secondary Scholl	63	32,6455	29,66303
	Vocational Secondary School	80	51,5208	28,50123
	Anatolian Secondary School	89	30,8240	27,74924
	Super Secondary School	52	27,5321	28,65065
	Science Secondary School	12	49,0278	21,24245
	Total	**296**	**36,9651**	**29,75441**

***P*<0,01

Table 7: One-way Variance Analysis Results Regarding Teacher Trainees' Education Software Development Self-Efficacy Level and the Secondary School they Graduated from.

		Sum of Squares	df	Mean Square	F	Sig.
PMIDMEAN	Between Groups	16433,389	4	4108,347	5,802	,000**
	Within Groups	206042,983	291	708,051		
	Total	222476,372	295			
ASVDMEAN	Between Groups	15868,036	4	3967,009	4,573	,001**
	Within Groups	252434,766	291	867,473		
	Total	268302,802	295			
GDMEAN	Between Groups	25815,035	4	6453,759	6,669	,000**
	Within Groups	281610,737	291	967,734		
	Total	307425,772	295			
PMMEAN	Between Groups	27854,745	4	6963,686	8,685	,000**
	Within Groups	233316,117	291	801,774		
	Total	261170,861	295			

**P<0,01

Table 6 shows teacher trainees' score averages and Standard deviations for education software development self efficacy, and Table 7 shows the results of one-way variance analysis conducted to identify whether there is a significant deifference between scores. According to the results, there are significant differences in all dimensions based on the secondary school the trainees graduated from.

The Tukey HSD analysis conducted to identify the source of difference referred to the source of Project Management and Instruction Design (PMIDMEAN) at the schools of Vocational Secondary Schools and Science Secondary Schools (F:5,802;sd(4-291);p<.000). The difference in Animation and Sound Videos (ASVDMEAN) dimension is again cuased by Vocational and Science Secondary Schools (F:4,573;sd(4-291);p<.001).

In the dimension of Graphic Design (GDMEAN), the source of difference is Vocational Secondary Schools. Finally, the difference in mean scores for programming (PMMEAN) results from Vocational Secondary School graduates.

4. The Self-Efficacy of the Teacher Trainees Regarding Education Software Development and the Geographical Location of the Secondary School they Graduated from

In this section, the focus is on the geographical location of the secondary school the trainees graduated from whether this has an effect on their self-efficacy level of education software development. The results are demonstrated in Tables 8 and 9.

Table 8: T-test Results of Teacher Trainees' Sel-Efficacy and the the Secondary School they Graduated from.

	Geographical Location	N	x	ss
PMIDMEAN	Central Anatolia	62	55,9726	26,66228
	East Anatolia	16	51,8938	27,93515
	South-east	25	53,6200	28,56545
	Black Sea	38	50,0526	28,78433
	Mediterranean	55	55,2182	25,86535
	Marmara	54	66,7407	23,86265
	Aegan	46	54,5217	30,83558
	Total	296	56,3922	27,46192
ASVDMEAN	Central Anatolia	62	45,7097	28,52277
	East Anatolia	16	43,9062	33,77858
	South-east	25	45,7000	28,84112
	Black Sea	38	40,1096	27,63798
	Mediterranean	55	40,5152	32,27028
	Marmara	54	53,7037	29,06233
	Aegan	46	46,0507	32,03270
	Total	296	45,4386	30,15793
GDMEAN	Central Anatolia	62	55,9409	28,20304
	East Anatolia	16	47,5000	35,22415
	South-east	25	46,6667	32,56049
	Black Sea	38	47,1491	33,86936
	Mediterranean	55	51,1939	33,66176
	Marmara	54	66,7222	28,00986
	Aegan	46	52,7536	35,39062
	Total	296	54,1622	32,28190
PMMEAN	Central Anatolia	62	36,6129	27,29614
	East Anatolia	16	36,7708	28,61927
	South-east	25	33,0667	28,39731
	Black Sea	38	31,7544	27,06889
	Mediterranean	55	30,9394	29,93780
	Marmara	54	51,3889	29,17767
	Aegan	46	34,2029	32,81211
	Total	296	36,9651	29,75441

Table 9: One-way Variance Analysis Results Regarding Teacher Trainees' Education Software Development Self-Efficacy Level and the Geographical Location of the Secondary School they Graduated from.

		Sum of Squares	df	Mean Square	F	Sig.
PMIDMEAN	Between Groups	8073,774	6	1345,629	1,814	,096
	Within Groups	214402,598	289	741,878		
	Total	222476,372	295			
ASVDMEAN	Between Groups	6162,247	6	1027,041	1,132	,343
	Within Groups	262140,555	289	907,061		
	Total	268302,802	295			
GDMEAN	Between Groups	13274,417	6	2212,403	2,174	,046*
	Within Groups	294151,355	289	1017,825		
	Total	307425,772	295			
PMMEAN	Between Groups	15002,436	6	2500,406	2,935	,009*
	Within Groups	246168,426	289	851,794		
	Total	261170,861	295			

*P<0,05

Table 8 shows teacher trainees' score averages and Standard deviations for education software development self efficacy in relation to the geographical location of the secondary school they gradutaed from, and Table 9 shows the results of one-way variance analysis conducted to identify whether there is a significant deifference between scores. According to the results, there are significant differences in the dimensions of graphic design (GDMEAN) and programming (PMMEAN) when considered in terms of the geographical location of the secondary school they graduated from. The Tukey HSD analysis conducted to identify the source of difference showed that for Graphic Design the sourve of difference was Marmara Region (F:5,802;sd(4-291);p<.000), and for Programming, the source of difference was again Marmara Region (F:2,935;sd(6-289);p<.009).

Discussion and Conclusion

In the present study made to determine the self-efficacies of the teacher trainees toward education software development, the following results were reached.

1. The education software self-efficacies of the teacher trainees were generally at the middle level. Teacher trainees, who are to train future individuals, are expected to become more efficant in developing education softwares that will be employed in learning-teaching processes. To achieve this, the number of the lessons and the number of the lesson hours of the present courses on developing education softwares must be increased in the programs of the teacher training institutions.
2. When the education software development self-efficacies of the teacher trainees were examined in all four dimensions, it appeared in the project management and instructional design dimension, the first of all dimensions, that while the teacher trainees trust themselves in determining the knowledge, means and materials that they need in order to develop an education software, they do not trust themselves much in making the materials to be prepared in developing an education software compatible with the standards. Teacher trainees need more knowledge and skills in developing education softwares in accordance with the standards. For this purpose, they must be given education on this matter in relevant courses.
3. In graphic design, the second dimension for the education software development self-efficacies of the teacher trainees, while they trust themselves in designing screen interface in

the development of education software, they do not trust themselves much in drawing a character for an education software using any graphic design program. Teacher trainees need more knowledge and skills in using graphic design programs. It can be stated that computer graphic design courses must be included in the present programs.

4. In animation and sound-video design, the third dimension for the education software development self-efficacies of the teacher trainees, while they trust themselves in converting a picture file into various video forms, they do not trust themselves much in making a three-dimensional animation using any animation software. The relevant courses that the teacher trainees take must include unit/units on using animation softwares.
5. In the programming dimension, the fourth dimension for the education software development self-efficacies of the teacher trainees, while they trust themselves in arranging pages using any authoring language program, they do not trust themselves much in writing codes using the database about monitoring of students in any programming language. In this case, it can be stated that teacher training institutions must include courses on database using and code writing in their programs.
6. When the teacher trainees' class year is considered, significant differences have been observed in all dimension between first year students and forth year students. The difference results from the forth year students. Based on this, it can be said that the hidher the class year the beter is teacher trainees' skills and competencies regarding educational software development. Thus, it can be claimed that educational institutions achieve their aims in terms of software development.
7. Significant differences have been observed in terms of educational software development and the secondary school that the teacher trainees graduated from. This difference is in favour of Vocational Schools and Science Schools. Vocational Schools and Science Secondary Schools select their students via an exam anda re known to offer a beter education. Thus, students who come equipped, demonstrate a higher success during their university education.
8. Significant differences were also observed in teacher trainees' self efficacy regarding software development and the geographical location of their secondary school. Graduates from Marmara region exhibited a higher level of self-efficacy for software development. Knowing that Marmara region is a more developed region when compared to others, the results seems to reflect that those students are beter in software development than the others.

References

Alabay, Erhan. 2006. İlköğretim Okulöncesi Öğretmen Adaylarının Fen İle İlgili Yeterlik İnanç Düzeylerinin İncelenmesi. **Yeditepe Üniversitesi, Eğitim Fakültesi Dergisi** Edu **7**. v. 2 , p. 1: 30-40.

Ashton, Patricia. 1984. Teacher Efficacy: A Motivational Paradigm For Effective Teacher Education. **Journal of Teacher Education.** v. 35**,** p. 5: 28-32.

Askar, P. and Dönmez, O.(2004) "Egitim Yazılımı Gelistirme Öz-yeterlik Algısı Ölçegi" Egitim Bilimleri ve Uygulama, 6(3), 259-274.

Bandura, Albert. 2001. Social Cognitive Theory: An Agentic Perspective. Annual Review Of Psychology. v**.** 52: 1-26.

Bıkmaz, Fatma. 2004. Sınıf Öğretmenlerinin Fen Öğretiminde Yeterlik Yeterlilik İnancı Ölçeğinin Geçerlik ve Güvenirlik Çalışması. **Milli Eğitim Dergisi.** Vol.: 161.p:183

Chambers Sharon M, Hardy James C. 2005. Length of Time in Student Teaching: Effects on Classroom Control Orientation and Self-Efficacy Beliefs. **Educational Research Quarterly**. c. 28, s. 3: 3-9.

Gerçek, C., Yılmaz, M., Köseoğlu, P., Soran, H. 2006. Biyoloji Egitimi Ögretmen Adaylarının Ögretiminde Yeterlik- İnançları. **Ankara Üniversitesi Eğitim Fakültesi Dergisi**, 39/1, 57-73.

Henson, Robin K, Jennifer Stephens, Gale S Grant. 1999. Self-efficacy in Preservice Teachers: **Annual Meeting of the Southwest Educational Research Association**. **21-23 January**. San Antonio: 23. Educational Researchers İnformation Center**.** ED.436 482, p.1-29.

Önen Fatma, Aysun Yeterliktuna. 2005. Fen Bilgisi ve Matematik Öğretmenlerinin Yeterlik Duygusunun Belirlenmesi. **İstek Vakfı Okulları I. Fen Ve Matematik Öğretmenleri Sempozyumu**, March. İstanbul

Pajares, M. Frank. 1992. Teachers Beliefs And Educational Research, Cleaning Up A Messy Construct. **Review Of Educational Research**. v. 62, p. 3: 307-332.

Pajares, M. Frank, Schunk H. Dale.2001. [28.06.2007] Self-Belıefs And School Success: Self-Efficacy, Self-Concept, And School Achıevement **,**Chapter in R. Riding & S. Rayner (Eds.), Perception. London: Ablex Publishing. http:// www.des.emory.edu/ mfp/PajaresSchunk2001.html p: 239-266.

Palmer, David. 2006. Durability Of Changes in Self-Efficacy Of Preservice Primary Teachers, **International Journal Of Sience Education.** v. 28, p. 6: 655-671.

Sanemoğlu, Nuray. 2001. **Gelişim Öğrenme Ve Öğretme Kuramdan Uygulamaya**. 3. b.s. Ankara: Gazi Kitabevi.p:228-238

Schmitz Gerdamarie S., Ralf Schwarzer ,2000. Perceived Self-Efficacy of Teachers: Longitudinal Findings with a New Instrument, **Zeitschrift für Pädagogische Psychologie**, März 2000, c. 1, p: 12-25,

Tschannen-Moran, Megan Anita Woolfolk Hoy, Wayne K. Hoy .1998. Teacher Efficacy: Its Meaning and Measure, **Review of Educational Research.** v. 68, p. 2: Summer, 202-248

Ünlü, Erden. 2003. [01.07.2007]. **Bilimsel Yönteme Giriş Ve Temel Kavramlar,** Araştırma Yöntemleri Ders Notları. (2002-2003).I. . b.s. İstanbul http://yunus.hacettepe.edu.tr/~ unlu/ist480/IST480-Genel bilgi-2002-2003.ppt

Yılmaz Miraç, Pınar Köseoğlu, Cem Gerçek, Hâluk Soran**.** 2004. Öğretmen Yeterlik İnancı. **Bilim Ve Aklın Aydınlığında Eğitim Dergisi**. 5, 58 :67

Wikipedia, 2008. Retrieved from http://en.wikipedia.org/wiki/Self-efficacy, 2008-05-11

(D.37)

The intelligent Cultural Classroom: Strategies for Innovation and Assessment,

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Abstract

High-speed information networks allow access to authentic cultural materials and link language learners as well as teachers to native speakers around the world. When integrated into a pedagogical plan, these new technologies enhance learning opportunities beyond anything previously possible. The present paper, which is part of an on-going study sponsored by the LECUCRA Research Laboratory of the University of Annaba, aims at exploring and evaluating the possibilities of using the new Information and Communication Technologies in Cultural Studies in the age of Globalization. It demonstrates how such outlets empower students to take initiatives and to articulate their individual propensities as part of the new student-centred exigencies. Contrary to the conventional methods, this endeavour renders possible the student's exposure to primary texts, as opposed to ready-made commentaries or interpretations, leading him/her to weigh the information presented against his /her world view, in what is commonly known as "external consistency". The study ascertains the impact of the utilization of the Internet on both teachers and learners in terms of documentation and research. It also gauges its potential with regard to the new requirements of course designing to attain the aspired "dynamic syllabus".

Introduction

Recent approaches to language teaching, especially "self-directed learning" and student-centred modes, have stimulated educators worldwide in the search for fresh ways to incorporate Internet-based activities into the classroom[1]. The Internet, with its various applications now in vogue, largely suits the current communicative and learner-autonomy theories and is often assumed to concretize "augmented teaching."

The present study deals with the classroom as a community of readers with an invaluable potential of producing meaning out of direct exposure to a given text. Beyond the production of meaning stands also the negotiation of meaning through the various interpretations in a group framework. Using the WWW for a text-based approach in the culture class seems pertinent to the restoration of self-initiated exploration and interpretation amongst students.

The inevitably factual and historical nature of some tutorials tends sometimes to tinge the class atmosphere with an air of monotony. The teacher's task is paramount in circumventing this condition, by making every student's voice both heard and reckoned with in a collaborative learning environment where the different language skills are integrated. The goal is to empower students to take initiatives and to articulate their individual propensities. Reading primary texts, instead of relying solely on sterile factual information, allows students to compare and negotiate ideas from a first-hand reliable source through a "multi-vocal" process of sharing and critique. Accomplishing a first-hand experience of this nature in a culture class also guarantees the forestalling of biased information likely to be found on the Net. Exposure to primary texts, as opposed to ready-made commentaries or interpretations, is alone capable of allowing the "informed" student to detect irrational claims or arguments, and to weigh the information presented against his/her world-view, in what is commonly known as "external consistency."[2]

Objectives of the Proposed Model

❖ Using the www for Documentation and Research

- The WWW can be fully exploited as an electronic library to access online library resource databases, primary resources, and photographs from online archives.
- It can broaden research resources for the study of culture, but the students should have prior training to use and access new electronic resources, to accomplish "electronic literacy."

- It can enhance teachers' abilities to assign significant learning activities with primary materials closely related to inquiry and research as it is the case in the example given below.
- A trouble-free Web "hunt" also incites students to react more enthusiastically to the study of culture. The immediate access to the relevant archival material saves a huge amount of time and energy, as the students come to class with a vivid idea about the major historical and political manoeuvres of a given ground.

❖ **Using the WWW as a Resource for Course Design**

- Instead of a fixed sterile syllabus, the WWW can bring about a "dynamic syllabus" where both student and teacher can benefit from web resources to inject life into the different course materials (lectures, readings, assignments, exams, paper topics, etc). A web page on The Avalon Project that I used in 2006, for instance, has been continuously updated ever since my first consultation, and I found out that its last revision was made as recently as 10 March 2008.

Methodological Approaches and Assets

- Distributive learning: The use of the Internet guarantees the distribution of information and the transmission of knowledge. The authentic research tasks assigned to the students are unfeasible and unattainable without the vast storage and retrieval capabilities of information technologies.
- Dialogic learning: The WWW, with its different applications, promotes student conversation and dialogue.
- Constructive Learning: As the initial experiments have demonstrated, the Internet and its expansive spaces allow the students to foster a constructive, ever-growing interest in language learning, and also in the retrieval of knowledge.
- Reflexive and Critical Thinking: The Internet exposes students to self-guided intensive reading which guarantees the acquisition of reflexive and critical thinking.

Logistical and Practical Consideration

Teacher-tutored web working sessions (at a formal level) remain for the time being unattainable, as our department does not have the means to purchase a site licence and our research laboratory is still trying to overcome budgetary restraints to find an adequate formula for payment. Consequently, the students were asked to rely on their own means to consult the recommended websites.

The utilization of the Internet is apt to open gates towards browsing texts and archival materials of all kinds and of all historical periods; most of such materials are not likely to be found in print form in our libraries. We must however keep in mind the criticism levelled at the use (or rather misuse) of internet materials. I shall address this matter at a later stage of this paper.

Compared with the new teaching practices that some foreign institutions have developed, the methods I am suggesting are both simple and relatively inexpensive to implement. But, despite the simple and low-cost nature of our endeavour, experience has demonstrated the need for a high degree of personal commitment to innovation, self-motivation, time, energy, as well as patience and persistence, especially in the face of budgetary constraints and limited support.

In this context, Willis (1997) has put forward a model to supply teachers with an uncomplicated framework to facilitate their understanding of how the new technologies can be used to prop up existing learning processes. According to him, this framework can also be used on an "intranet" to reduce communication expenses and lessen the threat of exposure to bad content. However, he rightly notes that "access to the Internet is essential to allow students to explore and utilise the full range of resources, participate in distributed activities and publish to the widest audience" (Willis, 1997).

Most interestingly, Willis suggests a method that I find relevant to our project: to make up for the slow connections which is more often the case than the exception, an "intranet" can be used to create off-line resources that have the advantage of being completely user-safe.

The following is a detailed follow-up of a web-enhanced class centred round the end of WWW II and the bombing of Hiroshima and Nagasaki:

The Sample: The end of wwwII

Basic Information

The teacher orients access the A-bomb WWW Museum's main page on www.csi.ad.jp/ABOMB/index.html to obtain some basic information about the Atomic Bomb. There relevant link on which to click is: "Introduction: About the A-bomb," which offers ample information on the subject. Most significantly,www.dannen.com/decision/index.html contains a variety of documents related the decision to drop the atomic bombs.

Text-based Accounts

For more student involvement, it is strongly recommended that the teacher directs his students to read vivid accounts of victims whose testimonies are more precious than any journalistic report or commentary. Purely text-based accounts from a number of atomic bomb survivors from Nagasaki, are available on www1.city.nagasaki.nagasaki.jp/na-bomb/heiwa/heiwa01e.html where links to texts such as Hiroshima survivor testimony, A Child's Experience, and Voices of A-Bomb Survivors can be accessed.

Of particular interest isTadataka Kuribayashi's reminiscences of the day of the bombing, relating a child's first-hand impressions on the fateful events of the Hiroshima bombing:

"A child's experience: My experience of the atomic bomb"
By: Tadataka Kuribayashi

> "The Radiation Effects Research Foundation (RERF) and RERF Labor Union decided to distribute my note about my A-bomb experience, which I wrote almost 30 years ago, on the occasion of the '94 A-bomb anniversary. I feel a little uneasy, but I was glad to be able to cooperate. The evacuated elementary school students including myself have reached the age of 60 and many of us have grandchildren now. I have served at the RERF for almost 34 years. The 6 months I spent in Tsutsuga Village in the northern part of Hiroshima Prefecture still remains, vividly in my memory even after so many years. It might be difficult for young people to imagine what happened in those days, but I want them to know that there are many people who underwent similar experiences to mine and that they are still very much alive. It is worthwhile, perhaps, to go back once again from the affluent life we are now enjoying to the "starting point". [This note was included in "Koho Tsutsuga" (PR journal of Tsutsuga Village, Yamagata County) published in September 1975.]
>
> In late June 1966, I decided to visit Tsutsuga Village of Yamagata County for the first time in 21 years to do some sketches for an art exhibition. Probably because it was early Sunday morning, the diesel locomotive from Yokogawa to Kake was not crowded. High school girls in white sailor blouses were talking and smiling in a carefree manner. It was a peaceful sight with no trace of darkness at all.
>
> With the sound of a bell, the diesel locomotive left the platform. At that time, there was something that touched my heart, and I turned my eyes to the landscape outside the window. The sorrow and loneliness I had felt when I had parted from my mother for collective evacuation on 12 April 1945 came vividly to my mind."

The author's first-person narrative is more than a mere reporting of events. In addition to its authentic documentary value, it also bears all the literary qualities of textual build-up and rising suspense. The extract in fact strongly invites further implicated reading and empathy, accentuated by hypertext components, notably the photograph of Kuribayashi's family in 1940, in which the author—who was then in the first grade of a national elementary school—was happily surrounded by all the members of his family.

"Voices of A-Bomb survivors" offers a unique opportunity of coming into close contact with survivors who witnessed the bombing. The site home page features photographs of the witnesses and clickable openings of narratives to be browsed:

> Dr. Ryuso Tanaka, President of Hiroshima City University: I was with five other students in the sports ground of the university.... Mr. Kousuke Shishido, Business Consultant: I was in a shelter near Miyukibashi bridge which was about 2 miles away (South East) from the center of the explosion.... Ms Michiko Yamaoka, Kataribe (A-Bomb story teller): I was walking on the street. Two of my cousins and I had left home only a few minutes before that.... Mr.Yukiharu Nakagawa, Electrical Engineer: I was inside the old power plant building where I worked every day....

Such openings may serve as stimulating "starters" for students to experiment with creative writing by imagining the situation and identifying with the writers. The written, simulated product is then weighed against the original piece, enabling the students to compare their own inventive performance with the authentic one.

Another piece which elicits scrutiny is "Hiroshima," a famous New Yorker article by John Hersey, who is a renowned American journalist. This text stands out as highly rewarding since it reflects an opposing stance by an American national; it is available on www.geocities.com/Heartlandhills/6556/Hiroshiml. For a magazine article, it had a remarkable impact on the shaping of public opinion about the reality of the war.

The students will certainly take pleasure in reading this text because it is mostly a narrative. It traces the experience of six residents, including one foreigner, who survived the blast in Hiroshima. "It was the first foreign account to treat the victims as humans and not just statistics," reads the article, "thereby allowing the reader to identify or empathize with them."

Photographic Evidence

The visual, tactile aspect of Internet instruction is guaranteed by the immediate, gratis, and unconditioned access to photographs of some artifacts which remained after the Hiroshima bombing, and which may be viewed at www.csi.ad.jp/ABOMB/pmm.html. Scenes from the main site of the August 9 memorial, Atomic Bomb Museum, and Peace Education may be accessed at www.us1.nagasaki-noc.ne.jp/~nacity/na-bomb/indexe.html

Furthermore, the official site of the Nagasaki Atomic Bomb Museum at www1.city.nagasaki.nagasaki.jp/na-bomb/museum/m1-1e.html offers a detailed account of the bombing of Nagasaki with photographs.

In this context, developing the student's critical judgment is cultivated by addressing the issue of censorship and how it affects American public opinion. A comparison of the photographs or "the ground-zero images" of the Japanese army photographer who visited Nagasaki on August 10, the day after the bomb was dropped on Nagasaki at www.exploratorium.edu/nagasaki/ titled "Remembering Nagasaki," with those viewed by Americans, mainly those of the mushroom cloud, is highly stimulating to the critical faculties of the learners. The questions to be posed are: how do the perspectives of the American view from above, and the Japanese view from below differ? And why would American veterans wish to edit out the view from below or "ground zero?" In this particular instance, the interplay between cognitive processes and critical thinking proves the importance of the triad "understand, analyze, and evaluate," notably when it comes to the selection of "a big idea…worthy of discussion" (Walsh & Sattes 38, 28).

The American Decision-Making Process

To better understand American policy-making in the dropping of the bomb, the CIA's monograph by Douglas J. MacEachin, The Final Months of the War With Japan: Signals Intelligence, U.S. Invasion Planning, and the A-Bomb Decision at www.odci.gov/csi/monograph offers an insightful, first-hand idea about the American decision-making mechanisms. The most interest-educing piece is

perhaps the one that vividly traces the all-inclusive circumstances under which the decision to throw the bomb was taken:

"The Decision to Use the Atomic Bomb"

On the evening of 16 July—Truman's second day at Potsdam—he received a cryptic notification that the atomic bomb had been successfully tested early that morning at Alamogordo, New Mexico. On 21 July he received via special courier a detailed report on the test results from Gen. Leslie Groves. (This was the same day the Military Intelligence Service reported that the number of identified combat divisions on Kyushu had jumped to nine.) Three days later Gen. Carl Spaatz headed to Guam as the new head of Strategic Air Forces in the Pacific, carrying written instructions for his new command to deliver the first "special bomb" as soon after 3 August as weather permitted. The document said the instructions were issued "by direction and with the approval of" Stimson and Marshall. According to General Arnold, the dispatch that initiated the drafting of these instructions was sent to Washington from Potsdam via courier as early as 22 July.

On the morning of the 31st, President Truman was given a cable from Stimson requesting approval of a draft public statement planned for release immediately after the dropping of the first atomic bomb on Japan. Stimson's message included an apology for his "haste," but it added that "the time schedule on General Groves' project is progressing so rapidly that it is now essential that [a] statement for release by you be available not later than Wednesday, 1 August."

Truman penciled his response on the back of the Stimson cable and it was sent immediately to Washington. It said: "Suggestion approved. Release when ready but not sooner than August 2" (i.e., after Truman's departure from Potsdam). The President gave this go-ahead two days before the Military Intelligence Service issued its report on "eleven divisions" that was cited in the Joint War Plans Committee's recommendation for studying "Alternates to OLYMPIC."

This sequence of events is consistent with the weight of evidence from archival documents and from statements and memoirs of the participants in the Potsdam discussions indicating that for all practical purposes the decision on whether to use the nuclear weapon against Japan had already been reached by the time the President arrived in Potsdam. On this point virtually all scholars who have studied the issue seem to concur, however much they may disagree on the motives for its use and whether its use was justified.

On 1 June the "Interim Committee"--a group established by Truman and chaired by Stimson that included political advisers in and out of the government, scientists, and industrialists, with Marshall and Groves also involved--had recommended to the President that the bomb be used as soon as possible, against a military-industrial target in Japan, and without prior warning. This was the governing concept during all of the Committee meetings over the next five weeks. The meetings also featured discussions of drafts and re-drafts of Presidential public statements to be made when the bomb was used.

Debate continued over whether to provide a warning and perhaps a demonstration of the weapon's devastating power. Some scientists outside the Interim Committee dissented altogether from the idea of using the new weapon. But the record shows that Truman agreed with the course of action recommended by the Committee and had every intention of implementing it.

The record of documents and memoirs also shows that, from the time that word of the successful test arrived in Potsdam, the internal discussions there focused on (1) how soon it would be possible to use the weapon--including whether it might be ready before the USSR formally entered the war against Japan; (2) what would be the first target or targets (from a short list that had been already drawn up); (3) the wording of what would become known as the "Potsdam Declaration", which warned the Japanese of the consequences of not surrendering "unconditionally" and outlined in general terms what that meant (but did not warn specifically about the atomic bomb); and (4) the public statement the President should release immediately after the bomb was dropped. The news of the test also sparked further discussion on whether the USSR's commitment to the war was still needed and whether and how to inform Stalin of the bomb. There are, however, no explicit references to the Japanese defensive build-up as a factor in any of these discussions, and no indications that it affected any of the actions taken.

Whether any formal decision making meeting took place among the key Potsdam participants on the subject of using the bomb is itself a question for which the evidence is at best tenuous and conflicting. A Truman biographer has pointed to 24 July, when Truman and Churchill met jointly with their military chiefs, as the day of the "critical moment." But there is no evidence that this subject came up at that meeting.

Some sources have suggested that a key meeting took place on 22 July, the day after Truman received the Groves report on the test results, and that this meeting may have been the occasion when

the President asked the question of Marshall that resulted in the "quarter of a million" statement. All references to this meeting appear to be based on Truman's statement in his January 1953 letter to the Air Force historian--and also in his memoirs--that after receiving the "report" (presumably a reference to the Groves document), he called together all his advisers. The records and memoirs clearly establish that Truman did have a private meeting with Churchill that day, with Marshall and Leahy in attendance, to discuss use of the bomb.

A detailed review of the Potsdam records, however--along with accounts of the activities that day of the officials Truman claimed were present at a larger and more formal meeting--suggest that while the President may have engaged in separate consultations with individual advisers at different times, there was no gathering of the whole group as has been sometimes claimed. Based on the record, it seems more accurate to describe the events in Potsdam regarding the atomic bomb as a series of ad hoc "consultations," probably stretching over a few days following the President's receipt of news of the successful test.

A conclusion that no such formal gathering took place is not an argument that concern over the casualty cost of an invasion of the Japanese homeland was not a central consideration in the decisions regarding the use of the bomb. The concern over casualties is clearly reflected, for example, in the discussions between the President and his advisers on 18 June, including Admiral Leahy's questioning of the merits of paying such a price for unconditional surrender.

A further example is Secretary Stimson's memorandum to the President on 2 July, which ultimately evolved into the Potsdam Declaration. As initially drafted by Stimson, this memo was much more explicit than the version adopted at Potsdam on conceding to the Japanese the right to maintain the institution of the emperor. Stimson described his intentions as seeking Japan's surrender without incurring the high casualties he feared would result from an invasion.

Nor should the evidence be construed as indicating that concern over casualties was the only factor exerting critical force on the A-bomb decision. What the evidence does indicate is that the view of the bomb as a potential way to end the war quickly--in the hope of (1) avoiding the need for an invasion with resulting casualties that by any standard would be of intimidating proportions, (2) minimizing the USSR's post-war leverage, and (3) not having to confront debate over concessions on the terms of unconditional surrender--was the driving force in the minds of the US leadership team before Potsdam, and before the acquisition of intelligence showing much-larger-than-expected Japanese forces on Kyushu. Nonetheless, it is certainly plausible that the build-up disclosed by early August reinforced the belief that the decision to use the bomb was the path of least resistance.

Public Opinion

The teacher should know how to respond to learner curiosity about the different stances in America towards the bombing, especially the possible generational disparities in the appraisal of the issue. He/ she can intervene to help direct them in their search by recommending www.exploratorium.edu/ nagasaki/ mainn.html where they can click on the box “Commentary” and then on the box “The Decision,” in order to access authentic messages posted by American participants. The “global reach” and the “interactivity” of the Internet give “equal chances to participate in debate,” especially that the anonymity (which online communication guarantees through electronic forums) staves off “exclusionary tendencies” (Buckler& Dolowitz 4).

Memorials and Memorial Activities

To obtain direct information on how the after-effects of the bombings can still be felt in Nagasaki today, the students will not find better than the photos and texts describing the memorial activities that take place on August 9 at www1.city.nagazaki.nagazaki.jp.

The concept of *"peace education"* which arouses open admiration amongst interested groups is largely elucidated at www.us1.nagasaki-noc.ne.jp/~nacity/na-bomb/Protest/na-peacee.html and www.pcf.city.hiroshima.jp/peacesite/. It is edifying to learn about the ways in which the Japanese

reacted to the testing of atomic weapons, being victims themselves. To stimulate the students' analytical abilities, the question to be addressed in this context revolves around American racism towards the Japanese.

Virtual visits to important sites is made possible at a mouse-click, this is a unique experience for a direct cultural contact. The link "Tour Around the Peace Park"provides a virtual tour of Hiroshima's Peace Park, and also of specific places (a total of 60 sites) indicated by numbers, for example, "#4 A-bomb Dome", "#6 Monument to author Tamiki Hara," #10 Children's Peace Monument, " and "#21 Monument in Memory of Korean Victims of A-bomb."

Recommended Student Tasks:

STEPS	ACTIVITY	OFFSHOOT
1	Research and access: students use of search engines, web directories, expert sites and others).	Retrieval of information through downloading/ printing for resource use
2	Basic communication between individuals. One-to-one or group communication. (e-mail, chat, video conference.	Allows students to communicate with others, either peers or experts and to contribute to, and learn from, group on-line discussions.
3	Content production.	Students are able to produce and publish their own content using HTML and appropriate applications.
4	Collaborative working.	Students use their acquired skills to work with collaboration either locally via an intranet or at a distance via the Internet.
5	Project-based working.	Students become able to use an interdisciplinary and mixed media approach to project-based work involving problem-solving, research activities, and collaboration.

To enhance the reading and comprehension skills of the learners, the teacher of culture, whenever possible, can of course make full use of the other highly significant Internet application which is the hypertext. The presence of hypertext content offers the readers the controlling possibility to respond to cultural meanings, not simply from the point of view of basic language understanding, but also from the angle of the profound and multi-layered significance of the text. Establishing relationships between the various hypertextual elements is quite exigent as it demands an elevated intellectual cogency on the students' part. As Landow argues, recognizing "possible connections and arguing for their validity is a high-level intellectual skill" (Landow 136).

With the colossal amount of information obtainable in such an extraordinary design, the students are to be exposed to further background material than usually expected. This is what Landow considers as one of hypertext's most remarkable potencies (Landow 126; 187).

Along the same line, Dryden evokes hypertext's "structure of branching links and nodes" which "simulates the mind's associative processes, thereby providing an electronic platform for constructing and recording the reader's literate thinking" (Dryden 285).

While traditional reading offers "a constrained, linear form determined by the nature of print text," hypertext presents the students with a different kind of reading, which is a "decentred, participatory form" (Miall & Dobson). Additionally, hypertext increases individual freedom because "users are entirely free to follow links wherever they please" (Johnson-Eilola 145).

Provisos

Although Internet use is apt to improve both teacher and student output, it is more than necessary to consider the issues potentially having frontage on rational Internet use. The idea of using the web as a boundless library for the transmission of knowledge has been branded by some academics as "a myth." "Information does not equal knowledge," argue Christine Cheney et al. Learners ought to be warned that there is no "'authority' approving the information on the web" and, hence, websites need to be "examined with ...a much more critical eye than ...library sources" (161). Taking Wikipedia (the online encyclopaedia) as an example, Sara Baase addresses the issue of biased information on the web. Despite its enormous popularity, such a resource, she cautions, is both "unreliable" and "subjective" because "anyone can edit any article at any time" (351).[3] Therefore, students need to be alerted to the incorrect, deformed, and outdated information likely to be found on the web. Along a similar line, Hossein Bidgoli focuses on what he calls "information quality problems." To counteract biased content, he advises that it is more than vital to understand "the complex relations between sponsorship, advertising, and information on the web" (165).

The following table provides a sample assessment of Websites and web pages (author identity, competence, and objectives.)[4]

General Considerations		**Evaluative Possibilities**
The identity of the author of the site	- An official institution	- governmental (.gov) - university (u-) - NGO (.org)
	- commercial firm	(.com): (multimania.com/… geocities.com)
	- personal	- personal site - page on a web host
The objectives of the site	Are they clearly presented?	- informative - defending ideas opinions, values - advertising for products - propagating erroneous information
	Are the stated objectives commensurate with the pursued ones?	
	Do these objectives conform to law?	- breaching of human rights - infringement of human dignity -breaching of copyright
The author(s)' competence	Does he / she introduce his/ her credentials and publications	-professionally known
Targeted audience	-Large public -specialists audience of initiates -school audience	
The kind of information given	Form of expression of the author	- in his/ her name - in the name of an institution - in the name of the sponsor site
	Is the theme treated clearly stated on the homepage?	- introduction - thesis statement - plan - summary
	Is the subject treated as a whole or is it treated from a single angle?	
	Does the author lay claim to a given school of thought?	- explicit references - citations - notes
	Does the author put forward controversies on the subject	

	Is the material offered sufficiently updated?	- date of online posting - date and periodicity of updating
	Does the author list his own sources?	- bibliography - useful links and addresses
	Does the author recommend other sources of information?	- bibliography - webliography - links to other authoritative sites - operational links
	Is the author available for further information?	postal address, telephone, fax, email…
Presentation and organization of information	Is the homepage well "informed"?	- homepage design site e la page
	Is navigation user-friendly?	- menu - hypertext links
	Are the illustrations used pertinent to the information?	Are the illustrations well presented?

Conclusion

Teaching culture as part of foreign language learning has been subject to an ever-growing academic interest. Such an interest complies with the modern views of the communicative nature of language. The accomplishment of communicative competence largely rests on the intrinsic cultural understanding of the culture of the target language. The practical implementation of important cultural mechanisms in an FL context is made more attainable through the use of the Internet, as many conventional sources prove incomplete, and offer, more often than not, misleading views of the target culture. The incorporation of Internet-generated authentic materials to support in-context FL learning helps students develop a wide range of communicative competences. Hence, the use of the Internet not only increases linguistic and cultural knowledge, but also and above all else provides an enjoyable learning experience, capable of improving student output. A careful implementation of the proposed model can bring about the following rewards:

- More effective and student-centred visual/tactile learning styles of texts and contexts
- More confident, text-based, communicative and open feedback in a fully concerted learning situation;
- Better-paced, personalised recovery of integrated knowledge;
- More piercing critical analysis of the presented information; and
- Build-up of patterns of learner self-efficacy.

Endnotes

[1] See for instance the valuable work of Gavin Dudeney , The Internet and the Language Classroom, Second Edition, (Cambridge: Cambridge UP., 2007). See also Ian Forsyth, Teaching and Learning Materials and the Internet, Third Edition, (London: Routledge, 2001), and Deanie French, Charles Hale, Charles Johnson, and Gerald Farr (editors), Internet-Based Learning: An Introduction and Framework for Higher Education and Business (Sterling, VA: Stylus Publishing, 1999).

[2] "External consistency" is commonly used to refer to the extent to which a learner is able to situate his own world-view within the variety and diversity of other views. It is borrowed from computer science where it is used to denote determination of compatibility of a product with external criteria.

[3]Baase quotes T.S. Eliot's "Choruses from 'the Rock,'" (1934): "Where is the wisdom we have lost in knowledge? / Where is the knowledge we have lost in information?" (351).

[4]This model is inspired from Villaume and Bibeau.

References

Baase, Sara. A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet. 3rd ed. New Jersey: Pearson Prentice Hall, 2008.

Bibeau, Robert. "Grille d'évaluation d'un site Web." 20 Jan. 1999. http://ntic.org/guider/textes/div/bibcriteres.html.

Bigdoli, Hossein. The Internet Encyclopedia. New Jersey: John Wiley & Sons, 2004.

Buckler, Steve, and David Dolowitz. Politics on the Internet: A Student Guide. London & New York: Routeledge, 2005.

Cheney, Christine O., Michael M. Warner, and Diann N. Laing. "Developing a Web-Enhanced Televised Distance Education Course: Practices, Problems, and Potential." The Web in Higher Education: Assessing the Impact and Fulfilling the Potential. New York: The Haworth Press, 2001: 160-171.

Johnson-Eilola, J. Nostalgic Angels: Rearticulating Hypertext Writing. Norwood, NJ: Ablex. 1997.

Landow, G. P. Hypertext 2.0: The Convergence of Contemporary Critical Theory and Technology. Baltimore: Johns Hopkins University Press.1997.

Miall David S. and Teresa Dobson. "Reading Hypertext and the Experience of Literature" Journal of Digital Information. 2:1. 2001. 30 April 2008. <www.lled.educ.ubc.ca/faculty/dobson.htm>

Villaume, Françoise. "Grille d'évaluation d'un site ou d'une page internet. " 20 Jan. 1999. http://www.ac-dijon.fr/pedago/Cdi/tpe/tpe-ana.htm.

Walsh, Jackie Acree and Beth D. Dankert Sattes. Quality Questioning: Research-Based Practice to Engage Every Learner. London: Corwin Press, 2005.

Willis, D. 1997. "A Suggested Framework for the Educational Use of the Internet Technologies and the Development of Students' Abilities to critically evaluate Materials." South Bristol Learning Network. 15 March 2008. http://wfs.eun.org/support/edumodel/pframe.html.

(D.38)

Bachira Tomeh, Collaborative Learning: What About Limitations and Drawbacks? This presentation aimed at explaining the limitations and drawbacks of collaborative learning. It was very clear the importance of collaborative learning. Based on research evidence, Piaget's contribution (e.g., Self construction) has positive impact on the general awareness. On the other hand, Vygotsky's contribution (e.g., socio-construction) of knowledge added more value to the collaborative learning. The introduction of new technology, and the intensive use of such technology in distance learning has created new horizons and environments suitable for collaborative learning. This type of learning was employed successfully in teaching and solving real problems in medicine. In addition, it was employed effectively in case studies (see Tomeh, Sinani, Weber (2003)). The author will shed some light on the limitations and drawbacks when researchers and practitioners employ collaborative learning in the context of Problem Based Learning (PBL). A number of case studies will be introduced during my session in this conference, and the results of our practices will be discussed with the participants. (D.38) Abstract in French: L'objectif de cette contribution est d'expliquer quelques limites du travail collaboratif en apprentissage. Les travaux de recherches se sont multipliés sur l'importance de l'apprentissage collaboratif, depuis : (1) La prise de conscience de l'importance de chercheurs suite aux travaux de Piaget (autoconstruction) et Vygotsky (socio-construction) de connaissances; (2) l'introduction de la nouvelle technologie dans le domaine de la formation à distance. Nous citons comme exemple concernant le premier axe, l'introduction de l'apprentissage par problème en médecine, où le travail collaboratif occupe une place importante. La première recherche que avons réalisé , Tomeh, Sinani, Weber (2000) a montré que le travail collaboratif dans le contexte de PBL a certains inconvénients enter et intra personne. En 2002, Nous avons changé dans la démarche traditionnelle de la méthode à fin d'expérimenter les propositions et de diminuer ces inconvénients. Suite à ces résultats, Nous avons voulu approfondir l'analyse dans un contexte différent (cour de psychologie de l'éducation à l'université de Arabian Gulf University in Bahrain en 2003, et à l'université de Rouen, France en 2007) , ou le travail collaboratif a été demandé soit en présentiel ou non présentiel : Les étudiants ont la liberté de choisir le moyen de travailler : regroupemt, mails…. les résultats montrent que: (A) confirmation les résultats que nous avons eu en PBL, à savoir un inter freinage cognitif chez certains étudiants, du à la domination de certains membres du groupe. (B) Intra freinage cognitif du au facteur culturel, style d'apprentissage, caractéristique de personnalité. Pour ces raisons, nous pensons que le travail collaboratif demandé aux apprenants à distance, devrait prendre en comptes ces facteurs, ce qui est l'objectif d'une recherche que nous débuterons l'année prochaine.

(D.39)

Numan Mohammed Saleh Al-Musawi, Teachers' Attitudes toward Gifted Education in Bahrain and Kuwait and their Relationship to some: The aim of this study is to investigate the attitudes of University teachers of Bahrain and Kuwait toward gifted education and their relationship to some variables, such as age, gender, having a gifted family member, and culture. A Questionnaire assessing those attitudes is under construction based on the contemporary educational literature in the field of Gifted Education. The Questionnaire will be validated on a representative sample of teacher educators enrolled at the Universities of Bahrain and Kuwait, and the ensuing data will be analyzed quantitatively and qualitatively. Results of the study are expected to contribute to cross-cultural studies devoted to the assessment of factors related to attitudes toward gifted children as well as to the possibility of developing cross-culturally valid instruments in measuring teacher attitudes toward gifted education across the Arab Gulf States which will guide teacher educators in those countries to provide information and knowledge on the content of special classes and programs for the gifted.

(D.40)

Catherine Cuche; Sophie Brasseur; Anne-Sophie Genicot; Victor Braconnier; Isabelle Goldschmidt, School adaptation of gifted and talented children: From 2002 to 2007 in the French Community of Belgium, the Listening and Support's Network for Gifted Children has encountered a substantial number of gifted children with different difficulties or questions. The numerous consultations have drawn our attention to the link that could exist between the relational dimension, felt and expressed by the young people, and their school adaptation. Consequently, this study proposes to explore the link between school adaptation of gifted and talented children and the perception of their relational life. Their perceptions are divided into two parts: the relations with their peers and the relations with their teachers. In the general population, we clearly noticed the impact of those variables on different school adaptation indicators such as school results, motivation or attendance. By using statistical data analyses, the study highlights the relations between these two variables and the school adaptation of the gifted and talented children. It will compare their respective nature also. Statistical analyses will be conducted on a sample of over 450 gifted and talented children aged between 4 and 18 years old. They will be differentiated according to gender and the school level (elementary or high school). Qualitative hypothesis will then be discussed, regarding the potential impact and the specification of those variables in a population of gifted and talented children.

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(E.1)

Christy Rochelle Bressette, Success in Community-based Aboriginal Education: As involuntary minorities within their own ancestral lands, Canada's Aboriginal people have experienced trauma within western-based education systems such as federal residential and day schools, public, and independent schools, which has resulted, in many cases, in social devastation and economic disparity. An indigenous and community-based approach to Aboriginal education promises to provide a solution to the legacy of such generational problems. This research provides compelling evidence that improvement to Aboriginal education is possible when initiated at the local community level. This is an important discovery as most non-Aboriginal policies and initiatives designed to improve education for Aboriginal people have failed. A community-based culturally relevant definition of success in education has been demonstrated to bring about increased levels of critical awareness that provide incentive for an informed response that contributes toward improvements to education for Aboriginal people at the community level and beyond. This research involved my entry into an Aboriginal community as a researcher, possessing both insider and outsider status. I facilitated a community-based inquiry using a blend of action research and 'Anishinabe Bimaadziwin' (indigenous life philosophy) as a research methodology. The results were successful in that participation within the community-designed and community-driven research led to increased awareness and incentive for transformative action in education at levels that surpassed community involvement within other initiatives that were not community or culturally-based. These finding provide a strong argument in favour of increased Aboriginal jurisdiction over education and increased funding for self-government initiatives at the local community level in Canada and abroad.

(E.2)

The Different Roles of Pedagogical Agents in the Open Source Learning Management System

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Abstract

This article reports on the development of the instructional technology in the form of a pedagogical agent in the e-Learning system utilising the latest virtual reality and artificial intelligence technology. The virtual reality technology allows the development of pedagogical agents with different personas and appearances and taking different roles in teaching or coaching the students in their learning. Artificial intelligence is used to provide intelligent feed-back in the form of computer generated voices and texts on the questions posed by the students in accordance to the assigned roles. The different roles developed were the expert, the mentor and the motivator. These pedagogical agents were incorporated within the Model open source Learning Management System (LMS) used for the delivery of science courses to Malaysian secondary school students. The preliminary study revealed that the agent played significant roles in the learning of the students. It w as also found that the roles played by the agent as the expert, mentor or as a motivator when responding to questions also contributed to the way the students learned. The areas where there were weaknesses and need subsequent improvement included that of the language used by the agents which was found to be difficult to be comprehended by some of the respondents; the responses of the agents to the plethora of questions put forward by the students during learning were also found to be inadequate.

Introduction

The Learning Management System and the Pedagogical Agent

The Learning Management System (LMS) is a software application or web-based technology used to plan, implement and assess a specific learning process. The LMS automates the administration, tracking, and reporting of training events. From the educational perspective, the LMS can serve as an effective tool to assemble and deliver personalised learning contents on a scalable web-based platform.

Currently, most tertiary educational institutions deploy the LMS as a means to support the teaching and learning process. In the LMS, lecturers, administrators and instructors can create and deliver their course content, monitor their students' participation and evaluate their performance online. Students can easily access course contents and collaborate with the lecturers and peers as long as they are connected to the Internet.

There is currently immense interest in studying how cognitive development and learning can be enhanced in the LMS environment. Learning will be more effective if a conversational style of presenting the course content is implemented. One of the learning tools available to serve this purpose is the onscreen characters or animated life-like characters. These animated life-like characters are

called the Pedagogical Agents (PAs). PAs are designed to facilitate and support human learning by interacting with learners in an interactive computer-mediated learning environment.

PAs also act as cognitive and communicative tools that guide the learners to experience learning materials better. As for educational applications, these PAs are considered cognitive tools that manage large amounts of information, serve as pedagogical experts and create programming environments for the learners.

Over the years, large numbers of PAs have been developed to facilitate learning. They have also been examined in controlled studies to identify their effectiveness in promoting meaningful learning. Examples of PAs that have been developed and studied include Herman-the Bug in the Design-A-Plant Instructional Game, Steve who shows students the steps to operate and maintain gas turbine engines aboard naval ships and Cosmo who guides students through the architecture and operation of the Internet. Examples of such PAs are shown in Figure 1.

Figure 1: Examples of developed Pedagogical Agents.

Potential of the Pedagogical Agent

It is evident that one-to-one tutoring improves learner performance significantly. However, it is not practical to provide a human tutor for every learner in this world. Nevertheless, it may be possible for PAs to offer personalised curriculums for every student who has access to a computer. An interactive and animated PA has the potential of providing individualised instruction for unlimited numbers of learners. Animated PAs can promote student motivation and engagement and enhance effective as well as cognitive responses. Thus, the PA is suitable to be used and manipulated in a multimedia learning environment as this would promote meaningful learning and enhance learners' thinking as well as help in the construction of knowledge.

Design of the Pedagogical Agent

One of the most important aspects when developing the PAs is to design their role within the learning environment carefully so that they serve the intended educational purposes. This is because the instructional roles played by the agents may influence the perceptions or expectations of the learners as well as the social bonds that are established with the learners.

Over the years, researchers and computer scientists have suggested various terms or roles for computerised agents, such as agents with cognitive tools, mentors, learning companions, etc. Baylor and Kim (2003) effectively formulated three instructional roles for the PAs (as expert, motivator and mentor) which serve distinct instructional purposes (refer to Figure 2).

	Expert	Motivator	Mentor
Image			
Animation	Limited gestures	Highly expressive	Highly expressive
Voice	Limited intonations	Enthusiastic, higher speed	Calm, engaging
Script	Information	Encouragement	Information & Encouragement
Affect	Low	High	High

Figure 2: Characteristics of the instructional roles of a Pedagogical Agent (Baylor & Kim, 2003).

The Study

In this study, the PA is incorporated in the *Moodle* open source LMS to form a new instructional method and technology, called the Pedagogical Agent-Based Learning Management System (PALMS). The development of PAs in the PALMS requires the utilisation of both virtual reality and artificial intelligence technologies. The virtual reality technology allows the development of PAs with different appearances and personas whereas the artificial intelligence technology is used to provide intelligent feedback – in the form of computer generated voices and texts – on the questions posed by the students. Figure 3 shows a screen display of the PALMS used in the delivery of instruction.

Figure 3: A screen display of a Pedagogical Agent-Based Learning Management System (PALMS).

Development and Design of Pedagogical Agents

Animated PAs have been developed using the *SitePal* application (refer to *Figure 4*), empowered by *Oddcast.* The images of the agents have been designed and developed to create the appearance of a professor/lecturer (expert), a peer/learning companion (motivator) and a tutor/facilitator (mentor).

Figure 4: A screen display of the Design & Development Platform of Pedagogical Agents (www.sitepal.com).

Figure 5 shows the development of six PAs that represent specific instructional roles.

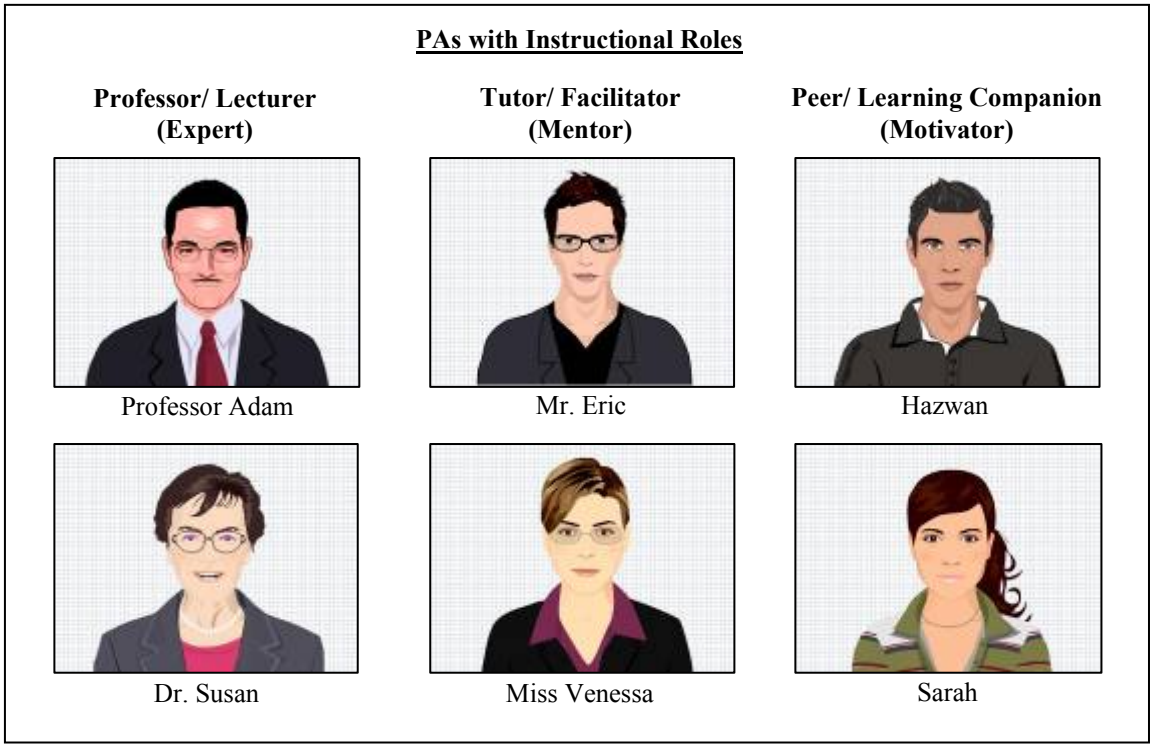

Figure 5: Images pepresenting instructional roles of Pedagogical Agents.

In the forties, the images of PAs with the instructional role of an expert were designed with the appearance of a professor or lecturer and they were referred to as "Professor Adam" and "Dr. Susan". They were formally dressed and set with limited gestures. As for the images of mentors, "Mr. Eric" and "Miss Venessa" were designed with the appearance of a tutor or facilitator in semi-formal attire.

The appearances showsyoung and mature tutors with the age ranging from 25 to 35 years old. They were designed to show and represent the combination of expert and motivator.

The images of motivator agents were set to the appearances of college or university students in the twenties, as the sample of the study was a group of university students. This was to create the images of peers or learning companions for the sample. The PAs were casually dressed and were referred to as "Hazwan" and "Sarah".

Scripts for the Pedagogical Agents

By applying the personalisation principle in the applications of PAs, the scripts of the agents had to be presented in a conversational style to promote better learning and motivational outcomes. Figure 6 below shows an example of the formal and personalised versions of an introductory script of a research study conducted by Moreno and Mayer (2000).

Introductory Portion of Text Spoken in a Computer-Based Educational Game on Botany

Formal Version

This program is about what type of plants survives on different planets. For each planet, a plant will be designed. The goal is to learn what type of roots, stem, and leaves allow the plant to survive in each environment. Some hints are provided throughout the program.

Personalized Version

You are about to start a journey where you will be visiting different planets. For each planet, you will need to design a plant. Your mission is to learn what type of roots, stem, and leaves will allow your plant to survive in each environment. I will be guiding you through by giving out some hints.

Figure 6: A formal versus a personalised lesson introduction.

In this study, the scripts were also formulated with a conversational style based on the personalisation principle. Three versions of a personalised script were written to represent the way the agents spoke in different roles (refer to Figure 7). The length and content of the scripts were almost the same. The script of the professor or lecturer was written in a way to present accurate and timely information. On the other hand, the script of the peer or learning companion was set to give encouragement and motivation to engage the involvement of the learners in the learning environment. The role of the mentor was the combination of both expert and motivator; this script was meant to give information, guidance and encouragement to the learners.

Introductory Scripts of the PAs based on Instructional Roles

Professor/Lecturer (Expert)

Hello there! I am Adam. In this session, I will introduce to you briefly about pedagogical agent. Actually, pedagogical agents are life-like characters or virtual avatars, which are designed to facilitate learning in a computer learning environment. Agents can be built utilizing the virtual reality and artificial intelligence technologies. Hope you could learn more effectively, with the help of pedagogical agents.

Peer/Learning Companion (Motivator)

Hi! How are you?! I am Hazwan! I am so glad to meet you today! So, do you like to know more about pedagogical agents? Well, you do look investigative. Actually, I am one of the agents! We are created to assist you in your learning in this computer environment! Yeah, I know we can do well together! I hope that we will know each other better and I'll be your excellent learning companion! See you later!

Tutor/Facilitator (Mentor)

Hello! Welcome to this new learning environment! I am Eric, and I will facilitate you to know more about pedagogical agents. Pedagogical agents are life-like characters or virtual avatars just like me! We are designed to help you learn better in this computer environment. Well, as you are so investigative, why not you look for more information in the official SitePal website, or the official Media Semantics website! Anyway, you may talk to me if you have any doubts. All the best and nice meeting you!

Figure 7: Examples of introductory scripts for Pedagogical Agents based on instructional roles.

Methodology

This preliminary study was carried out to validate the role of the developed PAs in terms of the instructional roles they played. Two aspects of validation were carried out in this preliminary study. Firstly, the images of the agents were validated for their appearance to represent their instructional roles correctly. Secondly, the scripts of the agents were validated for their purpose and role.

A total of 50 undergraduate students from Universiti Sains Malaysia participated in this validation study. The sample consists of 30% male and 70% female students. The average age of the sample was 23.86 (SD=2.424). The sample presented the six images of the developed PAs (refer to *Figure 6*). Based on the images they observed, the students were required to identify the instructional roles played by the PAs, that is, whether the appearance of the image looked like that of a "professor/lecturer", "peer/learning companion" or "mentor/facilitator".

In the validation study of the scripts, the sample was presented with three versions of the script presentation entitled "Introduction to Animated Pedagogical Agents". The evaluation by the students took about three minutes. Subsequently, the students were required to identify whether the script sounded "informative", "motivating" or "informative and motivating".

Results and Discussion

Table 1 shows the percentages of learners who identified the intended instructional roles of the pedagogical agents in terms of their images and Table 2 shows the percentages of learners indentifying the instructional roles in terms of the scripts.

Table 1: Percentages of learners voting for agents' instructional roles in terms of images.

Image of Agent (Intended Instructional Roles)	Image	Percentage (%) of Learners Voting on Agent's Instructional Role		
		Professor/Lecturer	Tutor/Facilitator	Peer/ Learning Companion
Image 1: Adam (Professor/Lecturer)		82.0%	14.0%	4.0%
Image 2: Susan (Professor/Lecturer)		84.0%	12.0%	4.0%
Image 3: Eric (Tutor/Facilitator)		0%	48.0%	52.0%
Image 4: Venessa (Tutor/Facilitator)		40.0%	46.0%	14.0%
Image 5: Hazwan (Peer/Learning Companion)		0%	20.0%	80.0%
Image 6: Sarah (Peer/Learning Companion)		0%	26.0%	74.0%

Table 2: Percentages of learners responding to instructional roles in terms of scripts.

Presentation of PA (Intended Purpose)	Percentage (%) of Learners Voting on Purpose of the Script		
	Informative	Motivating	Informative & Motivating
Presentation 1: Adam (Informative)	74.0%	4.0%	22.0%
Presentation 2: Hazwan (Motivating)	30.0%	44.0%	26.0%
Presentation 3: Eric (Informative and Motivating)	12.0%	22.0%	66.0%

For the image validation study, the results revealed that the learners' perception on the instructional role of images 1, 2, 4, 5 and 6 conformed to the intended roles indicated by the design of the images. Image 3 did not, however, effectively show the appearance of a tutor or facilitator. A possible reason for the slightly different result is likely due to the appearance of the sample's average age. The appearance of image 3 might have looked too young and most likely that of the image of a university or college student. As the mean age of the sample stated was 23.86, image 3 appeared as a peer to the sample. The appearance and attire have to be changed to a more formal appearance to improve the image to effectively show that of a mentor agent.

As for the script validation study, the results revealed that the students' perception towards the three versions of presentations corresponded to the purpose the scripts were intended for. This preliminary study revealed that the PAs played significant roles in the learning of the students. According to the feedback given by the learners, they gained more detailed information from Adam's presentation (informative), but learning was more fun, interesting and informative when they learned from Eric (informative and motivating).

Conclusion

This study found that in general, the PAs with instructional roles were effectively developed and empirically validated. The agents were also successfully integrated in the *Moodle* open source LMS that represents a new instructional method in e-learning. However, further research and implementing this study on different samples have to be undertaken, as learners of different ages and backgrounds may have different perceptions on agent roles.

References

Alias, N. A., & Zainuddin, A. M. (2005). Innovation for Better Teaching and Learning: Adopting the Learning Management System. *Malaysian Online Journal of Instructional Technology, 2*(2), 27-49.

Baylor, A. L. (1999). Intelligent Agents as Cognitive Tools for Education. *Educational Technology, 39*(2), 36-40.

Baylor, A. L. (2000). Beyond Butlers: Intelligent Agents as Mentors. *Journal of Educational Computing Research, 22*(4), 373-382.

Baylor, A. L. (2005). *The Impact of Pedagogical Agent Image on Affective Outcomes.* Paper presented at the Workshop "Affective Interactions: The Computer in the Affective Loop" at the International Conference on Intelligent User Interfaces, San Diego, CA.

Baylor, A. L., & Kim, Y. (2003, June). *Validating Pedagogical Agent Roles: Expert, Motivator, and Mentor.* Paper presented at the ED-MEDIA 2003, Honolulu, Hawaii.

Baylor, A. L., & Kim, Y. (2004). *Pedagogical Agent Design: The Impact of Agent Realism, Gender, Ethnicity, and Instructional Role.* Paper presented at the Workshop on "Social and Emotional Intelligence in Learning Environments," held at the International Conference on Intelligent Tutoring Systems, Maceió, Brazil.

Bloom, B. S. (1984). The 2 Sigma Problem: The Search for Methods of Group Instructionas Effective as One-to-One Tutoring. *Educational Researcher 13*, 4-16.

Chen, W., Mørch, A., & Wasson, B. (2002). *Pedagogical Agent Design for Distributed Collaborative Learning.* Paper presented at the International Conference on Computers in Education (ICCE2002), Auckland, New Zealand.

Clark, R. C., & Mayer, R. E. (2003). *e-Learning and the Science of Instruction: Proven Guideliness for Consumers and Designers of Multimedia Learning* (1 ed.). San Francisco, CA: Jossey-Bass/Pfeiffer.

Craig, S. D., Gholson, B., & Driscoll, D. M. (2002). Animated Pedagogical Agents in Multimedia Educational Environments: Effects of Agent Properties, Picture Features, and Redundancy. *Journal of Educational Psychology 2002, 94*(2), 428-434.

Johnson, W. L., & Rickel, J. W. (2000). Animated Pedagogical Agent: Face-to-Face Interaction in Interactive Learning Environments. *International Journal of Artificial Intelligence in Education 2000, 11*, 47-78.

Kim, Y. (2005). Pedagogical Agents as Learning Companions: Building Social Relations with Learners. In C. K. Looi (Ed.), *Artificial Intelligence in Education: Learning through Intelligent and Socially Informed Technology* (pp. 362-369). Amsterdam: IOS Press.

Lester, J. C., Voerman, J. L., Towns, S. G., & Callaway, C. B. (1997, August). *Cosmo: A Life-like Animated Pedagogical Agent with Deictic Believability.* Paper presented at the IJCAI'97 Workshop on Animated Interface Agents: Making Them Intelligent, Nagoya, Japan.

Moreno, R., & Mayer, R. E. (2000). Engaging Students in Acive Learning: The Case for Personalized Multimedia Messages. *Journal of Educational Psychology, 93*, 724-733.

Moreno, R., Mayer, R. E., Spires, H., & Lester, J. (2001). The Case for Social Agency in Computer-Based Teaching: Do Students Learn More Deeply When They Interact With Animated Pedagogical Agents? *Cognition and Instruction, 19*, 177-214.

Rickel, J., & Johnson, W. L. (2000). Task-Oriented Collaboration With Embodied Agents in Virtual Worlds.

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Education as Basic Social Protection for Rural Children

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Abstract

The strategic role of education for social development have been consistently stressed by academics and policy makers; the centrality of education in rural and poverty stricken communities is also taken as the most effective long term strategy for poverty relief and economic development. However, in rural China, rural children are often not accessible to education or have to get reach of it at very high personal and familial costs, partly because of the shortage of education resources, partly as a result of administrative inertia, and partly because of the lack of social awareness to the essentiality of education as a basic right for children. The study proposes that education for rural community has to be perceived as part of the Social Protection Package and should be guaranteed to all. Otherwise, not only the long discussed urban-rural disparities will be left un-gapped, the capacity for social and economic development in rural sector of China will be left untapped, the basic right of rural children to a fair start for development will also be further jeopardized. The study reviewed studies and research on rural development and rural poverty issue, as well as rural education in China in recent decades, combining with several field studies in different parts of rural China. It intends to conclude some outstanding trends for policy development as well as to unfold the existing situation. Recent progress will also be highlighted. Additionally, new measures proposed by the central government in recent years will also be analyzed and assessed.

Introduction

According to the Convention on the Rights of the Child, access to free and compulsory primary schooling is already universally agreed upon as a basic right of children. This spirit is best reflected by an ambitious yet agreed upon commitments that has been reaffirmed by governments from different parts of the world at the Millennium Summit in 2000. It stated that by the year 2015, every child around the world is going to be ensured attendance and completion of primary school education.

However, by 2005, five years after the Summit, though school attendance has increased in many part of the world, it was still found that 100 million children, of which forty million are boys and sixty million girls, are still out of reach of the education system.[58] There are many reasons for this global issue of failing to protect a huge number of children's right to Education. According the Report of the *Human Rights Watch* in 2005, school fees and other related costs of schooling is one of the major reason depriving education for children from poor families. Discrimination based on race, ethnicity, religion or other status is another major factor blocking some from education. Child labour, son preference to rule out girls, violence and abuse associated within or near school settings, as well as some other factors, are recognised as the major reasons failing universal coverage of education for children. [59] The Human Rights Watch, after studying the situation of some Latin American countries as well as rural South Africa, concluded that many rural and indigenous children were having no possibility of attending schools and that the dropout rate of rural children are far most higher than their urban counterparts. [60] Obviously, the local rural communities of different countries are just without the financial and management strengths to materialize that high-sounding goal, and the lacking of proper recognition of the values of education as well as without the mentality that education as basic social protection for children all compounded to worsen the situation. Of course, the inadequacies in policy formulation and implementation could also be attributed as one of the many factors leading to that unsatisfactory "progress" in comprehensive education. When examining the situation of China, particularly the countryside of this most populated nation, the above mentioned factors all are to

[58] Global Campaign for Education (2005), *Missing the Mark: A School Report on rich countries' contribution to Universal Primary Education by 2015,*
[59] Human Rights Watch (2005), *Failing Our Children: Barriers to the Right to Education,* 2005
[60] Ibid, pp24-25

different degree hampering the actualization of children's proper right to the most basic social entitlement of children.

General Rural Situation in China

China is the world's largest developing country. Since the Communist takeover in 1949, A *dual system* started to take its shape to pave different paths for the economic and social development of rural and urban China. In the cities, as most major resources and capitals were eventually nationalized, all people were, so to speak, working for the country. This in turn made it reasonable for them to expect more from the country. Nearly all material needs, including housing, medical facilities, foodstuffs, education, wages and allowances, were basically from the state apparatus. People in the cities were under an umbrella of universal and comprehensive entitlements and protection erected by the state. In result, education as part of the social provision package was offered to urban kids. In the dawn of its national development, poor maybe the quality of school facilities, yet most urban kids were able to get through the primary education stage.

While in the villages, the pendulum was swung to another extreme. Access to land was guaranteed for every household, family system and its traditional functions were largely retained in their original forms. Uplifting of the rural subsistent living level later made it possible to organize some collective measures on a cooperative basis. In social provisions, poor relief and care for orphanage were provided for those in need or without familial support. But some other social services, such as health care and education, were far lagging behind the urban counterpart. It was not uncommon for village children to have no education at a very early age, and the situation has been extending to recent years, even when the country as a whole has experience leaping forward in term of surging of GDP.

This dual system of development in China has been in place for decades to maintain a certain degree of static equilibrium and divisional stability. According to a study for the World Bank, although China has achieved remarkable agricultural and rural industrial growth, as well as impressively reduced the incidence of rural poverty, China's rural sector is still facing considerable challenges in achieving further development.[61] Adding to the complexity of China's economic and social development is its vast rural population which still count up to more than 800 million, or 70% of its total population.

It is true that although China has been going through a miraculous economic development in the last three decades, but the overall economic situation is still comparatively backwards internationally. However, the separatist approach in administration has been now becoming no longer sustainable as urban-rural integration has become inevitable when labour force transition as well as population diffusion could not be strictly controlled as before. With the impression continual economic growth for more than two decades, when recent years' economic growth is consistently double digits, it is still acceptable to tolerate the status quo when it is apparent that the situation of some interior villages is remaining similarly worrying as two decades ago? And most importantly, with widening rural and urban disparities, is it still morally justifiable that the country could not able to bridge-up the education gap among rural and urban children?

LI Changping, who had been a local Communist Party Secretary in the rural township of Hubei Province for seventeen years, wrote this in an article published in the Newsweek:

> Make no mistake: rural China faces a crisis. Today the amount of money that farmers have left after paying taxes and local administration fees is not enough to purchase seeds and fertilizers for the next planting. Farm incomes have shrunk, while production costs have skyrocketed. The countryside's basic infrastructure is a shambles, with education, health care and other public services existing in name only. Whereas 85 percent of the rural

[61] Nyberg, Albert & Rozelle, Scott (1999). *Accelerating China's Rural Transformation,* Washington D.C.: The World Bank.

> children attended high school in the early 1980s, now the same percentage drops out during the first nine years of school. In the past the critically ill died in hospitals, today they die at home. Small-scale farms in China are failing, and they are pulling down millions of Chinese peasants with them.[62]

The above description could be easily observable in various interior regions of China. Schooling for children was not guaranteed, basic health consultation service was available but on a self-financed basis, hospital services also have to be purchased, the Five Guarantee System is in some cases only running as ritual or even in name, income of farming households was low, and some village level governments were levying a lot from the already thin incomes of farmers. For education, as well as medical and health care, the local "collectives", which always implied the people in the localities themselves, had to make available even the policy or even the national constitution had already explicitly spelled out as people's right and entitlements.

Recently, when impressive economic development is still in the making, how to speed up rural development on pure developmental ground or on the ground to catch up with the pace of its urban counterpart has become the most pressing concern of the government. This is crucial as the widening gap of development has already stirred up regional tensions. The government report delivered at the 10th National People's Congress held in March 2003 cited the following statistics: "China's GDP increased from 7,400 billion yuan in 1997 to 10,200 billion in 2002."[63] This implied that the per capita GDP stands around US$1,000. This symbolizes that the country has entered a relatively well-off stage. It is true that many people living in cities are now enjoying living standard much better than just two decades ago, many of these city dwellers could have better housing, internet access and more other choices in their daily life. However, it is also understood that to many rural dwellers, their living is still far from comparable. The figure of US$1,000 per capita GDP does not mean a lot for them as many are still struggling for bare necessities. In 2003, according to the standard set by the government, about 29 million farmers were still living under the state poverty line.[64] If those who are in the fringe of poverty were included, the total poverty-prone population in China may even surge to near 80 million. For this sector of people, most of them farmers, the concept of a well-off society is just too remote from reality in the countryside.

In rural areas, although poverty relief work over the last two decades has enabled many people to leave the poverty line, but the instability of rural economy makes them susceptible to become returned poor. A considerable number of rural people in undeveloped and underdeveloped areas are still struggling on the brink. For most villages, there is currently no stable aid mechanism.

While on the other hand, the ever-increasing disparities are also becoming a problem for further development as the lagging behind countryside has become a burden to hinder the national economy from leaping forward further. The slow and lagging behind of income growth in the rural side of the country would eventually hamper economic growth. If purchasing power of farmers remains weak in the future, the expanding industrial production in the urban side would find no new outlets for their outputs. The rural sector would become a bottleneck for further economic development if it fails to become a source of domestic demand.

From another angle, raising farmers' income is important to achieve common prosperity. In the last two decades, reform in urban economy and the reform of state-owned industrial sector have turned many of these state-owned enterprises from losses to profits. The CPC General Secretary Hu Jintao noted at the CPC Central Committee's working conference on rural areas held on January 8th of 2003 that rural areas were facing the most arduous task to realize the goal of building an overall well-off society.[65] He promised to attach greater importance to the issues of farming, farmland, and farmers (the so called "Three Problems of the Peasants").

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[62] *Newsweek, August 21,* 2000
[63] *China Daily*, March 6th, 2003, p.1
[64] *China Daily*, March 6th-7th, 2004, p.7.
[65] *China Daily,* February 6th, 2003, p.6.

In reality, short of supply of public goods, including education, medical services and all other social welfare services, is a phenomenon facing the whole China, but the condition in the rural area is particularly acute because of the dual approach to development. With the progress of economic reform and the changing social structure of the rural areas, some of those services, even in their basic and primitive nature, are in fact collapsing in rural areas in recent years. For example, many students could not afford schooling, or they have to pay a high costs for education. In many instances, the quality of education and the school environment is at the modest level, yet all these are regarded as basic rights for all members of the country and should be guaranteed through policies, regulations and even laws. Provision of these should also be well monitored to protect the basic rights of people who should be entitled. Therefore, apart from the afore-mentioned pragmatic consideration on economic pragmatism, it is also true that the development of the rural sector has become a "moral" concern for the whole country. In essence, to provide education for children and to ensure this as an unalienable right to social protection should be taken as one of the most important goal as well as strategy of rural development.

A Case Illustration

The following is a case study into a village in the year 2002 to 2003. It may appear optimistic yet realistically true that the situation should have been improving now as a few years have already been passed. It is also true that the central government has amended the law and has committed to abolished all school fee-charging for village children. However, the scenario as reflected in this case is still a good illustration of the unpromising situation in some parts of rural China in safeguarding children's basic social right to education.

The Village: Neujiou Village

Neujiou Village was one of the many unknown villages in Hunan Province. It had a total population of about 1600 people, making up 483 households. All households here were administratively defined as agricultural. These households were further divided into 19 villager groups; each had to bear some communal responsibilities among each other and to team up for village duties, such as road maintenance and sewage disposal.

Education for Children in the Village

There was a primary school in Neujiou Village exclusively for its 238 primary school age children. There was a school premises purposely built 30 years ago for education. From its outside appearance, the school was not much different from other village houses. But it was still identifiable as a plate with the name "Neujiou Village Primary School" was held in the front door. It was also larger in base area and was more distant from paddy fields. It was just several minutes walking distance from the Village Committee Building. In front of the school door was a bare platform, rising several feet above the fields, where assembly could be possible. Inside the school, partitions were done with brick and concrete, providing three larger rooms and one smaller room. Long benches and tables were row by row inside every room. Two rooms were with blackboards and two without. There was no other room specially arranged for teachers. Inside classrooms, there was no fan or other ventilation facility, but windows were always widely opened, some without the windows or window frame in it. Lighting facilities were there but people said that they rarely turned on the bulbs during daytime school hours, except when village meetings or other cultural functions were to be held. There was also no toilet and other amenities inside the school building.

The school employed four teachers, two of them were indigenous villagers grown up in the village. Two were from other parts of the country. These teachers were recruited and assigned by the authority on Education from the County administration, but the Village Committee was also their boss as their salaries were paid by the Village. The County Government, on the other hand, was responsible for distributing an amount on primary education for every village as a manifestation of the support of the State on rural education. However, the amount was also not stable and was subject to the financial situation of the County Government. Moreover, this educational fund from higher government would

always not be adequate for running the school. That was why the Village Committee had to bear some costs. In 2005, village households with children going to school had to pay fees. For a child to attend school, his or her family had to bear an annual school fee of 330 yuan, which was 30 yuan per month, they could choose to pay at one shoot or by eleven monthly instalments. There were also other fees to be charged, including fees for books and papers, fees for drafting exercises, fees for amenities etc., making a whole year schooling cost at around 450 yuan for a child.

There were some years in the past when senior level government failed to realize its commitments, making it even not possible to pay for the services of the teachers. The situation improved in recent years but the Village Committee still found it unable to cover all cost for education. Although school fees has now been abolished, school students still have to pay for school maintenance, textbooks, stationeries and other minor levies.

It was not unusual for members from the Village Committee and for ordinary villagers to express their indifferent attitudes towards education. Many people in Neujiou Village still thought that education was not necessarily important in improving their living conditions; education for girls was widely believed to be a luxury. Many of them still had the idea that with labour ability and good physique, one could always improve own living by hardworking.

Anyway, to have such a primary school had already made Neujiou Village quite superior when compared with neighbouring villages. Many villagers shared this idea.

However, not all school age children had the privilege to attend school. In 2003, out of the 238 primary school age children, only 113 of them went to school, implying more than half was without proper schooling. Many people in Neujiou Village thought that the school fees were just too high for them to afford, many even doubted that the Village Committee was making profit from education. With just four teachers and a member from the Village Committee to handle routine school duties, the total annual revenue from school fees was rather huge when calculated against the costing.

Additionally, there were some other reasons why children did not go to school. One of which was the need of labour for domestic farming works. Some households were made up of grandparents and grandchild, with the middle layer going away for urban employment. In principle, these households should have the ability to bear the school fees although it was rather high. However, as many households still had agricultural works to take care of, a child was not merely a child but also a family labour. This was more likely to apply when the child concerned was a girl aged 10 or above.

There was no secondary school facility provided by the Neujiou Village, not even by its nearby neighbouring villages. In 2003, sixty-six secondary school age children in Neujiou Village went to secondary school in town, which was only about one third of the total relevant age group. Four of them who had had outstanding performance in their schools were sponsored by the Village Committee in form of supporting half of their tuition and other fees. All other secondary school goers had to have their families bore the costs. However, level of tuition fees for the first three years in secondary school in Ningsheng County was even lower than that in the Village. The major reason was that the county government invested more in education and had to accommodate to the policy of Nine Year Compulsory Education put forward by the central government. Still they had to pay different types of fees levied by the school authority. The cost for sending a child to attend secondary school was high as students had to travel more than three hours a day for schooling, leaving them no time to help in household and farming duties. It was very common for girls to cease schooling after attending primary schools. This was also not uncommon for adolescent boys as they were always treasured labour in farming.

Many of these non-school-attending teens would soon get tired of rural life or were fascinated by stories they heard about urban living. Some of them started to have an idea of leaving at their early adolescence, and many did indeed go away, individually or with fellow young villagers. Some left the village as early as when they were only ten years old. In fact, with no schooling, it made little difference for them to leave the village at ten or at twenty.

Education as a Developmental Concern

Neujiou Village is but one silent village lying unknown in the heart of rural China, yet the reality encountering it was not unique but rather common to many interior villages. In recent years, the central government is aware of this and has openly admitted that a more progressive investment has to

be made to foster rural development. Up to 2008, for five consecutive years has the Central Committee of the Communist Party of China and the State Council issued the first document of the year, as generally dubbed the No.1 central document, to address rural issues.

New Socialist Countryside

First of all, it is announced clearly in 2006 that the country is going to shift the development focus to the rural areas. When Premier Wen Jiabao mapped out the country's development plan for the next five years starting from 2005, it also marked the beginning of an entirely new phase in China's development. To develop effective strategy to boast rural development has become the top most important issue of China's continuing development. The overall goal of this is to develop the so-called "New Socialist Countryside" as the backyard and hinterland of national economic development. It is also aiming at an overall and significantly uplifting of living standard in rural to bridge up the urban rural disparities. As strategy, the development of medium size cities and townships as well as to foster the development of rural industry and enterprises are perceived as long term strategies. These obviously call for sustained support and effective social and economic policy from the central government, as well as better-coordinated collective efforts To package with this, the fundamental improvement on social infrastructure, such as education, social security, health care etc, is perceived as an indispensable factor to match with the changing and more demanding rural communities.

This planned change for comprehensive development which is now spurring toward the rural side calls for a more sophisticated and well equipped labour force, which exert higher needs for a more comprehensive education for those still stay living in the villages. To match with the national goal of speeding up rural development, improving the population quality of rural dwellers is obviously the most urgent issue to address to, as the development of quality manpower resources is fundamental ingredients for social and economic development in the countryside.

According to official data, among the country's 480 million rural labourers, 420 million have only received junior middle school level education or below. On one hand, there are still a huge number of illiterate in China, most of which are in the rural. Up to end of 2007, China still has 80 million illiterate people. Understandably, most of them are dwelling in the country's less developed rural areas of the landlocked western regions. Coincidently, most of these illiterate people are also constituting the country's 80 million poverty stricken population.

In 2002, when China had an illiterate population of 85 million people, it was then the second largest illiterate carrying country in the world just next to India in absolute term. Every year, 500,000 new illiterates were gained. This huge illiterate gain was result of premature school dropouts, mere non-enrolment to schools, lack of education for children following the migrant workers, and the lack of education opportunities in some villages. More than 90 percent of illiterate people in China are from villages[66]. A member of the National Committee of Chinese People's Political Consultative Conference (CPPCC) drew a conclusion that "China's rural poverty basically rooted in poor education and high illiteracy in the countryside"[67].

Poverty and illiteracy always come hand in hand, and the correlation is particularly acute in China when illiterate people are more difficult to catch up with the developmental pace. It has become a common sense now that the illiterate are more likely to remain poor, and the poor are more likely to be illiterate. The uneducated and unskilled who have been lacking education are always trapped in the vicious cycle of poverty. With its "rural" as the territorial factors closely linked to poverty, this viscous cycle run a further risk of perpetuating across generations or at least contributing to an extended period of widening inequality. The rural poor are more likely cannot afford education, and therefore less likely to be get out of the poverty cycle. For children coming from the poor sector of the nation, poverty has become both the cause and the result of inaccessibility to education. The trans-

[66] *China Daily*, Sept.9th, 2002, p.3
[67] *China Daily*, March 12th, 2004, p.4

generational characteristics of poverty is then more likely to become a truth in the countryside of the rapidly development China.

Education as Legal Right of Children

Most basically, education opportunities have long been established as legal rights for rural kids. The reform of education bill in 1985 has once again reasserted this point. China put the Law on Compulsory Education into use in 1986, which ruled that compulsory education at elementary and junior high school levels have to be free from tuition fees. Dating back to 1993, the government had also already promised in a national plan that it was a goal to increase the country's educational input to 4 percent of its gross domestic product by the end of last century.

Therefore, in term of legal stipulation and social rights definition, education has long been perceived as the most basic and fundamental social protection for rural children. However, although China passed the Compulsory Education Law in 1986, only 20 percent of students were able to complete the nine-year compulsory education at that time and they needed to pay school fees. For the disadvantaged groups in the rural areas, it was still too expensive for them to send their children to school.

Nationally, recent reports released by the Ministry of Education continually showed that attendance to elementary primary schools have been spectacularly improved, that the total attendance ratio has hit over 98, and the illiteracy among adults is now under 4 per cent. While this could be perceived as a breakthrough from the recent past, the country is still facing challenges in developing a healthy and sustainable education system. For some remote inner villages, "Project Hope", which is still largely funded by overseas donations, is still an indispensable part of the country's primary school education system. The case of the Neujiou Village also clearly demonstrated that even with state policy and legal stipulation, the opportunity cost of forgoing education is still neglected by a portion of rural dwellers when other "pressing" needs are tangibly in place. This tendency of individual households to undermine the future costs or to disregard the future is inevitably when other "realistic problems" have to dealt with. The government, therefore, has to offer support, to take up a proactive role in education provision and legal supervision, to provide the infrastructure and framework for education, and to foster an "education friendly" rural environment.

Basic Education as Basic Social Protection to Children

It is apparent that the most effective long term investment to promote economic and social development should be in education. Education should also be assigned with a strategic role in long term rural development and has to be guaranteed for all school age children. Measures in this category inevitably demand public funds commitment and should be the most fundamental social protection committed by the nation to all children.

Education, apart from other physical need fulfilment, should be properly perceived and recognised as the most basic social protection for school age children. As the case of Neujiou Village indicated, however, receiving basic education has become a luxury for many children in the villages. Taxes were being levied from all rural households to maintain a substandard school, teachers were poorly paid, schooling arrangement was substandard and school facilities were primitive. Some children simply stayed at home or went to work on field in early formative years without proper schooling.

Inputs to Education as the Key Issues

Resources devoted to rural education in China were unacceptably low. It was estimated that expenditure of compulsory education in rural areas in 2002 was only 30 billion yuan. This amount is only 0.3 percent of the gross domestic product and 1.76 percent of State revenue in 2002[68]. In 2003,

[68] *China Daily*, March 19th, 2003, p.3

the situation improved significantly as the country increased education spending, making it 3.28 per cent of its gross domestic product (GDP). But it was still well below the world's average of 4.1 per cent for developing countries and merely half that of the developed world.

In addition, the existing policy arrangement to education also frustrated the effort to ensure education opportunity for rural residents. Governments at the lowest levels - in townships and counties - shouldered the bulk of the financial burden to provide education for children staying in villages.

A United Nation education expert commented that the poorly coordinated educational and financial system in China has resulted in the excessive dependence of elementary education on local budget, and this has led to the irrational allocation of resources in public education[69]. Though the legislation for compulsory education had already been in place, it did not clarify clearly the responsibilities of different levels of governments in funding compulsory education, the money needed to support it cannot be fully guaranteed, especially in vast inner remote and poor rural areas.

Under the current system, the county level governments are responsible for elementary education and the central and provincial level governments are responsible for higher education. But in the financial system, the county and township governments are with the weakest bargaining power regarding financial resources and financial independence. In result, with their scanty financial resources, the county and township governments as the main bearers of elementary education have to support rural compulsory education involving large population.

Recently, developed provinces are getting more money from the central government and developed regions are getting more from their provincial governments. As the law does not clarify the responsibilities of different levels of governments in funding the compulsory education, the money needed to support it cannot be fully guaranteed.. In the township and village level, as fund injection from the central has not been stable, resources for social service provisions, including health care, social welfare and even education, are all similarly have to be often mobilized locally.

This situation was particularly true for most village level governance before 2006 when “local”, that is county, township or village governments have to be the major sources of funding for rural education. As disparities among different parts of rural China have been acute, it is quite natural that there were sharp differences in school budgets depending on local fiscal conditions. Taken for example, for another village in the southern part of China with only 2000 indigenous villagers, its geographical supremacy in neighbouring Hong Kong has enabled it to convert most agricultural lands into factory setups attracting outside investments and receiving huge amount of rental payments. The Village Committee could be rich enough to erect two luxury schools for its less than 700 school age youngsters without having to charge them and their family a single buck. But for Neujou village deep inside the Hunan Provinces, the conditions could be too poor that school age children have to pay one third or more of their total annual incomes for them to secure a place in the obsolete and poorly equipped school. It was therefore expectable that one out of two primary school age students cease to stay in school before time for them to progress to secondary. And more than two third secondary school age youngsters were reserved at home as another labour.

Poor affordability of local farmers, scanty financial resources on education in rural areas, weak in policy bargaining, as well as the traditional values of some farmers, all add to the difficulties to popularize the policy of nine-year compulsory elementary education.

In education, making premises for the physical set up of schools, the payment for school operation and maintenance, the assembly of the most basic educational facilities, as well as payment the salaries for school teachers, are all in principle to be made by the “village-level” administration. It is therefore quite natural that school students and their families have to pay for books and the upkeep of their schools. Or if rural administration has to abide to the ruling that all school fees and other related charges are to be forbidden, then even higher variation in education quality will become inevitable.

Since the current law on compulsory education is lacking clear stipulations on responsibilities, it is hard for the law to play the role it should play. To deal with this, one of the needed measures is for

[69] Wang, Changyang (2003), “UN Pushes China on Education Reform” in *Beijing Review,* November 6th, 2003. pp.20-21

the Central Government to revise its compulsory education law to explicitly define the concrete responsibilities of the governments at each level. Liabilities and punishment should also be detailed to make local governments more accountable.

In 2006, after reviewing the 20-year-old Law on Compulsory Education, a revised legislation was submitted to the full meeting of the Standing Committee of the 10th National People's Congress (NPC) with an aim to narrow the educational disparity between rural and urban areas. The revised law is focused on establishing a mechanism for guaranteeing government investment in compulsory education.

The newly amended Law of Compulsory Education has taken effect in September 2006. The Ministry of Education recently required that public educational resources be distributed according to law. It was initially estimated that an additional 20 billion yuan (US$2.5 billion) is required for the implementation of the free compulsory education drive.

If modernization of agriculture is the national goal to cherish, and if local human capital is to be developed for rural development, measures to facilitate school enrolment and to better support basic education in the countryside have to be considered. In 2003, the State Council issued the *Decision on Further Strengthening Rural Education*, promised to make effort to increase financial support to rural education from the central budget and treasury bonds[70]. It is a correct approach for the central government to provide more funds for education development in villages and to ensure that financial difficulties of the local communities would not halt education development. Priority should be given to subsidizing basic physical infrastructure for village schools, to raise and ensure salary payment for rural school teachers and to encourage more qualified teachers to go teaching in villages. On this basis, the government could take strict actions to ensure local governments properly taking up the responsibility to provide elementary education at affordable cost for farmers.

At the most practical and administrative level, if the policy of nine-year compulsory education is to be upheld in rural areas, greater efforts are needed to increase student enrolments and to prevent dropping out prematurely. The government should provide more resources or support to rural families and to secure the opportunity to get equal access to education for all children in village. On this basis, in poverty stricken villages where getting sufficient food and adequate clothing is difficult, the only way to prevent non-enrolment and drop out is to provide the students with free food and clothing. Only with this could some families be convinced to "trade" releasing their children to school in exchange for one less mouth to feed and one less body to cloth. That means the government should invest more and increase resources transfer to rural areas for education.

The same principle is also applicable to other schooling items, such as stationary, books, teaching equipments etc. Public funds have to be provided, or, as an alternative approach, households with school age children should be allowed to exempt from a certain amount of contributions (tax or other levies) to the local administration as incentive for them to enrol children to school and to compensate partially what they have to bear for sending their children to schools. Although this second approach would not incur public transfer of funds, it still implies financial commitment of the government. The point is how willing and affordable is the local governments to have this implemented.

This issue of supporting education in rural area must also be conceptualized as a social protection measure commitment. School age children in villages have to be secured of their equal rights to education. This right should not be alienated by poor family economic situations, weak local strength in the provision of education or community unresponsiveness. A CPPCC National Committee member once made a judgement that the central government has to shoulder higher responsibility for boosting rural education by diverting more central funding to the sector[71]. His proposal of jetting up State funding in the rural educational investment to 50 percent of the total may be a little bit too radical and over demanding for the central government to commit in the short run, but obviously, a mere 4 percent of state revenue on rural education in recent years is still too low to be reasonable especially when considering the essentiality of children's rights to education and the strategic role of education in rural development as well as national development of China.

[70] *China Daily*, March 6th-7th, 2004, p.5
[71] *China Daily*, March 12th, 2004, p.4

Conclusion

The government has always restated the essential strategy of invigorating China through science and education, the strategic role of education in China's long term development is obvious. In the pragmatic side, as a strategy to promote economic development and to uplift the quality of human resources, China must boost education not only in urban areas, but also in the rural. Only with better equipped and better educated manpower could the rural areas transcend from the existing relatively poor situations and could further play a part in national development. A better educated rural population could also become more self reliant and would in turn reduce public commitments in the long run.

Starting from 2006, school tuition and various other fees for schooling in rural areas were officially exempted. Then in 2007, free education should have been completely extended to all students in the rural area. According to the Ministry of Education, nine year of compulsory education, including six years at elementary school and three years at junior high school, was expected to be the norm for 98 percent of children in the poorest areas by the end of that year.

If this turns out to be true, the situation like that of the Neujiou Village should no longer be existed. However, the situation is still not as perfect as it is planned and announced. Practically, compulsory education in the rural areas was made free to enlist all school-aged children and to ease the burden on farming households. However, China still have to continue to fight illiteracy by providing more financial support for the students from poverty families, as parents do not necessarily see the benefits of taking kids to schools. Sending kids to school still incur some financial commitments of the families; a kid to school sometimes implies a family labour forgone.

It is still common for families in the rural area to give preferences to sons rather than girls. The enrolment and dropout rate of girls when reaching the junior high school level are of particular importance to weight the effectiveness of the new rural education policy.

It is not surprising to occasionally learn that some villages are still unable to offer "truly" free education for rural kids. Some kinds of financial contribution to secure a school place is still a practice in some areas.

When talking about equal access to education, "quality education" should be the most important yardstick for equality. However, school premises and facilities in villages are still very far away from satisfactory and the effect of education is still lagging behind.

On the other hand, mere provision of better educational infrastructure and financial support is still not enough. The goal of quality education has to depend very much on the availability of high quality, excellent and committed teachers who are willing to stay in the countryside. Recently, the ministry of education and official media repeatedly appealed that teacher in rural schools should be respected and duly paid, arguing for incentives to be given to retain teaching manpower, and to proposed that more training of teachers should be provided. All these more or less reflect the new tension when education resources are really in place. The problem of teacher shortage is particularly acute in the western inner villages where most college graduates are not willing to go. And this issue seems to have no ready remedy.

For the inner western regions, education for ethnic minorities is still problematic. Some population groups are just not aware of the initiatives or are not treasuring the new opportunities being offered. A recent survey by UNICEF reveals that many people from ethnic minorities are stuck in a difficult situation due to poverty and poor school quality. In Tibet and some other north-western districts, sending kids to temple as monks is still the only sure guarantee to education opportunity.

On the other hand, more and more rural kids are moving to urban together with their parents who are seeking employment as migrant workers in cities. This group of outsiders' children are always with lower school attendance rate as well as to tolerate incomparably poor education quality even if they could get access to some migrant schools. Rural kids in urban has become another outstanding issue for actualizing the compulsory free education goal.

To conclude, though a breakthrough was made recently, compulsory and free education for all rural kids is still a national goal to cherish. When considering the size of the gap which is a result of decades of near neglect, it has to admit that the recent situation is understandable though not at all acceptable. However, education should be taken as the most important social right of children, it is the most fundamental social protection all children are entitled to. Therefore, it is never enough just to be

stay satisfied by the recent stride forward, but further steps have to be taken to duly deal with all afore mentioned problems and issues so as to secure proper education for all rural kids.

References

Cai, Xia. (2004), Literature Review of the Researches on the Issue of the Education of Migrant Workers in Cities. *Shanghai Education Study* (12): 9-11.

China Education and Research Network (2005), "*Compulsory Education Law of the People's Republic of China*". (http://www.edu.cn/20050114/3126820.shtml).

Global Campaign for Education (2005), *Missing the Mark: A School Report on rich countries' contribution to Universal Primary Education by 2015.*

Human Rights Watch (2005), *Failing Our Children: Barriers to the Right to Education,* Human Rights Watch

Kwong, Julia. The Integration of Migrant Children in Beijing Schools, in Postiglione, Gerard A.(2006) (ed.), *Education and Social Change in* China. New York: M.E.

Li, Shi and Yue, Ximing (2004), 'Study on the Urban-Rural Income Disparity in China*',* in *Caijing Digest*. Beijing: Caijing Digest. Feb. 20th, 2004. Vol.101/102(3 & 4) : .30-38.

Nyberg, Albert & Rozelle, Scott (1999), *Accelerating China's Rural Transformation,* Washington D.C.: The World Bank.

Ortiz, Isabel (2000) *'Social Protection and the Asian Development Bank'*, in Asian Development Bank and The World Bank (ed), *The New Social Policy Ageneda in Asia: Proceedings of the Manila Social Forum.* Manila: Asian Development Bank, pp.95-98.

Postiglione, Gerard A. (2006) (ed.), *Education and Social Change in China*. New York: M.E Sharpe, Inc

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Challenges of Practicing Early Childhood Education

Majida Mehana

Abstract

Early Childhood Education (ECE) attracted the attention of many associations and educators. The Association for Childhood Education International, The National Association for the Education of Young Children, and Bennett (2004) offered in depth frameworks for ECE. This article examined the challenges that the preschool teachers in Lebanon and the United Arab Emirates face in adhering to ECE frameworks that advocate developmentally appropriate and innovative practices, and recommended to overcome those challenges by meeting the needs in teacher preparation programs at the university level and by providing continuous professional education.

Keywords: Early childhood education, international, curriculum, United Arab Emirates education, Lebanese Pre-Primary Education, Kindergarten system in Emirates, UAEU Teacher Preparation Programs, NAEYC guidelines, UNESCO briefs on ECEC, ACEI guidelines, developmentally appropriate practices, technology, cultural context, professional development, teachers' beliefs, inclusive education.

Introduction

How to provide a successful university program based on sound theory and geared towards a rewarding practice in Early Childhood Education? As I was engaged in restructuring the Early Childhood Education (ECE) program in the College of Education at United Arab Emirates University (UAEU) following the National Council for Accreditation of Teacher Education (NCATE) and the National Association for the Education of Young Children standards (NAEYC 2001) standards, I had to go back and forth between the aspired high quality Teacher Preparation Program (TPP) at the university, the practices in the field, and the NAEYC requirements. Consequently, I developed a teaching approach that was oriented towards the diversified needs of teachers, teacher candidates, and children. According to this approach, a preschool teacher needs to portray a creative model for the children, to provide a space for the children to experiment, and to exercise self-accountability. University faculty members could help by regularly evaluating the curriculum offered to teacher candidates, adding performance objectives as needed, and mapping the objectives to course content. An open eye, mind, and heart to the community facilitate the delivery of quality education.

In this paper, I examined challenges awaiting teacher candidates (TCs) as they attempt to implement NAEYC guidelines or other ECE frameworks. Challenges emanate from the transferability of the guidelines to international contexts, the TCs' individual issues, the pre-primary curriculum, and the daily challenges of inservice teachers. Examples were drawn from two countries, the United Arab Emirates (UAE) and Lebanon, where I had experience training inservice and preservice early childhood teachers.

Transferability of the NAEYC Guidelines

The daily tasks of the early childhood teacher as characterized in NAEYC (2004) are grounded on best practices that are nevertheless hard to transfer to international settings. Specifically, the criteria for health and nutrition, outdoor environmental design, environmental health, management policies and procedures, and access to children regardless of socio-economic status and special needs require support from multiple governmental agencies and availability of qualifications at varied governmental levels. The underlying infrastructure must be established to support the implementation of the criteria; something that is not always available.

ECE associations and educators other than NAEYC (2001, 2004) have addressed expected challenges and offered recommendations that would empower the teacher candidates. Examples were perspectives on early childhood education and care (ECEC) stipulated by the Association for Childhood Education International (ACEI, 1998, 2000-2002) and by UNESCO Policy Briefs on Early Childhood, no. 26 (Bennett, 2004).

A comparison among the three frameworks shows that NAEYC, ACEI, and Bennett (2004) stress the well being of all children as a foundation for a nation's future success. For NAEYC (2001) and

ACEI (1998), the early childhood teacher should ideally be licensed or a graduate of a university program within the scope of a teacher preparation program. Curricular areas should immerse the teacher in early childhood education, so that she (a) promotes child development and learning, (b) engages in the teaching and learning process encompassing cognitive, physical, emotional, aesthetic, and moral domains of development, (c) builds family and community relationships, (d) develops techniques for planning and evaluating the teaching environment using observation, documentation, and assessment that supports children and families, and (e) bases her evolving philosophy and continuing professional development on current research and experiences at quality sites.

Bennett (2004) advocated an open approach to curriculum with general value-based framework that accounts for diversity. He argued that too much stress on a cognitive curriculum could limit the benefits of the experience. He also recommended dealing with bilingualism carefully as the language factor could act as a deficit or as an advantage to the child. Moreover, Bennett pointed at contexts in developing countries with inadequate funding, insufficient staff, and low-quality teacher preparation program. He proposed remedial measures that include the use of available community materials, mobilization of mothers, and embedding the cultural heritage in the curriculum. Support for children's health and overall development should be key factors to further curricular improvement and delivery.

Bearing in mind that even within the same country, there is a discrepancy in the practices among the preschools, what conclusions could be drawn regarding needs of novice teachers in the countries, the United Arab Emirates (UAE) and Lebanon?

A comparison between UAE and Lebanon in terms of environmental and teachers' characteristics is displayed in Table 1.

UAE is classified as a rich country due to oil revenues. The Emirates is a setting where the government is eager to reform the educational system and where UAEU, the largest national university, has been updating its TPPs. Other universities are also adopting quality educational programs.

In UAE, teachers accepted in public schools should be graduates of a university program in early childhood education with some exceptions.

Table 1: Environmental and Teachers' Characteristics Surrounding Preprimary Education in UAE and Lebanon up to 2005.

Indicator	UAE	Lebanon
I- General characteristics		
Urban Population	Greater than 85 %	Greater than 85 %
Primary education	Free and compulsory	Free and Compulsory
Pre-primary education	Non-mandatory	Non-mandatory
Number of pre-primary education years	2 (4 to 5 years old)	3 (3 to 5 years old)
Pupil Teacher Ratio	18:1	16:1
Hours in preschool	Around 5 hours per day, 5 hours per week*	At least 4 hours per day, 5 days per week.
Percent of children with ECCE experience	79 %	Greater than 90 %
Percent in pre-primary schools	74 %	64 %
Percent in private preschools	Greater than 70 %	Greater than 70 %
Gender Parity in pre-primary education	100 %	100 %
II- Teachers' Characteristics		
Percent trained	70 % (1999) 50 % (2005)	10 %
Formal education	Public KGs: Most are holders of a university degree*	53 % holders of post secondary non tertiary education
Percent of female teachers	100 %	100 %

Note: The given information was extracted from UNESCO International Bureau of Education, 2006, UNESCO Regional Bureau for Education in the Arab States, 2008a and 2008b, and J. Van Ravens and C. Aggio, 2008.

* The information is based on personal experience.

The Emirates Public School System offers two elective years labeled Kindergarten (KG) I and II prior to first grade to 4 and 5 years old children (Van Ravens, J, & Aggio, C., 2008). The KG curriculum has been redesigned to reflect a developmentally-oriented instead of an academically-oriented model. Children's gross enrolment ratio in the KGs was around 74% in 2005 (UNESCO Regional Bureau for Education in the Arab States, 2008a). Among those, more than 75% were in private schools (Van Ravens, J, & Aggio, C., 2008).

As for Lebanon, the requirements for teachers vary widely both in public and in private schools. Teachers' degrees could be less of a high school and all the way up to a university degree. A Three year technical degree termed (Baccalaureate Technique) in kindergarten education is one of the degrees offered. It is equivalent to a high school degree but is focused on early childhood education. In private schools, the main criterion to accept a preschool teacher is knowledge of a foreign language in addition to whatever degree available.

Education in Lebanon is compulsory and free from 6 to 14 years old (as cited in UNESCO International Bureau of Education, 2006). Pre-primary education is non-mandatory and is offered over three years starting 3 years old. In Lebanon, gross enrolment ratio up to 2005 was 64% (UNESCO Regional Bureau for Education in the Arab States, 2008a). More than 70% were in private schools (Van Ravens, J, & Aggio, C., 2008).

While at least 90% of all teachers were qualified in the subject matter in UAE, only 13% of Lebanese teachers were (UNESCO Regional Bureau for Education in the Arab States, 2008a). For pre-primary education, the percentages were around 50 % for UAE and 10 % for Lebanon (UNESCO Regional Bureau for Education in the Arab States, 2008b).

Given the background information and the role that the preschool teacher plays in introducing children to the educational system, what adjustments do new graduates have to make to implement ECE guidelines?

Individual and Context-Specific Issues

Teacher Candidates should examine their needs to meet the guidelines stipulated by the three ECE frameworks discussed earlier. In addition, they should address individual- and context-specific issues as follows.

Individual-Specific Issues

Three individual-specific issues ought to be taken into consideration: voicing opinions, integrating former knowledge with developmentally appropriate practices (DAP), and evaluating internet resources. Addressing those issues objectively and systematically would enhance TCs skills to implement DAP. Each issue is addressed as follows:

Voicing opinions. Throughout schooling, the teacher candidates in UAE were not trained to voice their opinions; they needed coaching to do so once they had reached university education. Faculty members expected practices and activities that attended to the whole child. Sometimes, those practices were different from what was best practice in the teacher candidate's culture. Innovative ideas should be viewed in context. Encouraging the teacher candidates to discuss the child's environment in the light of new cultural and technological developments, to suggest possibilities for better practices, and to try out those alternatives was very time consuming but worth the effort and should be embedded in the performance objectives in the university curriculum; otherwise, the teacher candidates would not be able to become agents of change.

This issue is less of a concern for the Lebanese TCs since they are used to voice their opinions from the early years of schooling.

Integrating former knowledge with DAP. It would be very simplistic to take a book and deliver it as is or to apply an educational activity without accommodation in global contexts. I once asked teacher candidates in UAE to come up with five action songs or activities on one theme to use on the playground. Without directions, most students would either use songs from the Internet that were not culturally relevant or use national folk songs that were not necessarily related to the theme. To

integrate the cultural heritage in a developmentally appropriate manner, they used national folk songs and changed the words to fit the theme. They did a good job. Some of the action songs were similar to English songs, such as, *A tisket, a tasket* or *Here we go looby loo, here we go looby light*. TCs captured the joy and the importance of activities and looked for additional resources without fear.

The Lebanese teacher candidates were familiar with at least a second language and already knew children's songs from other countries. Integrating songs or activities was less of an issue.

Evaluating internet resources. The use of the Internet as a resource was common among the teacher candidates. In fact, using the internet was not an issue but assessing the relevance of the findings was. In one project, I wanted the teacher candidates to look for activities related to one theme of their choice using the Internet and to assess the relevance of the activities in context. So, I asked them to translate one activity from English to Arabic, and adjust it to the context providing a justification. The justification for when and how to use the Internet should be continuously discussed with the teacher candidates in UAE and Lebanon, both for their own use and for the children's use in the classroom later on.

Context-Specific Issues

Teacher candidates need to be aware of issues in the early childhood settings that would hinder full implementation of ECE guidelines. Specifically, they need to be aware of the curriculum content and the everyday challenges of pre-primary teachers.

Nature of the KG Curriculum. In UAE, transitioning between behaviorist and cognitive methods of instruction was the main challenge; in Lebanon, achieving the balance among emotional, social, cognitive, and physical areas of development was more pressing.

KG teachers in UAE have used an academically-oriented model for years with emphasis on behaviorist methods. In the behaviorist model, teachers immediately see the benefits; they can write an objective and actually see it happen at the end of the session. For example, the child identifies numbers or names pictures, as requested. The teachers were hesitant to apply a play-based model based on cognitive theories. They were not comfortable experimenting with the child and waiting for long-term results.

How to break the cycle? One solution was to brainstorm with the KG teachers on the importance for the child to know the required piece of information. Reflective teaching would encourage teachers to try something less predictable but more joyful.

In Lebanon, the public schools have adopted a preschool program based on themes and activities for the three years of pre-primary education. The program proposed by the Center of Educational Research and Development in the mid 1990 was composed of 12 topics each year falling under two major clusters: People and communities, and natural environment. Children learn songs in the Arabic language and one foreign language, English or French. They also learn key words of the different topics in two languages. The program is currently under review. Objectives of the review are to expand the content to allow for more literacy activities and to embed an evaluation system in the curriculum (Center for Educational Research and Development, n.d.).

Private schools do not have to abide by the governments' curriculum. They teach the proposed topics and have ample time for additions.

Given the emphasis on academics and learning foreign languages in private schools, financially able parents enroll their children in private schools because learning a foreign language, French, English, or both, is considered an asset. Teachers distribute the time so that learning words and writing letters take a portion of the daily activities. That portion increases or diminishes depending on the school's program, teachers' knowledge of the foreign language, and children's achievement. In many private schools, children reach first grade fluent in the foreign language. Their counterparts in the public schools can identify key words and main sentences only. This difference leaves public school

children with a disadvantage in the acquisition of the foreign language right from the start of their academic lives.

It is important to discuss the difficulties in the implementation of the KG curriculum with the teachers and the TCs in a direct and planned manner. Teacher effectiveness needs to be evaluated based on the child's performance on the physical, cognitive, social, and emotional domains rather than on the child's memorization of numbers, words, or concepts.

Challenges of inservice KG teachers in UAE and Lebanon. Inservice teachers need to rectify the societal expectations of them, strengthen their assessment of children's behavior and special education needs, and engage in effective professional development. Each of the three challenges is addressed below:

1- Community and family expectations: In UAE, teachers pointed out to inconsistencies regarding their status in the community and expected roles. With respect to their status, the teachers felt that most members of the community viewed the KG school as a place where children were kept for few hours. The communication was not effective between the school and the parents. Most parents were not interested in discussing the child's performance with the teacher. Unless there was a major problem at the KG school, the mother, being the primary caregiver, rarely visited the school. As for their roles, the teachers reported being uncertain how they complemented the parents' roles at home.

Teachers were willing to work with the ambiguities regarding their status and roles because they loved children. Love for children was a reason mentioned by many teachers for choosing the profession. TCs need to be aware of those ambiguities and try to work out plans to highlight the role of ECE to parents.

In Lebanon, parents' involvement in their children's lives throughout preprimary education varies widely. However, they are keen on following up their child's progress in the second language.

2- Children's behavior and special education needs: A teacher who does not recognize or address a child's non-normative behavior might engage in developmentally inappropriate practices. However, the interviewed teachers in UAE did not view attending to children with special needs as part of their roles. They wanted help with diagnosis and they feared not doing a good job. The majority of the interviewees developed a preference for a class without children with special needs. The teachers' attitudes could negatively affect the child with special needs especially that the delay in setting special programs to the child would jeopardize her chances of successful inclusion.

In Lebanon, teachers were willing to attend to a child with special needs in their classes when coached to do so by a coordinator.

3- Status quo of professional development: Some teachers in UAE have difficulties keeping up with latest developments in the specialty and using technology. In general, teachers look for resources on their own or receive information from coordinators. However, there is a shortage of qualified coordinators trained to provide the needed resources but it is predictable that more qualified people would join the system in the future. A more global perspective is more aligned with Bennett's recommendation (2004) to start professional development step be step.

As for Lebanon, one main issue for Lebanon would remain the low number of trained teachers in the field, estimated to be around 10%.

The government given the unstable political situation in Lebanon is not able to adequately follow up on teachers both in public and private schools or to provide timely and adequate training.

Teachers in private schools are mainly recruited because they speak well a second language. Children receive a second language instruction but they do so sometimes at the expense of the social, emotional, and physical areas of development.

A review of the issues is available in Table 2 below.

Table 2: Individual and Context Specific Issues affecting UAE and Lebanese Teacher Candidates (TCs).

Issue	UAE TCs	Lebanese TCs
I- Individual-specific issues		
Voicing opinions	Need coaching to do so	Less of a concern
Integrating former knowledge with DAP	Need support	Need less support
Evaluating internet resources	Activities need to be assessed for their relevance. TCs should be trained to do so.	
II- Context-specific issues of inservice KG teachers		
Nature of the curriculum	New curricula are being developed. Transition from behaviorist to play-based methods.	New Curricula are being developed. 3Rs at the expense of other areas of development.
Community and family expectations	Inconsistencies regarding status and roles	Emphasis on child's academic achievement
Children's behavior and special education needs	Attendance to children with special needs should not be part of the role.	Attendance to children with special needs could be part of the role with help.
Professional development	Coordinators expected to deliver necessary material	Varies widely between none available to well- provided.

Recommendations

What challenges would new Emirati and Lebanese graduates in ECE face in meeting the ACEI and NAEYC guidelines? At the university level, the requirements for an accredited program are being implemented. TCs are aware of the ECE standards stipulated by specialized organizations and are prepared to implement them and to be resourceful.

However, at the applied level, a lot needs to be done. The management component, health and nutrition requirements, policies regarding inclusion, and community outreach, as specified by NAEYC, are not adequately developed. In addition, the management component should encompass public and private sectors.

TCs need to address the context-specific issues described above. They are not expected to do so alone. To succeed, they should be supported by policies that provide for children's needs.

Bilingualism is yet a debatable issue. In the emirates, policy makers at the public schools prefer the child to be competent in his/her native language (Arabic) before learning a second language (English). In Lebanon, immersing a child in a second language is part of the culture. Literacy needs should be embedded in harmony with other areas of development.

I can't emphasize enough the importance of conducting research into the lives of preschool teachers, coordinators, and administrators in order to plan for continuous professional education and to feed that information into the curriculum offered at the university level so future graduates would not have to face the same issues. This is increasingly important with the rapid changes taking place in the society. If conditions for structured research are not available, then informal inquiry should be initiated.

Implications for International Contexts

How to provide a successful university program based on a sound theory and geared towards a rewarding practice in Early Childhood Education? Throughout this paper, I examined two cases but the steps could be applied to other countries as well. Educators could provide for a successful ECE by, firstly, assessing the gap between theory and current practices on the ground; secondly, empowering inservice and preservice teachers with reflective skills so they are able to assess situations themselves; thirdly, planning with teacher candidates to address challenges on the ground by starting step by step; fourthly, getting involved in inservice training to narrow the knowledge gap between novice and existing teachers, and finally, conducting research and feeding results into workshops in the preschools and in the university curriculum for new graduates.

In conclusion, university preparation imparts the process of quality education. Better yet, the teacher who has memories of creative activities in her childhood would want other children to have a similar experience. So, the earlier quality education is started, the better.

References

Association for Childhood Education International. (1998). *ACEI position paper: Preparation of early childhood teacher education teachers.* Retrieved February 18, 2004, from http://www.udel.edu/bateman/acei/prepec.htm

Association for Childhood Education International. (2000-2002). *Global guidelines for early childhood education and care in the 21st century*. Retrieved February 18, 2004, from http://www.udel.edu/bateman/acei/wguides.htm

Bennett, J. (2004, September). Curriculum in early childhood education and care. *UNESCO Policy Briefs on Early Childhood (26)*. Retrieved March 29, 2005, from http://unesdoc.unesco.org/images/0013/001374/137401e.pdf

Center for Educational Research and Development. (n.d.). The Kindergarten Curriculum – Arabic. Retrieved June 18, 2008, from http://www.crdp.org/CRDP/all%20curriculum/Rawda/Rawda_ar1.htm

National Association for the Education of Young Children. (2001). *NAEYC standards for early childhood professional preparation: Initial licensure programs*. Retrieved October 5, 2001, from http://www.naeyc.org/profdev/prep_review/preprev_2001.asp

National Association for the Education of Young Children. (2004). *NAEYC final draft accreditation performance criteria.* Retrieved November 11, 2004, from http://www.naeyc.org/accreditation/naeyc_accred/draft_standards/crit/completecriteria.html

UNESCO International Bureau of Education. (2006). *Country Profile commissioned for the EFA Global Monitoring Report 2007, Strong Foundations: early childhood care and education.* Retrieved June 18, 2008, from http://unesdoc.unesco.org/images/0014/001480/148027e.pdf

UNESCO Regional Bureau for Education in the Arab States. (2008b, draft document). *Education for All Mid-Term Review for the Arab States 2008. Sharpening our tools: Statistical Document.* Beirut, Lebanon: Author.

UNESCO Regional Bureau for Education in the Arab States. (2008a, draft document). *Education for All Mid-Term Review for the Arab States 2008. Sharpening our tools.* Beirut, Lebanon: Author.

Van Ravens, J, & Aggio, C. (2008). *Expanding early childhood care and education: How much does it cost? A proposal for a methodology to estimate the costs of early childhood care and education at macro-level, applied to the Arab States* (Working Paper No. 46). The Hague, The Netherlands: Bernard van Leer Foundation. Retrieved June 5, 2008, from http:// www.eldis.ids.ac.uk/go/topics/resource-guides/children-and-young-people&id=36345&type=Document - 16k

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(E.5)

Assessing co-operative teaching: Greek pupils' attitudes towards it

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Abstract

In recent years new curricula and textbooks which demand synthetic and holistic learning approaches have been introduced in Greece, and teachers have been strongly encouraged to use alternative teaching methods. However, teaching in small groups is still a relatively unknown teaching method, especially in upper secondary education (Lyceum), which is largely considered as just a preparatory level for university entrance examinations. This study attempted to assess teaching and learning in small groups in the upper secondary school in Greece via the investigation of pupils' attitudes towards it, aiming to provide empirical data for supporting the use of co-operative teaching on a wider scale. Students of the three year groups of a Lyceum in Athens were taught English in a co-operative way for a school year, which was designed jointly by the researchers and their English teacher. After the end of it, pupils assessed themselves as well as their peers, and they also completed a questionnaire investigating their attitudes towards their new learning experience. The results show that the Greek pupils of the school of the study, enjoyed school work more when they work as a team, they expressed more easily and freely their opinions, and that they want to co-operate with their friends. The questionnaire may also be used by teachers to diagnose errors in the formation of the groups, the unequal contribution of the members to the workload, and to communicate with the pupils.

Introduction

The main characteristic of Greek school today is the traditional whole class teaching method, where the teachers' role, time and speech are at the centre of it. Although co-operative teaching is considered to be a modern teaching approach, which develops both cognitive and social skills, in Greece, it is still not used systematically.

Taking into account that in recent years new curricula were introduced, which demand holistic and synthetic teaching approaches, we consider that teaching with small groups is still an innovative solution within the Greek educational system.

The main aim of this study is a better understanding of the operation of teaching and learning with small groups, as well as the dynamics that are being developed during this process, aiming at the promotion of co-operative teaching in the Greek school. For the accomplishment of this aim a questionnaire was used which can be considered as a diagnostic as well as a prognostic tool.

The results of the study indicate that Greek students enjoy more class work when it takes place in groups, and they express easier and more freely their opinions. However, they prefer to cooperate with their friends and not just with any of their classmates. Using the questionnaire, the teacher may diagnose any errors in the formation of the groups, the unequal contribution of the members in the group work and to communicate with the pupils.

The changes that take place in the educational system as well as in the business sector, lead to an increased need for the development of co-operative skills. It is thus necessary for pupils to work in groups, to communicate and to solve problems in an effective way.

Review of the issue

Teaching and learning are two complementary concepts, and therefore at school, both teachers' and pupils' role is considered important. The traditional pedagogy that still characterises Greek education to a large degree, places a great importance on teachers' role whose main aim is the transfer of knowledge. They present the lesson to the class and, subsequently, pupils are obliged to return it through examination and testing the day after. Freire (1977) has described this process as a "bank view" of education. Teachers deposit knowledge into pupils' minds and then they attempt to withdraw it through assigned exercises and homework. In traditional pedagogy, teachers spatially organize

pupils so that they are opposite of them and face them, and interact with them (Dervisis, 1996). Teachers' role is limited to that of a "forwarder" of informative material (Barkatsas, 1999). There is a given body of knowledge controlled by one teacher-transmitter, and a number of pupils-receivers who attempt to conceive and digest it (Thomaides, 1999). Traditional schooling, undoubtedly leads to the socialisation of the person, a passive, however, socialisation (Matsaggouras, 1987) where a person, under pressure of external commands, simply adopts already set models.

Modern educational theories stress the importance of active learning through personal interaction (Garfield, 1993). Co-operative learning is considered as a valuable educational strategy, as it reinforces active learning at school and promotes cognitive and social development of pupils. It is a collection of educational strategies that encourage pupils to work in small groups, and all together, with their abilities and skills, to contribute to the accomplishment of the aim of the group (Johnson & Johnson, 2000). The activities are structured in such a way so that every member of the group not to be responsible only for him/herself, but also for the rest of the members of the group. Sharan (1990) stressed that co-operative learning offers a better understanding of the learning situation as well.

It is necessary for teachers to modernise their methods of teaching and practices, and to apply strategies that have been proven to be beneficial for pupil learning. According to Ksylogiannopoulou & Gepis (2006), the smooth transfer from the existing practices to more innovative methods is difficult, regardless the fact that there may be substantial research that supports the effectiveness of new methods. On the attempt to change teaching from traditional to co-operative, teachers may need to tackle numerous problems such as those related to classroom management, to teachers' preparation time, to pupils' heterogeneity, to assessment and to resistance to change.

The role of pupils' perceptions, views, and behaviours is central in characterising a teaching method as successful or not, and therefore they should be examined extensively. Knowledge of pupils' attitudes towards cooperative learning may ease the implementation of such a teaching method. It is also possible any negative attitudes towards working in small groups to endanger the relations and interactions among members of the group as well as the process of learning. However, studies of children's perceptions of cooperative learning have been scarce (Gillies, 2004). It has been shown that pupils' attitudes, motions, values and behaviours are affected by those of their classmates (e.g. Parr & Townsend, 2002). It can be concluded therefore, that exploring these attitudes may be very important for the teacher, in planning and monitoring teaching in small groups.

Aims of the study-Research Questions

The main aim of this study was not to enrich the international literature regarding co-operative learning. The present study was too limited regarding its sample and its implementation time to have such an ambition. Its main aim was to examine one Greek secondary school's pupils' attitudes towards working in small groups for a certain cause: It was thought that the highly traditional and centralised Greek educational system leads to an absolute conservativism in teaching practices which, in turn, does not allow any new approach to be investigated. Studying pupils' attitudes towards new approaches, therefore, may offer a basis for innovative suggestions.

The aim of the study led to the statement of the research questions which are the following:

- Which are the process and the quality of work within the group?
- Do members of groups support each other?
- Is there interaction among all the members of the group?
- Are there any difficulties in working within the group?

Method

Sample

The sample of the study consisted of 73 pupils of the three grades of one Upper Secondary School (Lyceum) of an underprivileged area on the outskirts of Athens. Thirty eight pupils (52.1%) were studying at the first grade at the time of the study, 18 pupils (24.7%) at the second and 17 pupils (23.3%) at the third grade. The distribution of the participants according to their grade and gender is presented in table 1:

Table 1: Gender and grade.

			Grade			Total
			A	B	C	
GENDER	Boys	N	16	7	8	31
		%	21,9%	9,6%	11,0%	42,5%
	Girls	N	22	11	9	42
		%	30,1%	15,1%	12,3%	57,5%
Total		N	38	18	17	73
		%	52,1%	24,7%	23,3%	100,0%

The questionnaire

In order for the research questions to be answered a written anonymous questionnaire was used. This method was considered to be the most appropriate because it traces positions and attitudes of pupils, it eases direct and efficient collection of the data and allows the participants to answer in an unbiased and unforced way. The negative side of this method is related to the non sincere answers sometimes given by participants (Cohen & Manion, 1994).

The questionnaire consisted of thirty seven closed ended questions which participants were asked to answer by indicating their level of agreement to statements followed by a five point Likert-Type that varied from "strongly disagree" to "strongly agree". Closed ended questions may restrict the freedom of participants regarding the form of their answer; they have the advantage, nevertheless, that they can be answered easily and allow statistical analyses of the answers (Dimitropoulos, 2003).

The questions of the questionnaire can be grouped under the following thematic units:

- Process and quality of school work;
- Interdependence of group members;
- Interaction among group members ; and
- Difficulties among group members.

Process

The implementation of teaching with groups took place at the lesson of English. Cooperative learning in English has been extensively used (e.g. Cheung & Slavin, 2005). The process was the following:

At first, pupils were informed by their teacher about the new method of teaching and working. Then the classroom was arranged so that they could work in groups. The desks were placed facing one another, for a better inter-personal communication to take place. Then, pupils were organised in groups of four. The formation of the group was done by the pupils absolutely freely, according to Johnson, Johnson & Holubec (1993). It was observed, however, that existing social and emotional relationships among pupils affected grouping. The formed groups were both homogenous and heterogeneous as far as gender was concerned. Afterwards, the subject of the study was defined, which was the listening of simplified literature text. Finally pupils were given copies of the test as well as the worksheets. The worksheets included open and close ended comprehension questions, vocabulary and grammar exercises as well as exercise of speech production in a topic related to the text they had listened. All groups were given the same work. No specific roles related to group work were assigned to pupils by the teacher since pupils of that age were thought to be able to decide that by themselves.

Second, the pupils heard the narration from a tape recorder and in the meantime read the text which was given to them. On the third stage pupils were asked to co-operate for the completion of the given worksheet. Before they started, their teacher gave them accurate directions so that all members of all groups understood the questions. She also reminded to pupils the aims of co-operative work. The role of the teacher did not end there, but throughout the period of the team work, she continued to give explanations and offer her help each time that there were questions, and to monitor the work of the

teams. At the last stage, pupils presented their work, and discussed it. The teacher, at that stage, coordinated the discussion. Finally, pupils completed the assessment questionnaire.

Results

The first thematic unit which included questions 1-13 of the questionnaire, focused on the process that pupils followed in their work in groups, as well as on the quality of the work within the group. It investigated whether the work within the group was of good quality, if they enjoyed their work, if they needed more time, if they improved the way they usually work, and if they learned more.

Table 2.

Process and quality of school work	SD+D*	U**	A+SA***
When I work with my schoolmates I need less time in order to I complete my work (Quest. 2)	27,4	15,1	57,5
I enjoy my work more when I work in groups (Quest. 3)	8,2	1,4	90,4
When I work in a group I have less work to do. (Quest. 8)	9,6	9,6	80,8
The work is more interesting when I work in a group (Quest. 10)	8,2	2,7	89,1
When I work in a group, I improve the way I work (Quest 11)	13,7	17,8	68,5

*Strongly Disagree+Disagree, **Undecided, ***Agree+Strongly Agree

The results shown in table 1 demonstrate, first of all, that the answers "agree" and "strongly agree" to the statement "I enjoy my work more when in work in groups" summed up to 90.4% of the participants. The first conclusion therefore is that, regardless of the result of the learning process, pupils enjoyed more their work in groups and the new way of teaching.

The great majority of pupils (57.5%) mentioned that they needed less time to complete their work when working together with their classmates, while relatively large percentage (27.4%) disagreed and strongly disagreed. The latter may mean that although most of the pupils enjoyed their work, they did not know how to manage their time effectively when they worked in small groups.

Pupils also expressed a high level of agreement to the statement "when I work in groups I have less work to do". This may mean that pupils felt that they had less work to do when their work was distributed to all the members of the group. The work which was before expected to be done by each one is shared by all four of them in group work.

Another important finding of the first unit of the questionnaire was the relatively large percentage (17.8%) that appeared to be undecided to the question "when I work in groups I improve the way that I work". It should be noted that this was the largest percentage of the entire questionnaire of "undecided". This finding may imply that the short time that such a method was used, did not allow pupils to draw firm conclusions on the issue, or that pupils believe that the assessment of their works is an exclusive teachers' work. In other words, it may demonstrate the lack of self-assessment skills among Greek pupils, as assessment is considered to be one of the major and exclusive roles of teachers.

No significant differences were found in pupils' answers to questions of the first unit, regarding either their gender or grade. There is only one significant difference in pupils' answers to question 2 regarding their grade. Pupils of the third (final) grade expressed significantly lower levels of agreement with the statement of question 2, than the other two year groups ($F(72)=4,66$, $p=,012$). Pupils of the final year did not appear to need less time to finish their work when they work in groups. It seems that examination oriented pupils, like the ones of the final grade of secondary school, believe that it takes less time to finish work when working individually. Overall, however, their positive views regarding the process and quality of their work in groups were characterized by unanimity.

The second thematic unit of the questionnaire included question 14-21 that referred to the support among the members of the group. These questions investigated if there was respect among the members of the group, if they expressed their opinions and ideas freely, if they were interested about the feelings of the members of the group and the feel that they belong to the group.

Table 3 demonstrates that 94.5% of the participants answered that they agree or strongly agree with the question "When I work in groups I can share my ideas" and no participants answered that s/he disagreed or strongly disagreed with the question "I feel that the members of the group like me".

Table 3.

Interdependence of group's members	SD+D*	U**	A+SA***
When I work in group I can share my ideas (Quest. 15)	4,1	1,4	94,5
I feel that the members of group like me (Quest. 20)	0,00	15,1	84,9
All the members of group can express their opinions without fear (Quest. 21)	4,1	1,4	94,5

*Strongly Disagree+Disagree, **Undecided, ***Agree+Strongly Agree

It is evident that when pupils worked in groups felt more free to express their opinions and ideas. This may not be happening in traditional teaching where the teacher teaches, while pupils just listen to him/her. Often, they may feel inhibited and embarrassed, if the want to say something in the formal class setting. The freedom of expression is allowed in small groups, and seems to be considered as very important for pupils. The high level of agreement with the statement was expected to a high degree, taking into account the freedom in group formation and the preferences among the members of each group.

One significant difference was found when pupils' level of agreement was compared with regarding their gender or grade. Girls appeared to feel significantly less liked by the member groups than boys ($F(72)= 6.15$, $p=.015$), they seemed more insecure about themselves than boys and about the feelings they evoke to member groups.

The third thematic unit included questions 22-29 of the questionnaire. This part investigated the interaction among the members of the group, if there was influx of information among them, if all members worked on the given class work, and if they finish their work in time. Table 3 shows that 94.5% of the pupils agreed and strongly agreed with the statement "I help my team by giving information on the subjects I know", while in question "it is necessary for each member to express her/his ideas if we want to do a better work", 93.1% answered "agree" and "strongly agree".

Table 4.

Interaction among group members	SD+D*	U**	A+SA***
It's necessary for each group member, to express his ideas, if we want to do better work (Quest. 22).	5,5	1,4	93,1
I did not let most of the other group members to do the work. (Quest. 24).	9,6	5,5	84,9
When I explain to the members of the group what they should do, I learn from the process (Quest. 25).	9,6	21,9	68,5
We can finish the work only when each member complete his work (Quest. 26).	15,1	5,5	79,4
I help my team by giving information on the subjects that I know (Quest. 27).	4,1	1,4	94,5
It is important for me that members of the group finish their work in time (Quest. 28).	16,4	12,3	71,3
I feel pleasant when I discuss with my schoolmates the material in which they have different opinions from mine. (Quest. 29).	11,0	13,7	75,3

*Strongly Disagree+Disagree, **Undecided, ***Agree+Strongly Agree

High levels of agreement (agree + strongly agree) were also expressed to the statements: "I did not let most of the other group members to do the work" (84.9%), "It is important for me that members of the group finish their work in time" (71.3%). Such answers allow the conclusion that there was responsibility and inter-dependence among group members. It should also be noted that in the question "when I explain to the members of the group what they should do, I learn from the process", a relatively large percentage (21,9%) of the participants answered that they were uncertain.

This implies that the short implication of cooperative work, did not allow clear learning effects on pupils. No significant differences between the two genders or among pupils of different grades were found.

The fourth thematic unit included questions 30-37 of the questionnaire. Through these, it was attempted to investigate if there were any difficulties among the members of the group, if pupils want to work with their friends and the ones they like, if all the members carry out the work assigned to them, if during the team work they chatted about irrelevant issues, if they want to choose the ones that they want to work with, and if they sometimes are obliged to work with pupils they don't like.

Table 5.

Difficulties among group members	SD+D*	U**	A+SA***
When I work in groups I want to be with my friends, so that I face no difficulties (Quest. 30).	24,7	5,5	69,8
I prefer to cooperate with my classmates I like, so that I face no difficulties (Quest. 31).	19,2	4,1	76,7
Some members of the group forget to do their work (Quest. 32).	24,7	31,5	43,8
I prefer to select with who I will cooperate (Quest. 35).	12,3	13,7	74,0

*Strongly Disagree+Disagree, **Undecided, ***Agree+Strongly Agree

In the question "when I work in groups I want to be with my friends", 69.8% answered that they agree and strongly agree. In the question "I rather co-operate with classmates that I like with" the agreement reached to 76.7%. Pupils' answers to the above question showed that pupils prefer to work in groups with their friends and with people that they like, so that they face no difficulties, apparently, because they feel more comfortable with them. Pupils appeared to prefer to have a say in the formation of the groups. Agreement in the question "I prefer to select with whom I will co-operate" reached 74%. The question "some members of the group forget to do their work" received a 31.5% "don't know" answer. This may imply that group members did not want to report to the researcher that some pupils who did not do as much work as they should, or simply that their short experience of co-operative learning, did not allow them to draw any conclusions on this issue.

Two significant differences of male and female pupils were found in the levels of agreement with questions 30 and 31. In both questions boys expressed significantly higher levels of agreement (Q30: $F(72) = 6.31$, $p = .014$; Q31: $F(72) = 4.29$, $p = .042$). Boys thus appeared more dependent to their friends than girls. Overall however, very few differences appeared. This means that the positive attitudes expressed was almost unanimous.

Discussion and Implications for practice

In order for any discussion of the results of the present small scale study to be made, it is important to mention the usual teaching routine in the Greek secondary school classroom. The teacher of the subject enters the classroom, examines the assigned homework, proceeds to the presentation of the new material mainly by monologue, and then s/he asks pupils to do their textbook exercises, or hands out photocopies. The ones which are not finished are for homework. This process to a greater or a lesser degree is being used from the beginning of the primary school to the end of the secondary in every subject (Kanakis, 2001). Any other teaching methods which may be used by some teachers are rather the exception than the rule.

The result of a static, conservative schooling system is the negative attitudes towards it by everyone who is involved in the process. According to a study by the Greek Institute of Education (Lakassas, 2008), Greek pupils are stressed, bored and angry. Eighty percent of higher secondary school pupils believed that their teachers were not sufficient to help them in order to be accepted in universities, which according to them "is a lifetime target". Sixty six percent mentioned that school corresponded a little or not at all to their expectations. Both primary and secondary pupils find school unattractive, and the older they get the more they don't like the used teaching methods and school in general. School problems were primarily attributed to the structure and the character of the system and secondarily to their teachers.

In this framework the findings of this present study have important implications for the changing teaching practice. In particular:

Process and quality of school work. Pupils expressed the view that they enjoyed work more when they worked in groups because the lesson becomes more pleasant. Also, they believed that the members of their group help them and their work becomes more interesting. This study supports the literature findings regarding the motivating effects of cooperative learning (e.g. Slavin, 1996; Oortwijn, et. al. 2008). From this perspective cooperative learning appears to be able to help in tackling Greek pupils' lack of motivation and individualism.

Interdependence of group members

Participants believed that working in groups allowed them to share their ideas, to think that they belong to a group, to express themselves and to feel liked. Friendships and belonging to a group is extremely important for teenagers (Cole & Cole, 2002). Cooperative learning is compatible with this need of theirs, while traditional teaching does not take into account pupils' psychological needs and social interactions. It seems, therefore, that in this perspective also, the present study showed that cooperative teaching would be well accepted by pupils in the Greek educational system.

Interaction among group members

Pupils appeared to believe that it is necessary for them to express their ideas in order for good work to be done. They thought that each member helped each other. Helping behaviour (e.g. Oortwijn, et. al. 2008), or social cohesion (Slavin, 1996) of pupils has been extensively studied in the literature and, in many cases, it has appeared to be related to learning gains. According to the literature and the pupils' attitudes presented in this study therefore, it can be concluded that cooperative learning, is not only something that is pleasant, but also effective. Furthermore, learning to cooperate and help, per se, is an important target of schooling, and it seems that the best way to achieve it is through work with small groups.

Difficulties among group members

Although pupils stressed that they wanted to select whom they wanted to cooperate with, so that they would face no difficulties, they directly or indirectly expressed the notion that they faced problems with work and time distribution. Difficulties were expected, as, working in groups put them into a new situation, which encouraged them to talk to each other, something forbidden in traditional Greek whole class teaching. At the beginning of the implementation, the class displayed high levels of noise, which is normal until pupils adapt to the new situation and the new learning environment.

It is evident that introducing a new, innovative approach in education is not easy. Moreover if this new approach is much more difficult than someone may assume. Cooperative learning is "more than just putting students in teams" (Siciliano, 2001). Teachers should be well trained and informed about the research regarding cooperative learning before they implement it. Group formation, task preparation, teacher intervention and pupil assessment and accountability are only some of the issues related to cooperative learning that teachers should be informed about.

In the Greek educational reality, as it was previously described, change and innovative approaches are even more difficult. Innovations have not been proven successful when they follow a top-down process. For instance, the central administration in Greece has failed to convince teachers even about the reasonableness of curriculum and handbook change that took place last year (Olme, 2008). Even the centrally designed training programmes which are being carried out, have failed to achieve their goals and to earn teachers' respect.

For successful implementation of any new approach, the process should be "bottom-up". Motivated teachers only implement such innovations in the framework of a school unit with an appropriate ethos. In such an effort, however, all the support from everyone involved is needed: Educational authorities, consultants, colleagues, and parents should be involved. A flexible curriculum is also a prerequisite for the success of such an effort.

In conclusion, the present study, although small and of very limited generalisation, clearly demonstrated that Greek pupils' attitudes towards cooperative learning were very positive. These positive attitudes suggest that innovative teaching and learning approaches is the direction to which the Greek educational system should move, in order to deal with pupils' lack of motivation and stress it produces.

References

Anagnostopoulou, M., (2001). *I omadiki didaskalia stin ekpaidefsi*. (In Greek) *Group teaching in education,* Thessaloniki, Kyriakidis bros.

Barkatsas, A., (1999). I theoria tis kataskevis tis gnosis (constructivism) kai o rolos tis sti mathisiaki diadikasia kai sti didaktiki ton mathimatikon. (In Greek) The theory of construction of knowledge (constructivism) and its role in mathematics didactics. *Erevnitiki diastasi tis didaktikis ton mathimatikon,* 4,136-153.

Cheung, A., & Salvin, R. (2005). Effective Reading programs for English Language Learners and Other Language-Minority Students. *Bilingual Research Journal, 29,* 241-267.

Cohen, L. & Manion, L. (1994), *Methodologia Ekpaideftikis Erevnas,* (In Greek) *Research methods in education*, Metaihmio, Athens.

Cole, M., & Cole, S. (2002). *I Anaptiksi ton paidion* (In Greek), v. 3, Puberty. Athens: Dardanos.

Dervisis, S. (1996). Oi staseis ton mathiton apenanti stin paradosiaki-metopiki kai tin omadiki morfi didaskalias (In Greek) Pupils' attitudes towards the whole class traditional and the group method of teaching *Nea Piadeia,*v.79, p. 40-63.

Dimitropoulos, G. E. (2003). (7th Edition), *Ekpaideftiki Aksiologisi: I Aksiologisi tou mathiti. Theoria-Praksi-Provlimata* (In Greek.) *Educational assessment: Pupil assessment,. Theory - Practice - Problems.* Athens: Grigoris.

Freire, P. (1977). *I agogi tou katapiezomenou (*In Greek). Education of the oppressed. Athens: Kedros-Rappa.

Gargield, J. (1993). Teaching Statistics using small-group Cooperative learning. *Journal of Statistics Education,* v.1, n.1.

Gillies, R. (2004). The effects of cooperative learning on junior high school students during small group learning. *Learning and Instruction, 14,* 197-213.

Hancock, D. (2004). Cooperative learning and peer orientation effects on motivation and achievement. *The Journal of Educational Research, 9,159-166.*

Johnson, D., & Johnson, R. (1974). Instructional Goal Structure, in *Review of Educational Research.*

Johnson, D., Johnson, R., & Holubec, E. (1993). *Cooperation in the classroom* (6th Ed.). Edina, MN: Interaction Book Company.

Johnson, D., & Johnson, R. (2000). *Joining together: Group theory and group skills*. Edina, MN: Interaction Book Company.

Kagen, S. (1995), *Cooperative learning*, San Juan Capistrano: Kagan Cooperative Learning.

Kanakis, I. (2001). *I organosi tis didaskalias-mathisis me omades ergasias* (In Greek) *The organization of teaching and learning with group work*, Athens: Tipothito Dardanos.

Kelly, A. (1974) *Teaching Mixed Ability Groups,* London.

Ksylogiannakopoulou, G., & Gepis, G. (2006). I sinergatiki mathisi sto elliniko sholio (In Greek). Cooperative learning in Greek School. Proceedings of the 1st Educational conference *"Greek school and the challenges of modern society,* Ioannina.

Lakassas, A. (2008). *Disarestimenoi oi mathites* (In Greek) *Dissatisfied pupils.* Kathimerini, 30/03/2008.

Matsaggouras, H. (1987). *Omadokentriki didaskalia kai mathisi*. (In Greek) *Group teaching and learning,* Athens: Grigoris.

Matsaggouras, H. (2000). *Stratigikes Didaskalias. I kritiki skepsi sti Didaktiki Praksi.* (In Greek) *Teaching strategies: Critical thinking in teaching.* Ed. Athens: GUTENBERG.

Olme, O. (2008). *Sholika programmata kai biblia stin ekpaidefsi* (In Greek) *School curricula and textbooks in education.* Online: http://olme-attik.att.sch.gr/files/educonfolme/ereunassymperasmata.pdf.

Oortwijn, M., Boekaerts, M., Vedder, P., & Strijbos, J.W. (2008). Helping behaviour during cooperative learning and learning gains: The role of the teacher and of pupils' prior knowledge and ethnic background. Learning and Instruction, 18, 146-189.

Parr, J. M., & Townsend, M. A. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research, 37,* 403-423.

Sharan, S. (1980). Cooperative learning in small Groups, in *Review of Educational Research.*

Sharan, S. (1990). *Cooperative learning: theory and research*, Praeger, New York.

Siciliano, J. (2001). How to incorporate cooperative learning principles in the classroom: It's more than putting students in teams. *Journal of Management in Education, 25*,1, 8-20.

Slavin, R. (1996). Research on Cooperative Learning and Achievement: What we Know, What We Need to Know. *Contemporary Educational Psychology, 21*, 43-69.

Thomaides, G. (1999). Mia episkopisi erevnon gia ti didaskalia ton mathimatikon stin Elliniki Defterovathmia Ekpaidefsi (In Greek) A meta-analysis of studies for mathematics' teaching in Greek Secondary education *Erevnitiki diastasi tis didaktikis ton Mathimatikon, 4,112-132.*

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(E.7)

Educational Aspects of Three Methods of Accessing International Classification for Nursing Practice

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Abstract

Teaching about classifications plays an important role also in nursing education. International Classification for Nursing Practice is a unified professional language devoted to nurses, other health workers and broader. In the contribution the e-version of classification is presented as a challenge for efficient educational practice searching for new information solutions in different environments using information and communication technology. This thesaurus is represented with a database. On its base several browsers are developed which enable users to browse the classification on personal computer, internet and PDA-hand-held computers. The emphasis is on strengths and weaknesses of each browser implementation and the reasonable synchronization with a printed version. Fruitful combination of those versions significantly contributes to successful education in health-care. Teaching classifications takes place in the frame of information system to support nursing process with a special emphasis on nursing documentation. Nursing documentation is treated as a structured nursing patientâ€™s record where nurses identify nursing diagnoses, interventions and outcomes. For the articulation of nursing phenomena proper use of classification is essential. With the computerized educational support we do not teach only classification but also a structured approach to documenting nursesâ€™ work. This encourages not only students, but also nurses on all levels of health care for a more creative use of their knowledge in problem solving.

Introduction

International Classification for Nursing Practice (ICNP®) is a professional language for communication among people (Mortensen, 1999; ICN, 2005; Hardiker & Coenen, 2006). An important goal of this thesaurus is also to facilitate informatization in the whole field of health care. It is a good base to support nursing process (Potter & Griffin Perry, 2003; Taylor et al., 2001; Yu et al., 2006) and their computerization along the lines of patient's record, minimal data set, etc (van Bemel & Musen, 1997; Šušteršič et al., 2003; van de Castle, 2006; Müller-Staub et al., 2007). Therefore, in nursing education it is not only important that students become familiar with ICNP®, but also that they develop critical thinking/reasoning about its usage in nursing documentation and informatization of nurses' work (Cowan et al., 2005; Thorne, 2006; Eldh et al., 2007, Gould et al., 2007; Suliman & Halabi, 2007). To meet these challenges ICNP® must be widely accessible, not only as a book (ICN, 1999; Cibic et al., 2000), but also on electronic media such as personal computers, Internet, PDA computers (Bond, 2006; Norton et al., 2006; Saranto, 2007).

In this paper three versions of browsers for different above mentioned media are presented. User can browse Slovene and English version of ICNP® beta 2. Each version is discussed regarding its technical advantages and disadvantages. Teaching critical thinking enables nurses and other health workers not only to select the most suitable access to ICNP® in given situation, but also to evaluate the role of information and communication technology (ICT) as a tool for adding value in their work. At College of Health Studies, University of Ljubljana, the use of different e-versions of ICNP® became an integrated part of teaching nursing process with special emphases on nursing diagnoses, interventions and outcomes.

ICNP® and its expectations

ICNP® can be viewed as an information tool for describing nursing processes in practice (Mortensen, 1999; ICN, 2005). It encourages unified acquisition, storage, processing and dissemination of nursing data in the frame of health information system. Such data can be used by practitioners, researchers and educators (van Bemel & Musen, 1997; Scholes et al., 2000; Hammon & James, 2006; Hardiker & Coenen, 2007).

These data are also the basis for quality management in nursing. Consequently the need for possible changes in education, management and health care strategy become more evident.

In the frame of information system ICNP® supports unified coding, which is significant for electronic patient's record and data exchange among different information solutions. Formalized health care language supports process method of work (McEwan & Wills, 2007) and standardizes the way nurses work with patients / clients. It also makes the exchange of "best-practice" experiences easier.

With the e-representation of ICNP® we would like to contribute to the achievement of the above-mentioned goals. The classification should be accessible to nurses during their education and work in different situations where it can be used for describing nursing diagnoses, interventions and outcomes. Different browsers together with a book offer the possibility to every nurse to choose the most suitable access to ICNP® for her/him.

Browsers

A browser must offer flexible access to ICNP® with the aid of information and communication technology. So the book version (ICN, 1999) is significantly extended. Besides the usual advantages of e-representation it is important to mention multilingual access to ICNP® like in our case a combination of Slovene and English language.

Different browsers can be used in different segments of nurse's education and work. Therefore, advantages and disadvantages of each browser must be known. From our experience no single solution can serve as a replacement for others. We propose the complementary view on the use of different browsers. Thus, a nurse should have access to all browsers. It is up to her/him to choose the most appropriate in certain case.

Internet Version

The Internet browser can be accessed on the web (http://lopes1.fov.uni-mb.si/icnp). Screen image is shown in Figure 1. It offers browsing the hierarchical tree structure, search for keywords (in both languages and their codes) and full-text search. Search is conducted on the server side and results are transferred to the user. In the case of multiple search results, the user can move forward and backwards among them. Access to the database is possible only through the search engine on the server in order to secure the database.

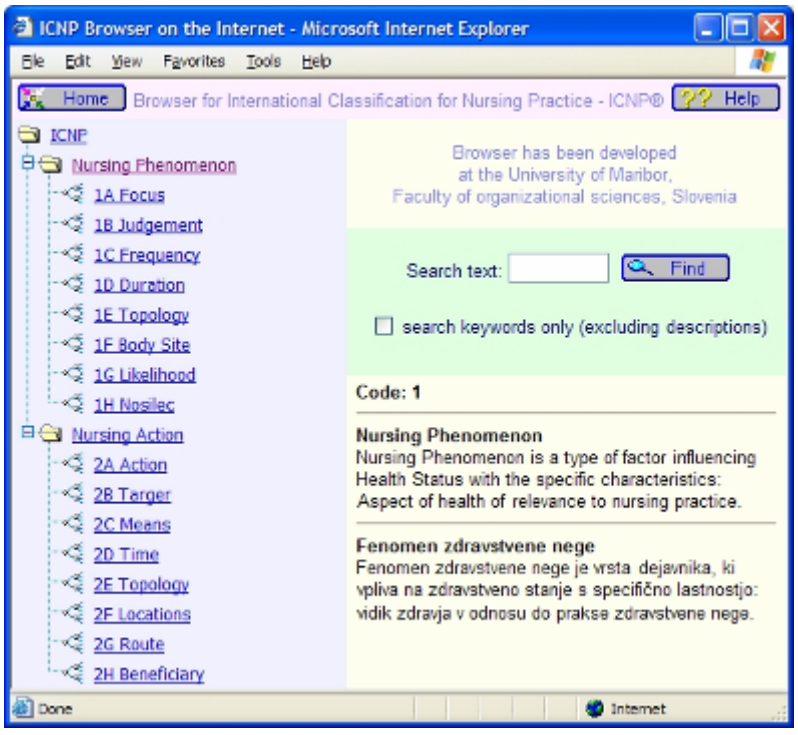

Figure 1: Screen of the browser on the Internet.

One of the main advantages is the ease with which changes on the central computer are implemented, always offering users the newest version of ICNP®, which is a live language still undergoing some changes. Access to this version is based on the access to the Internet. To a certain degree Internet connection can present a problem. Therefore, the tree structure is built on the client's side.

From educational point of view this is a good example of using internet in teaching students about the ICNP® and ICT concepts together. In relation with other teaching materials it also encourages distance learning.

Personal Computer Version

A user must install this version in order to use it. It is available on a CD-rom together with installation software. Screen shot is shown in Figure 2. There is a flexible user interface offering more ways for searching than other versions. Having the database on personal computer means that this browser is the fastest.

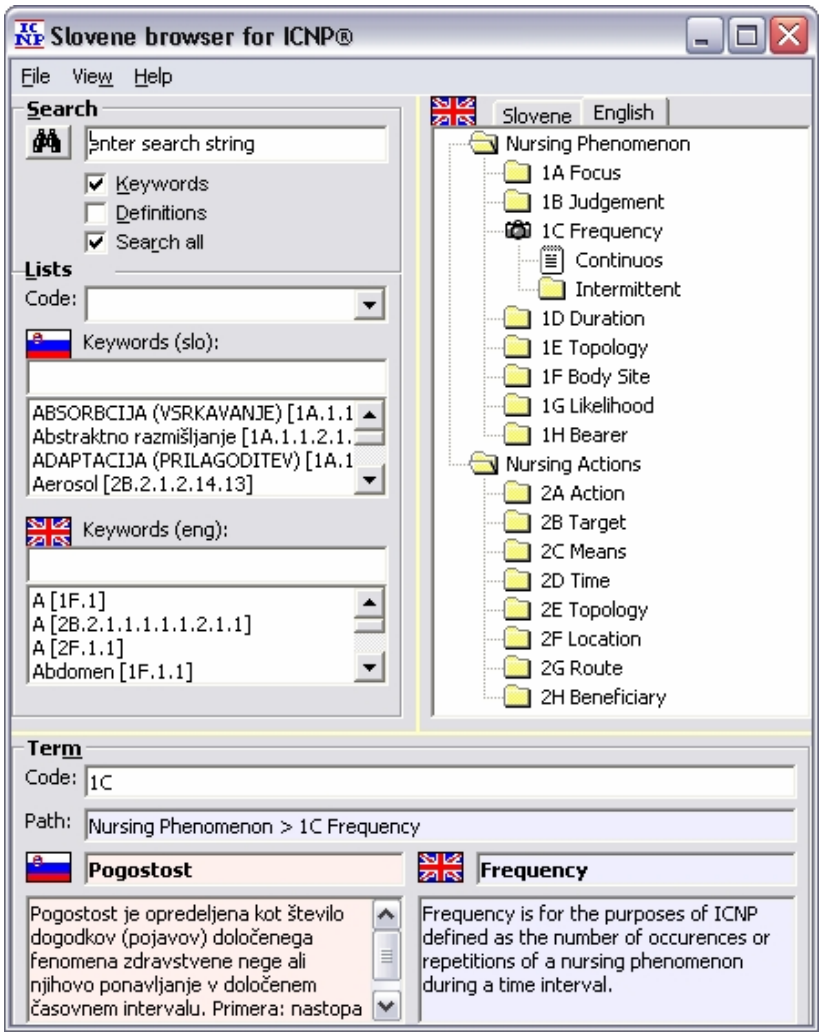

Figure 2: Screen of the browser for a personal computer.

It offers keyword and full-text search. There are alphabetically ordered lists of codes and keywords in both languages. Tree structure is instantly changing according to the position of a search result in a hierarchical structure.

Compared to the Internet version we would like to emphasize the speed and numerous search methods. Friendly user interface offers flexibility so it can be customized to fit the user. This version can be viewed as a step forward toward information system solutions.

According to our practice PC version is suitable for classroom work and individual student's work on documentation in nursing. Due to the fact that our Ministry of Health printed the CD-ROM with PC browser (Rajkovic et al., 2004) and made it available free of charge, students can use the software at their homes on their own PCs.

PDA (Palm) Version

PDA hand-held computer version (Figure 3) is based on the Palm operating system. The database was changed to suit it. The solution takes advantage of PDA's characteristics such as handiness, short start-up time, different user interfaces, etc. The most significant one is that a nurse can always carry a PDA in her/his pocket. This way ICNP® is kept close at hand. Among disadvantages we would like to mention the processing speed and small screen size.

PDA does not offer a wider view over the tree structure. A user can browse the hierarchical structure by moving one level up or down, search for keyword, code or search through full-text. In the latter case the browser returns the list of keywords where the search string was found.

Even when the PDAs and mobile phones will be joint in a single device, this version will present cheaper access in comparison to the mobile version through WAP protocol.

Using PDAs students realize the strengths and weaknesses of available mobile applications. They have some ICT support always with them, what is especially important as they work with patients on site that is far from classrooms and often far from other ICT support.

Figure 3: Screen of the browser on a PDA.

Conclusion

Classification ICNP®, which is widely accessible in professional community by electronic means, contributes toward faster development of standardization of nursing diagnoses, interventions, outcomes and documentation in the field of nursing care. It also encourages multilingual approach what is important in multicultural environment where different mother languages are used. Consequently it means better information picture of the whole nursing process. It encourages integration with other segments of health care as well as the usage of existing data for research and development purposes (Bohanec et al., 2000; Sustersic et al., 2002). With the e-representations of ICNP® we also bring the spirit of e-services closer to practice. To achieve these goals we recommend the use of presented browsers as tools in education on several levels from ICT literacy through the whole nursing process to the students' practical work with patients.

References

Bohanec, M., Zupan, B. & Rajkovic, V., 2000. Applications of Qualitative Multi-Attribute Decision Models in Health Care. *International Journal of Medical Informatics* 58-59, 191-205

Bond, C.S., 2006. Nurses on the Net, Consumer-Centered Computer-Supported Care for Healthy People. In: Park, H.A., Murray, P. & Delaney, C. (Eds.). *Proceedings of NI2006 – the 9th International Congress on Nursing Informatics*. Seoul 11-14 jun. 2006. IOS Press, Amsterdam.

Cibic, D., Dogsa, I., Filej, B., Slajmer-Japelj, M. & Sustersic, O., 2000. *ICNP International Classification for Nursing Practice, Mednarodna klasifikacija prakse zdravstvene nege, beta*. Kolaborativni center SZO za primarno zdravstveno nego, Maribor.

Cowan, D.T., Norman, I. & Coopamah, V.P., 2005. Competence in Nursing Practice: A Controversial Concept – A Focused Review of Literature. *Nurse Education Today 25* (5), 355-362

Eldh, A.C., Ekman, I. & Ehnfors, M., 2007. Communication errors as definitions of patient participation lacks patient's point of view. In: Oud, N., Sheerin, F., Ehnfors, M. & Sermeus, W. (Eds.), *Proceedings of the 6th biennial European Conference of the Association for Common European Nursing Diagnoses*, Interventions and Outcomes. Amsterdam 19-21 apr. 2007. Oud Consultancy, Amstedam.

Gould, D., Berridge, E.J. & Kelly, D., 2007. The National Health Service Knowledge and Skills Framework and its Implications for Continuing Professional Development in Nursing. *Nurse Education Today 27* (1), 26-34

Hammon, W.E. & James, J.C., 2006. Standards in Biomedical Informatics. In: Shortliffe, E.H. (Ed.), *Biomedical Informatics, Computer Applications in Health Care and Biomedicine*. Springer Verlag, New York.

Hardiker, N. & Coenen, A., 2006. A Formal Foundation for ICNP®, Consumer-Centered Computer-Supported Care for Healthy People. In: Park, H.A., Murray, P. & Delaney, C. (Eds.), *Proceedings of NI2006 – the 9th International Congress on Nursing Informatics*. Seoul 11-14 jun. 2006. IOS Press, Amsterdam.

Hardiker, N. & Coenen, A., 2007. Standards to support the ongoing development and maintenance of nursing terminologies. In: Oud, N., Sheerin, F., Ehnfors, M. & Sermeus, W. (Eds.), *Proceedings of the 6th biennial European Conference of the Association for Common European Nursing Diagnoses, Interventions and Outcomes*. Amsterdam 19-21 apr. 2007. Oud Consultancy, Amsterdam.

ICN - International Council of Nurses, 1999. *International Classification of Nursing Practice, Beta*. International Council of Nurses, Geneve.

ICN - International Council of Nurses, 2005. *International Classification for Nursing Practice – ICNP®*, Version 1.0. International Council of Nurses, Geneve.

McEwen, M. & Wills, E.M., 2007. *Theoretical Basis for Nursing*, 2nd ed.. Lippincott Williams & Wilkins, Philadelphia.

Mortensen, R.A. (Ed.), 1999. ICNP and Telematic Application for Nurses in Europe, *The Telenurse Experience.* IOS Press OHM Ohmsha, Amsterdam.

Müller-Staub, M., Lavin, M.A., Needham, I., Odenbreit, M. & van Achterberg, T., 2007. Improved quality of nursing documentation: Results of a nursing diagnoses, interventions and outcomes implementation study. In: Oud, N., Sheerin, F., Ehnfors, M. & Sermeus, W. (Eds.), *Proceedings of the 6th biennial European Conference of the Association for Common European Nursing Diagnoses*, Interventions and Outcomes. Amsterdam 19-21 apr. 2007. Oud Consultancy, Amsterdam.

Norton, M., Skiba D.J. & Bowman, J., 2006. Teaching Nurses to Provide Patient Centered Evidence-based Care Through the Use of Informatics Tools that Promote Safety, Quality and Effective Clinical Decisions. In: Park, H.A., Murray, P. & Delaney, C. (Eds.), *Consumer-Centered Computer-Supported Care for Healthy People*, Proceedings of NI2006 – the 9th International Congress on Nursing Informatics. Seoul 11-14 jun. 2006. IOS Press, Amsterdam.

Potter, P.A. & Griffin Perry, A., 2003. *Basic Nursing*, Fifth edition. Mosby Inc., St. Louis.

Rajkovic, V., Sustersic, O., Rajkovic, U. & Porenta, A., 2004. *Slovene Browser for International Classification for Nursing Practice*. Ministry of Health of Republic of Slovenia, Ljubljana.

Saranto, K., 2007. Challenges for multidisciplinary education in health informatics. In: Oud, N., Sheerin, F., Ehnfors, M. & Sermeus, W. (Eds.), *Proceedings of the 6th biennial European Conference of the Association for Common European Nursing Diagnoses, Interventions and Outcomes*. Amsterdam 19-21 apr. 2007. Oud Consultancy, Amsterdam.

Scholes, M., Tallberg, M. & Pluyer-Wenting, E., 2000. *International Nursing Informatics: A History of the First Forty Years 1960-2000.* The British Computer Society, Swindon.

Suliman, W.A. & Halabi, J., 2007. Critical thinking, self-esteem, and state anxiety of nursing students. *Nurse Education Today 27* (2), 162-168

Sustersic, O., Rajkovic, V., Kljajic, M. & Rajkovic, U., 2003. Improving Nursing Care Documentation by Computerized Hierarchical Structures. In: Marin, H., Marques, E., Having, E. & Goossen, W. (Eds.), *Proceedings of 8th International Congress in Nursing Informatics*. Rio de Janeiro 20-25 jun. 2003. IOS Press, Amsterdam.

Sustersic, O., Rajkovic, V., Leskovar, R., Bitenc, I., Bernik, M. & Rajkovic, U., 2002. An Information system for Community Nursing. *Public Health Nursing 19* (3), 184-190

Taylor, C., Lillis, C. & LeMone, P., 2001. *Fundamentals of Nursing: The art and Science of Nursing Care* (4th ed.). Lippincott, Philadelphia.

Thorne, S.E., 2006. Nursing Education: Key Issues for the 21st century. *Nurse Education Today 26* (8), 614-621

van Bemel, J.H. & Musen, M.A., 1997. Handbook of Medical Informatics. Springer-Verlag, Heidelberg.

van de Castle, B., 2006. The Perfect Role of Nursing Informatics: Nursing Staff Development. In: Park, H.A., Murray, P. & Delaney, C. (Eds.), *Consumer-Centered Computer-Supported Care for Healthy People*, Proceedings of NI2006 – the 9th International Congress on Nursing Informatics. Seoul 11-14 jun. 2006. IOS Press, Amsterdam.

Yu, O.S., Park, I.S., Joo, Y.H., Woo, K.S., Shin, H.J., Ahn, T.S., Kim, E.M., Jung, E.H., Kim, Y.A., Oh, P.J., Park, H.A., Jo, E.M. & Baek, H.J., 2006. Classification of Nursing Statements based on ICNP®, the HHCC, and the Nursing Process for Use in Electronic Nursing Records. In: Park, H.A., Murray, P. & Delaney, C. (Eds.), *Consumer-Centered Computer-Supported Care for Healthy People,* Proceedings of NI2006 – the 9th International Congress on Nursing Informatics. Seoul 11-14 jun. 2006. IOS Press, Amsterdam.

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(E.8)

Jason Chihyu Chan, Four major classical novels of China are created to Yuan, Ming and Qing Dynasties: However, these three dynasties are specially strong too in control on intellectuals, who are controlled with the ethnic discrimination and social stratification in Yuan Dynasty, with the eight-part essay in Ming Dynasty, and with the literary inquisition in Qing Dynasty. Under this kind of historical background, why can produce some non-mainstream literary creation? Why these works become unexpectedly successful finally? How do these authors think about themselves and their environments? In the politics, society, cultural environment at that time, which characteristics were useful to development of creativity? Which are unfavorable? In order to understand this kind of questions, this proposal chooses Guan Hanqin, Luo Guanzhong, Wu Cheng-en, Pu Songling and Cao Xueqin five people as representative cases to be analyzed, because their creation was all non-mainstream at that time, but obtained the remarkable achievement. Those cases will be analyzed according to the systems view of creativity. According to this view, when a person's creative achievement involves the break-through of the history and culture level, the meaning of "œcreativity" is not about cognitive skills or strategies but involves life theme and life history. In the life-long developmental processes, individuals interact with their family, peers, mentors, political/social/economic systems, and ecological environments in order to form a unique identity and to create a meaningful life. A detailed framework and a quasi-judicial methodology were proposed to carry out case studies in the current proposal.

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(E.9)

Juliana D. Yousif, The Status of Education in Iraq: Past Worries and Future Aspirations: Needless to say that Iraq was one of the old world's countries that harboured education millions of years ago and witnessed the invention of the cuneiform writing to meet the growing needs of its ancient civilisations. The importance of learning and schooling were never neglected by almost all native nations or the foreign invading nations save the Tartars, at the times of whom the edifice of education collapsed and crumbled. Being part of an area that embraced the three major world religions, Judaism, Christianity and Islam, the status of learning was enhanced by the different religious circles across the country. Although these religions promoted learning (though recitation ,and reading) of the religious texts, their role in transforming some sectors of society from literacy into illiteracy cannot be ignored. The presence of Jewish schools, Christians missionary ornon–missionary schools and Islamic (Quranic) Kuttab throughout the country contributed to the development and progress in Iraq by the efforts of their graduate thinkers and scientists who reflected the multicultural fabric of the Iraqi society but all participated in building a culture that is Iraqi-specific. At the beginning of the twentieth century, Iraq, as many other countries in the Middle East, was under the British colonization, which helped in introducing compulsory education but access to learning was still restricted to very few sectors of society due to a variety of factors. When Iraq became a kingdom in 1922, the national government realised how education was a centeral issue in nation-building and efforts were made to increase it all over Iraq but not successfully in the rural areas.

(E.10)

Khalil Ibrahim Al-Kanaani, The Role of Globalization Education on Developments and Productivity: Education has played a great role on development and productivity in various field. Modern organization depends on education to create value and high production and to construct competitive advantages in addition to reducing cost and maximizing market share. The increments of educated people creates a push and pull strategy and forces the producers and governments into more involvement in globalization to improve high production which has a positive effect on growth and development in general. The aim of this paper is to study the globalization of the education systems some developing countries and its effect on their productivity and development; it is a serious attempt to evaluate the current situation and the necessity for more involvement in order to cope with rapid global changes.

(E.11)

A Model of Teaching Expertise: The Philippine Experience

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Abstract

The paper is based on a nationwide research funded by the Philippine Commission on Higher Education. The research covered 69 outstanding Filipino teachers in 48 colleges and universities. They were interviewed, observed, and videotaped while teaching. The first part of the study surfaced the profile of the experts in terms of age, sex, educational attainment, field of expertise, teaching experience, brain dominance, educational philosophy, and teaching strategies. The study likewise identified factors that explain their success in teaching. Qualitative analysis of these findings yielded a model of teaching expertise in higher education. The emergent model, referred to as "The Pyramidal Model of Teaching Expertise" presents the qualities, classroom behaviors, and teaching practices common to all of the experts at the base of the pyramid. Those are labeled the "essentials" of teaching expertise, which means that a teacher can be an expert if all of those are true of him/her. The other steps of the pyramid present the other qualities and teaching behaviors and practices which explain why some of the experts are able to maintain and sustain students' interest, attention, and active engagement more than the other experts do. These qualities, teaching behaviors, and practices, which serve to enhance the teaching performance of the experts, are referred to as the "enhancers." The percentages of experts who manifest the enhancers decrease from the second to the last step of the pyramid. The pyramidal model of teaching expertise extends the literature on teaching and provides an innovative way of viewing teaching performance in higher education. The second phase of the study is a phenomenography of epistemologies of the expert teachers, as regards effective teaching of adult learners. Based on the findings and conclusions of the study, implications were drawn for improving teacher training programs and for policy making, concerning teacher selection, testing, and professional development.

Introduction

For Shulman, one of the leading researchers on education and teaching, "Teaching is and has always been at the center of all education and educational reform" (Oser, Dick, & Patry, 1992, p. 14) Thus, any research that focuses on teaching is significant, especially if it provides an empirical base that can guide policy decisions and actions concerning teacher pre-service education and continuing professional development.

Compared with teaching effectiveness research, relatively few studies have been done on teaching expertise. The paucity of research on teaching expertise, particularly on theory building, provides an interesting focus of educational research. Another interesting research focus in education is the ongoing controversy among researchers and educators concerning teaching adults. Jarvis (2002, cited in Wang, 2003) for example, explains that from an andragogical perspective, teachers of adult learners should serve as facilitators of learning. Viewed from this perspective, pedagogy, characterized by knowledge transmission, is not appropriate for adult learners. In contrast, Knudson (1980) proposes humanagogy, the blending of pedagogy and andragogy. For him, both have something to offer, and "like the Chinese symbol of the yin and the yang, they are at the same time opposites and complements and equally necessary" (p.8). Knudson's opinion finds support in Brookfield (1990) who avers that flexibility in teaching adult learners can better meet students' needs.

The research gap on theory building concerning teaching expertise, and the ongoing controversy as regards appropriate ways of teaching adults prompted the conduct of the present two-phased study. The first phase is concerned with the development of a model of teaching expertise in higher education, grounded on the realities of the classroom situation viewed from the lenses of reputed expert teachers. The second phase focuses on the issue, andragogy or, humanagogy?

Research and practice in adult learning have been dominated by Eurocentric and North American worldviews, and there is a dearth of cross-cultural studies that can identify inter-cultural differences, if any, on the issue (Brookfield, 1995). Research on Chinese conceptions has started. There is an

Africentric/Afrocentric model of adult education. Why not explore a Filicentric perspective of teaching adults in higher education?

A model of teaching expertise, substantiated by epistemologies about effective teaching of adult learners, extends the literature on a very significant component of the educative process. Hopefully, the study may inspire self-reflections among teachers, and stimulate interest among researchers in other cultures and settings, thereby contributing to a multi-cultural perspective about what it takes to be an expert teacher in higher education.

The first phase of the study was funded by the Philippine Commission on Higher Education.

The Present Study

This is a nationwide study aimed at developing a model of teaching expertise and exploring the epistemologies of reputed Filipino expert teachers in higher education institutions about teaching adult learners.

Methodology

A purposive sample of 69 reputed expert teachers from 40 institutions of higher learning (47 private and 22 government-owned) in the Philippines were covered in the study. The teacher participants consisted of 28 (40.6%) awardees of an annual national search for outstanding teachers in higher education institutions in the Philippines by the Metrobank Foundation, Inc., in cooperation with the educational sector, 9 (13.0%) teachers from Centers of Excellence, and 32 (46.4%) from Level - 3 accredited programs, who were identified by their school heads as most outstanding, based on the same criteria used by Metrobank Foundation, Inc.

The participants varied in terms of geographical location, school affiliation (private, government), gender, age, field of expertise, brain dominance, educational philosophy, and length of teaching experience.

Data for the model-building phase were gathered through: (1) Knowing Yourself - Right or Left brain hemisphericity test adapted by Reyes (1994) for use with Filipino respondents, (2) Philosophy Preference Assessment by Wiles and Bondi (1994), (3) a survey questionnaire, and (4) an interview protocol developed by the researcher. Only the last instrument was used for the second phase of the study.

The model–building phase primarily involved qualitative analysis and translation of raw data (gathered from classroom ethnographies, videotaped lessons, executive interviews, survey questionnaires), into concepts and categories or domains of teaching expertise, followed by the development of propositions that relate the derived concepts and categories. Quantitative content

analysis involved frequency counts and percentages. For the second phase of the study, the views of the expert teachers regarding teaching adult learners were content analyzed.

Results

Phase 1. Model of Teaching Expertise

Profile of the Expert Teachers

There are more female (73.9%) than male (26.1%) expert teachers. This may give the impression that female teachers are more conscientious and perfectionists than their male counterparts. However, this inference cannot be fully substantiated by the data alone, considering the preponderance of female educators in the Philippines. Owing to the comparatively low salaries of teachers, compared with professionals based in industry, teaching is not an attractive career for Filipino men who are traditionally considered as the family breadwinners.

The oldest participant is 79 years old (a widower and Metrobank awardee), while the youngest is aged 23 (a male bachelor teaching in a Center of Excellence). It is worth noting that a teacher can earn recognition as an expert at the early part of his or her career. This indicates that some are born teachers. However, this is more of an exception rather the rule because the median age of the sample is 50 and the majority (82.6%) are over 40. Moreover, one-fifth of the experts are in the 60 to 79-age bracket, which implies that expert teaching does not deteriorate with age. This information lends support to the practice of extending the services of excellent teachers past retirement age.

Of the 69 teachers, only 24 (including a nun and a priest) are single, which indicate that having a family is not a hindrance to success in teaching.

Did the experts initially want to become teachers? The answer is no. After graduating from high school, only 26 actually opted for a teaching career. The rest would have been researchers, journalists, lawyers, engineers, doctors, nurses, TV hosts, priests or, pastors had their early career plans materialized. Thus, an initial liking for teaching is not essential, although it may be contributory, to the attainment of teaching expertise in Philippine institutions of higher learning.

Surprisingly, only 10 of the 69 expert teachers are products of teacher-training institutions, and no one of them attributes his or her success in teaching to formal schooling in teaching. Given these findings, one would be prompted to raise the question, *"If a non-education graduate can become an expert teacher, what is the true worth of teacher training institutions?* While in college, only a minority (14) engaged in extra curricular activities, athletics, or student organizations, while the majority (58) were academic achievers. These findings negate the common belief among Filipino parents that children who lack intellectual prowess should go into teaching.

In terms of educational background, 88.3% of the participants have at least a master's degree. This is a significant finding, considering that only a small percentage of college teachers in the Philippines have graduate degrees.

More than one-third of the participants have completed graduate programs either in education, educational administration, educational technology, or technician education (36%). The rest are either master's or doctoral degrees holders in applied/natural sciences (mathematics, chemistry, biology, zoology, plant pathology, or physics; 26%); language, literature, or communication arts (15%); nursing, public health, or medicine (6%); political/ social science, or economics (6%); psychology, guidance, or counseling (5%); philosophy (3%), or agriculture (3%).

The lengths of teaching experience of the participants vary from 2 years to 47 years, with a median of 25 years. These statistics support the contention of Berliner (cited in Oser, Dick, and Patry, 1992) and Adam (1992) that extensive practice is a prerequisite to teaching expertise.

The majority of the participants are mixed-brained (43 women, 11 men). The rest are left brained. Surprisingly, no one is right-brained. Left-brained teachers are often serious and formal while teaching. It is interesting to note that of the 27 teachers who inject humor in their teaching, only 7 are left-brained.

The left-brained expert teachers generally prefer strategies that require inductive analysis, critical thinking, and logical reasoning. This is because left-brained individuals process information analytically, logically, and sequentially. For instance, one left-brained chemistry teacher opines:

> A teacher can't be called an expert if students are just asked to memorize formulas. They should understand how formulas are derived: the logical basis. I don't state the real objectives of an experiment. I want them [the students] to formulate the objectives. …. I introduced the practice of a pre-lab quiz. Numbers 1 to 10 cover the analysis of aspects of the previous experiment and the procedural aspects of the current.

The mixed-brained expert teachers exhibit facility in employing both left- and right-brained techniques. Analytical and sequential or step-by-step instruction; use of print and verbal communication and of formal language; attention to details; observance of structure, and appeal to logic or reason characterize left-brained techniques. On the other hand, right-brained techniques are characterized by variety, creativity, use of imagery, and imagination; body language; partiality to the use of color, graphs, pictures, and other non-print visual materials; synthesis and overviews; humor, jokes, funny anecdotes, and appeal to the emotions.

The majority (81.1%) of the expert teachers uphold modern or progressive educational philosophies. Hence, as a whole, they are inclined towards a dynamic curriculum that considers the learners and the current needs of society. They view the teacher as a guide, consultant, or facilitator of learning who provides opportunities for students' active engagement in the learning process. This is confirmed during the content analysis of the ethnographic records and videotaped lessons of the participants. Only four give long lectures with minimal student participation.

Factors Contributory to Success in Teaching

Some factors explain success in teaching, based on the self-reports of the expert teachers. Foremost of these are desirable teacher attributes and attitudes, influence of teacher role models, and personal and professional support from the family and from the workplace.

The majority of the respondents attribute their success to their love and concern for the youth, patience, perseverance, and being understanding. The videotapes of their lessons affirm their self-reports. Other personal traits, which are not mentioned by the expert teachers during the interviews and on the survey forms, but which are clearly manifested in the videotaped lessons are their enthusiasm in teaching, open-mindedness to students' varied viewpoints or opinions, pleasing personality, and good grooming. A few have a good sense of humor, which is apparently appreciated by their students, and makes the class session lively and joyful.

The participants also partly attribute their teaching expertise to the influence of former teachers in elementary and high school as reported by 44.9%, and in college, according to 62.3%. Only 6 mentioned their graduate school professors as having that effect on them. These former teachers have served as their inspiration, owing to their personal attributes, virtues, and excellent teaching**.** They describe these teachers as dynamic, motivating, patient, persistent, warm, competent, dedicated, and nurturing. They make their subjects "*easy to understand and to internalize."*

For two expert teachers, unpleasant experiences with particular former teachers trigger their drive for excellence. They recall that these teachers were biased and unfair, insulted students, and entered their classes unprepared. Right then and there, they resolved not to walk in the footsteps of those teachers, should they later decide to go into teaching.

It is interesting to note that a comparatively greater percentage of the expert teachers have as their role models, former mentors at the tertiary level. This finding highlights the importance of exposing prospective teachers to excellent teaching during their undergraduate years.

Supportive family members (parents, spouses, and children), who *"understand the long hours and demanding work of teachers"* is also viewed by almost one-half of the participants as having greatly contributed to their success in teaching.

Encouraging school administrators, as mentioned by 69.6% and a supportive work environment as reported by 52.2% have also contributed to their success in teaching. In particular, they underscore the facilitative influence on their career of the trust and support of school administrators, the provisions for professional growth, the atmosphere of being one community, the reasonable workload, and the encouragement of creativity and academic freedom in the workplace.

Only a minority (26.1%) mentioned that the support, affirmation, and advice that they receive from their colleagues, friends, and confidants also contribute to their success in teaching. Lastly, nine teacher respondents mention the importance of continued professional growth in their career.

Components and Indicators of Teaching Expertise

How is teaching expertise manifested in the classroom? The answers to these questions were deduced from the qualitative content analysis of the videotapes and ethnographic records of the lessons conducted by the expert teachers. Results identify six domains of teaching expertise: subject matter expertise, instructional expertise, classroom management expertise, diagnostic expertise, communication expertise, and relational expertise.

Subject Matter Expertise

Content mastery. The following excerpts from the ethnographic records of the classroom observers describe the participants' knowledge of course content: "excellent knowledge of subject matter," "an expert in his field," "despite her age [73 years], teacher's knowledge of subject matter is amazing," "the teacher is well read; all her examples are quoted from many books," "teacher readily answers students' questions;" "explanations were spontaneous;" "seems to know the formulas by heart;" "cited different short stories written by numerous Filipino authors;" "knowledge of present issues on women was excellent."

Being up-to-date with the latest developments in their fields. The following observations form part of the classroom ethnographic records of two expert teachers:

- explains new alternative ways of solving a chemistry problem, based on the latest book editions.
- presents the most recent solutions to problems of tuberculosis in the workplace and makes use of current journals to supplement the lecture on tuberculosis cases in the Philippines and abroad.

Knowledge of the relationship of the lesson with content in another course or discipline

To facilitate students' understanding, some teachers relate their lessons with other disciplines. Hence, a mathematics teacher guides the students in analyzing the similarity between the use of the parentheses in mathematical statements, and the use of punctuation marks in sentences in English.

An education teacher connects contemporary issues in education to the "Pedagogy of the Oppressed;" a literature teacher links "People Power" to the story of Anthony and Cleopatra. Another expert teacher connects concepts and ideas on literary criticism with political science, specifically as regards tactics of some government officials to exercise or perpetuate their power. The participants' ability to relate their courses with those in other disciplines reflects mastery of subject matter that extends beyond their respective fields of expertise.

Knowledge of practical applications and concrete, interesting examples to clarify abstract ideas/concepts. The expert teachers have readily available simple, clear, and interesting examples to clarify or concretize abstract ideas. The following illustrative examples clarify this point.

- In teaching an idiomatic expression, the teacher asks the class, *"Assuming May Anne* [a pregnant class member] *calls her husband in China and her husband says, "I will pay you a visit." Does that mean her husband will pay her money?"*
- In presenting the setting of a poem, which is winter, the teacher asks, *"Do you know how cold winter is? Open your refrigerator to number 2 and that is winter."*
- In describing parabolas as dynamic and abounding in nature, the teacher explains, *"You see it in crowns of trees, shapes of leaves, nose of an airplane; in vegetables like eggplants and asparagus tip; in arm movements in a dance." "Parabolas are alive, they are dynamic!"*
- In an optometry class, the teacher emphasizes, *"If you put on tight shoes, you get blisters. Therefore, in contact lenses, there should be a fit."*

Subject matter expertise refers to content mastery. In sum, expert teachers give lectures without reading notes and answer students' questions knowingly and convincingly. They can easily relate subject matter with those in other disciplines. They have readily available clear/concrete, practical, and interesting examples or illustrations to facilitate students' understanding of the topics under discussion. These examples clarify abstract ideas, relate theory with practice or, show applications to actual life problems/situations. They cite recent developments or information related to course content, and share what authors (aside from authors of the textbook being used by the class) and other experts say about particular topics covered by the course.

Classroom Management Expertise

Content analysis of a second list of related teaching practices and behaviors of the expert teachers yields another set of concepts that appear to link them, and that is classroom management expertise. Following are the conceptual elements that clarify its meaning.

Efficient handling of routine activities and time management. Across teachers, classes are started and ended on time; class attendance is done in the shortest time possible; enough time is allotted for group activities; students are reminded to observe time allotments, and activities are completed within the time limit.

Maintenance of students' on task behavior. One teacher prepares handouts for the entire course for students (complete outline, explanations, and exercises). She explains, *"A teacher should prepare materials for students, according to the syllabus, so that students don't take down notes anymore."*

Maintenance of students' on-task behavior is likewise observable in the following practices of the experts:

- Checking on students' work progress, asking*: "Where are you now?" "Are you now on…?"*
- Encouraging students to react to the answers of their classmates say (e.g., *"Do you agree with Julius, Dave?" "Frederick?")*
- Motivating/encouraging students to participate (e.g., *"Go ahead, no harm in trying)*
- Raising questions directed not only to the reporter, but also to the other members of the group

One participant shares during the interview:

> *I'm firm but friendly and fair. Students think I make them work hard. Then when they realize the benefits, they become thankful that I make them work hard."*

The expert teachers keep their students highly participative during class discussions. Across classes, students are generally serious and quiet while answering seatwork exercises or doing an experiment, and attentive while listening to the teachers or to their classmates.

Absence of class disruptions. In one class, when the students get noisy and excited due to the game or group activity, the teacher merely says "Focus" and the students immediately calm down.

This isolated incident is included in the presentation because it comes close to the definition of classroom management by Weinert, Schrader, and Helmke (1992) which reads in part, *"speedy elimination of learning disruptions*." It should be clarified though, that the teacher concerned does not view the students' behavior as a "disruption" to learning, but rather, as an impediment to completing the class activity on time. The noise is not intentional; it is a result of the students' excitement in the class contest.

When noise goes beyond tolerable limits due to excitement or agitation over contests or group activities, the expert teacher easily brings back order in the classroom. Classroom management expertise in the context of Philippine higher education of learning is not limited to *"the speedy elimination of learning disruptions."* It includes prevention of the occurrence of such disruptions. The expert Filipino college teachers are not reactive; they are proactive.

Summarizing, classroom management expertise refers to skills in maximizing class time and in maintaining students' on-task behavior effectively (relative to the instructional objectives) and efficiently (without unnecessary wastage in time and effort). Classroom management expertise is a proactive approach, preventive of dysfunctional learning delays and disturbances.

Instructional Expertise

A third domain of teaching expertise identified in the study is instructional expertise. Following are its conceptual strands, as gathered from the experts.

Use of varied teaching strategies. The experts draw out from their students, understanding and appreciation of the lesson through activities that engage them actively in the learning process. They are skilled in the art of questioning and in providing illustrations or examples to guide students in coming up with a generalization, rule or, conclusion. The majority of the participants use varied teaching strategies.

A popular strategy among the learner-centered teachers is the use of cooperative learning. The students are divided into groups and given problems or cases to analyze or, projects/things to accomplish. Learning teams are tasked, for instance to:

- portray how a guidance office should look like, using themselves as props (guidance and counseling);
- assume the role of health planners, and design a strategy that will respond to a major health problem in the country (nursing);
- make a plan of a trip to a tourist spot in the Philippines, given a budget of P10, 000.

During the cooperative learning activities, the expert teachers vary seating arrangements accordingly. In some cases, the chairs are moved to the sides and the students stand while engaged in the class activity. Only eight teachers rely solely on lectures with very minimal student participation.

Integration in teaching.

Three teachers integrate science with arts: poem writing in the case of two, and painting and music in the case of another. As a closure, the last mentioned teacher instructs his students to demonstrate their understanding of the lesson on ecology through individual and team drawings. While the students are drawing in their seats, the teacher makes some final touches on his own oil painting interpretation of the lesson; and later on plays his violin, with the accompaniment of classical background music. The students look relaxed and inspired, and come up with what the teacher judges as beautiful pieces of interpretive art.

Use of varied instructional equipment and material to enhance instruction.

Most of the experts (82.6%) use instructional equipment and materials to clarify concepts, enrich or strengthen an input lecture, induce reflective thinking, encourage student participation, apply learned concepts, or test students' comprehension of the lesson. The overhead projector is the most commonly used device, followed by the computer, tape recorder, LCD, slide projector, and laboratory

apparatus, to a lesser extent. They utilize films, PowerPoint presentations, slides, transparencies, videos and audiotapes, pictures, science specimens, drawings, cartoons, play/cue cards, models, students' projects, and ordinary materials (e.g., paper clips, spools of thread, scarves, leaves, newspaper articles). These instructional devices and materials help make abstract ideas concrete, and sustain students' attention.

Instructional clarity

Regardless of the choice of instructional strategies, devices, and materials, one striking observation across teacher participants is that they simplify difficult or complex concepts to the level of understanding of their students and explain those with remarkable clarity. They simplify and clearly present learning content to a form that can best be understood by the learners. In short, they possess instructional clarity.

Instructional expertise may therefore be defined in terms of skills in making learning meaningful, interesting, and easy through integration, instructional clarity, and the use of varied teaching strategies, instructional materials, and seating arrangements that work best in teaching particular topics or lessons.

Communication Expertise

Skill in using verbal and nonverbal communication in the classroom, which I labeled communication expertise, makes up another domain of teaching expertise. This skill is another distinctive manifestation of how best the experts facilitate learning among their students.

Excellent oral communications skills

Their oral communication is characterized by good diction, articulation, and fluency of expression; expressiveness and clear language; a pleasant voice quality, and variations in pitch, intonation, volume, and rate of speech that serve to sustain students' attention.

The following representative remarks taken from the ethnographic records reveal these characteristics:

- *He speaks clearly, not so fast and not so slow. Though his voice is not so loud, it can be heard at the back.*
- *The teacher is very expressive and has a good command of the language.*
- *Her voice is well modulated; she is excellent in oral communication.*
- *The lesson is clearly presented and explained because the teacher is articulate.*

The teachers' excellent oral communication skills are evident in the videotapes. They get the full attention of the students whenever they speak. Moreover, their students look very pleased while listening to them. Five of the experts though have regional accents or, commit some grammatical slips, but in spite of those flaws, they make themselves understood. Their explanations are well organized, easy to follow, and direct to the point.

Expressive nonverbal or body language

They are very expressive in driving home a point through their voice, facial expressions, hand and arm gestures, and whole body movement. For instance, a nurse instructress spreads her arms upward and says, *"Think of these as the fallopian tubes, my body as the uterus, and my boob as the fertilized ovum."* Similarly, aside from a graph drawn on the board, another teacher makes use of his arms to demonstrate the slope of a line (e.g., arms upward for infinity, and arms stretched sideward parallel to the ground for zero). They are their best visual aids.

The following selected ethnographic accounts additionally indicate how the expert teachers use nonverbal language to communicate in the classroom:

- *Her eyes are very expressive, and she is very lively. She is a visual aid herself*

- *The teacher gestures and facial expressions are more than enough to explain his point of view. He is very convincing.*
- *Face is very expressive; changes expressions according to moods; sometimes her eyes sparkle, or she smiles to emphasize a point*

Provision for two-way communication

Except for one teacher, all of the participants have their attention fully focused on their students. The exception is a teacher of a doctoral class who is more lecture-centered than student-centered. Nonetheless, slides and transparencies of actual situations related to the lecture enhance his input lecture.

They are good listeners. For instance, when a student gives an answer that differs from the rest, the teacher responds, *"Well, you are entitled to your own opinion."* Sensing that a student is groping for the right phrase to end her report, another teacher prompts, *"certain sum of money*".

Communication expertise attracts and sustains students' attention. It is a valuable asset of teachers, one that students highly appreciate. This may be attributed to the fact that Filipinos are non-native speakers of English, hence, those that have a command of the language usually earn the admiration of others. Strangely, most Filipinos even size up a person on the basis of his or her English proficiency or lack of it.

Based on those insights, communication expertise may be defined as the skillful and expressive use of verbal and nonverbal language that serves to arouse and maintain students' interest and attention, and to facilitate instruction. Teachers who possess communication expertise skillfully use nonverbal language to drive home a point; in the process, serving as the best visual aid, albeit unintentionally. They make provisions for two-way communication, and are concise with their lectures, oral questions, and directions such that there is no need for unnecessary repetitions.

Diagnostic Expertise

Filipino expert teachers also possess diagnostic expertise. What characterize this fourth domain of expertise?

Sensitivity to students' learning problems/difficulties

In one class, when the teacher notices a student who does not seem to understand, he asks, *"Question, so far?" "Feel free to ask questions of things you don't understand."* While giving lectures or, facilitating a discussion, an expert teacher is likely to pause and ask if students have questions or, if they understand what is being presented/discussed. During cooperative learning activities, s/he approaches different groups to check if they are on the right track.

Anticipation of probable learning problems or misconceptions.

Anticipating problems due to the inherent complexity of the lesson, a mathematics teacher asks, *"Anybody who has difficulty with the coding and decoding functions? All right, we can do more problems."* She provides more illustrative examples, and seatwork exercises. Feeling that the students are hesitant to do the board work, another teacher says*, "Don't be afraid, if you cannot solve it, we will solve it together."* These cases illustrate the perceptiveness and sensitivity of the teachers to students' overt and covert reactions and difficulties in learning. They get clues from students' body language.

The aforementioned conceptual elements and behavioral manifestations provide a definition of diagnostic expertise. It refers to the teacher's knowledge of students' abilities, interests, and achievement levels; anticipation or awareness of misconceptions that students are likely to have, and sensitivity to students' learning difficulties, coupled with skills in responding positively and immediately to such problems.

Relational Expertise

All of the expert teachers treat their students with respect, and demonstrate a caring attitude towards them. They raise the learners' self esteem. They possess relational expertise. This component of teaching expertise is deduced from the following conceptual elements and corresponding behavioral manifestations.

Nonthreatening disposition

A pleasant, nonthreatening disposition characterizes all expert teachers. They are non-intimidating and patient. They address their students by name, communicate concern, and treat them with respect. These personal attributes help promote a psychologically safe environment where students are not afraid to take risks.

Enthusiasm

This is an essential personal attribute of expert teachers. They manifest a great interest in what they teach and in the teaching act itself. They teach with a contagious enthusiasm that arouses students' interest and attention and prevents boredom from creeping in.

Provision of a psychologically safe learning environment

All of the teachers appear relaxed and comfortable with the students, and it is apparent that the students feel the same way towards them. They reach out to their students, as evidenced by the following ethnographic notes:

- Before the start of the class, the teacher talked informally with the students; asking those who were absent during the last meeting why they were absent
- She gave encouraging words. Ex. Jason spoke in a very low voice. She said, "You have the right answer, Jason, but you have to say it aloud." While saying this, she used hand movements, coaching.

Because the expert teachers provide a psychologically safe environment for learning, their students are generally uninhibited to participate in class activities. As one female participant recalls:

> "During my first two years of teaching here, I tried to put a wall between me and my students. I learned later that it was not healthy because they got inhibited. I switched. I changed my style."

The expert teachers encourage active class participation partly through affirmation. One expert teacher for example, prompts a student to answer by saying, "*Go ahead Karen."* After each report, she says, *"Thank you."* Others acknowledge students' answers with a smile.

Making learning pleasant and enjoyable

Some expert teachers conduct their classes seriously, albeit in a nonthreatening manner. However, other experts go one step further to make learning pleasant and enjoyable instead of being dour and boring. Their well-planned, interesting, and exciting learner-centered activities that promote learning bring about this learning situation. Here are two examples of the said activities:

- An expert makes use of the game called "separate, correlate, integrate while teaching creativity in curriculum design.
- As a culminating activity in a social science class, the teacher asks the students to write a cinquain, as a poem of five lines with specific measures or number of words/syllables per line.

For one expert teacher, providing for pleasant and enjoyable learning is a must for expert teaching. She believes that *"an expert teacher is one who is able to make learning an enjoyable experience."*

Classroom humor

Twenty-seven of the participants can make their students laugh through funny remarks, jokes,

and anecdotes which are related to the lesson. Humor in the classroom keeps a class awake and very much lively during an otherwise unholy period (1:30-3:00 p.m.), not to mention the expertise with which the teacher handles the lecture-recitation. He intersperses jokes and funny remarks throughout the session. At one point, one student gives the following example of deductive reasoning:

All human beings have talents.
Mongoloids are human beings.
Mongoloids have talents.

The teacher repeats the example, but after saying "mongoloids have talents," he pauses and asks, *"Why are you looking at me?*"

Not everyone can make people laugh. It is a gift, and some of the experts have it. Their classroom humor eases the tension or pressure on students caused by complex or difficult lessons, and keeps boredom from creeping in. They laugh with their students. They make learning not only pleasant and enjoyable; they make it fun.

Magnetism/Charisma

While teaching, 53 expert teachers exude a certain kind of magnetism, charisma or, dynamism which is stronger than any possible distracting stimulus. These teachers are very articulate and expressive in driving home a point through their facial expressions, hand and arm gestures, voice inflection, and body movements. The manner with which they deliver an input lecture or explain something; pose a question and wait for an answer; respond to a student's answer or query; carry themselves, all make the difference. Without any deliberate or conscious effort, they keep their students interested, and perhaps fascinated or even mesmerized, but definitely attentive and highly participative.

High rapport with students

It is apparent from the videotapes that the expert teachers enjoy what they teach, the teaching act itself, and their interaction with the students. The students also appear to like them and to enjoy their teaching.

Although the expert teachers are nonthreatening, they are obviously respected by the students. As one ethnographic entry goes, *"She commands the respect of the students…*."

Affectionate interactions with students

Forty-two expert teachers apparently consider their students as "unique, important persons" instead of "numbers" that comprise a class. Their concern and interest in their students appear to be something natural for them, a part of their person. They are appreciative of the learning efforts of their students, individually and collectively. They teach with a "personal touch." They provide students with encouragement and positive feedback. They give each student a feeling of importance; of being appreciated. Let us take a look at this excerpt from a classroom ethnography:

She coaches a student, *"Slowly darling,"* and gently prods another, *"Sige na,[go on] Jeannete, you can discuss now."* After the student answers, she says, *"Thank you very much Jeanette!"* Sometimes she says, *"Very good observation." "Thank you very much for the beautiful sharing." "Can we give a round of applause?"*

Summing up, relational expertise refers to teachers' human relations skills in the classroom, which facilitate the establishment of high rapport with the class and the provision of a non-threatening, psychologically safe learning atmosphere that enhance students' self-esteem and self-confidence. Because Filipinos are by nature warm and friendly as a people, relational expertise comes out strongly as a domain of teaching expertise.

Responsible Teaching

Another domain of teaching expertise those surfaces in the study is responsible teaching. Let us see what it means by analyzing its conceptual strands.

Learner-centeredness

Although a teacher can attain teaching expertise with the use of teacher-centered and subject-centered instructional methods and strategies, it helps to be learner-centered in teaching. Some expert teachers prefer teaching strategies that actively engage students in the learning process. They employ their skills in questioning, in providing illustrations, examples or at most, prompts to guide students in coming up with a generalization, rule, or conclusion by themselves. At the same time, they are good listeners and are sensitive to students' learning difficulties or problems.

Developing students' responsibility for learning

Most of the teacher participants do not personally correct wrong answers; instead, they ask the class, "*Do you agree?*" "*Why?*" or, "*Why not?*"

The experts guide their classes in drawing inferences through their facilitation and questioning skills. For example, in a graduate class, most of the students, who are elementary teachers, raise questions regarding teaching strategies in the classroom. Instead of providing the answers, the teacher encourages them to share their opinion. In a similar situation, instead of correcting a wrong answer, a philosophy teacher throws it back to the class through a question, "*Is the proposition inductive?"* A student answers*, "No, deductive."* He follows up the response, "*Why do you say, it is deductive?"*

An ethnographic entry for a particular teacher reads*, "He did not take 'I guess so' for an answer. He prompted the students to take a stand."* In a physics class, the teacher, aiming to develop students' ability to analyze and solve problems by themselves, emphasizes, *"In solving a problem, don't just apply the formula. Understand the story. Ask, Ano ba ang sinasabi ninyo?[What does the problem actually mean?]"*

During an interview, one teacher shares her technique of checking students' laboratory experiments*: "I check the notebooks for the laboratory experiments individually, with the students listening to me. This way, they can argue with me. I want them to argue if they think they are right."*

The cited strategies can also be classified under instructional expertise. However, there is one instructional goal that the teachers are aiming at here -- the development of students' understanding and of reflective, critical thinking, a requisite for independent learning.

Values integration

The majority of the participants integrate values in their lessons. The following illustrative classroom situations attest to this:

- The teacher asks the class to point out the values derived from the story, Dante.
- A teacher shares her concern about the pollution in the environment. She challenges her class to do something about the problem in their own simple way.
- The teacher relates the lesson to social realities in the Philippine context.
- The teacher relates ecology to God's creation, explaining the importance of preserving and conserving the work of God.

Responsible teaching may therefore be defined as providing students with opportunities to assume an active role in learning process and to be responsible for their own learning, and integrating values in teaching.

A Pyramidal Model of Teaching Expertise

Quantitative content analysis, done by tallying frequencies of occurrence of particular teaching behaviors and practices during the class sessions of the expert teachers reveal that all of the expert teachers demonstrate mastery of content, instructional clarity, enthusiasm in teaching, nonthreatening disposition, provision of a psychologically safe learning environment, high rapport with students, efficient handling of routine activities and time management, provision for two-way communication, sensitivity to students' learning problems or misconceptions, and absence of class disruptions. For this reason, I consider these as the essentials or "musts" of teaching expertise in the Philippines. In the absence of anyone of them, an aspiring teacher cannot attain expertise.

Over and above the essentials or requisites of expert teaching are classroom practices and behaviors which are true of only some expert teachers, but which apparently contribute to their ability to maintain and sustain students' interest, attention, and active engagement in class activities. For this reason, I label them the "enhancers" of teaching expertise. They are not essential, but are contributory to expert teaching. These are: maintenance of students' on-task behavior (91.4% of the experts demonstrate this in their classroom), use of varied instructional strategies (89.9%), excellent oral communication skills (88.4%), expressive body language (88.2%), developing students' responsibility for learning (84.2%), learner–centeredness (84.1%), use of varied instructional equipment/materials (82.6%), magnetism/charisma (76.8%), making learning pleasant and enjoyable (65.2%), values integration (62.3%), affectionate interaction with students (60.9%), and sense of humor (39.1%). The essentials and the enhancers of teaching expertise make up the Pyramidal Model of Teaching Expertise that has evolved in the study. The base represents the essentials of teaching expertise as manifested by 100 % of the expert teachers, while the apex represents the least observed teaching behavior.

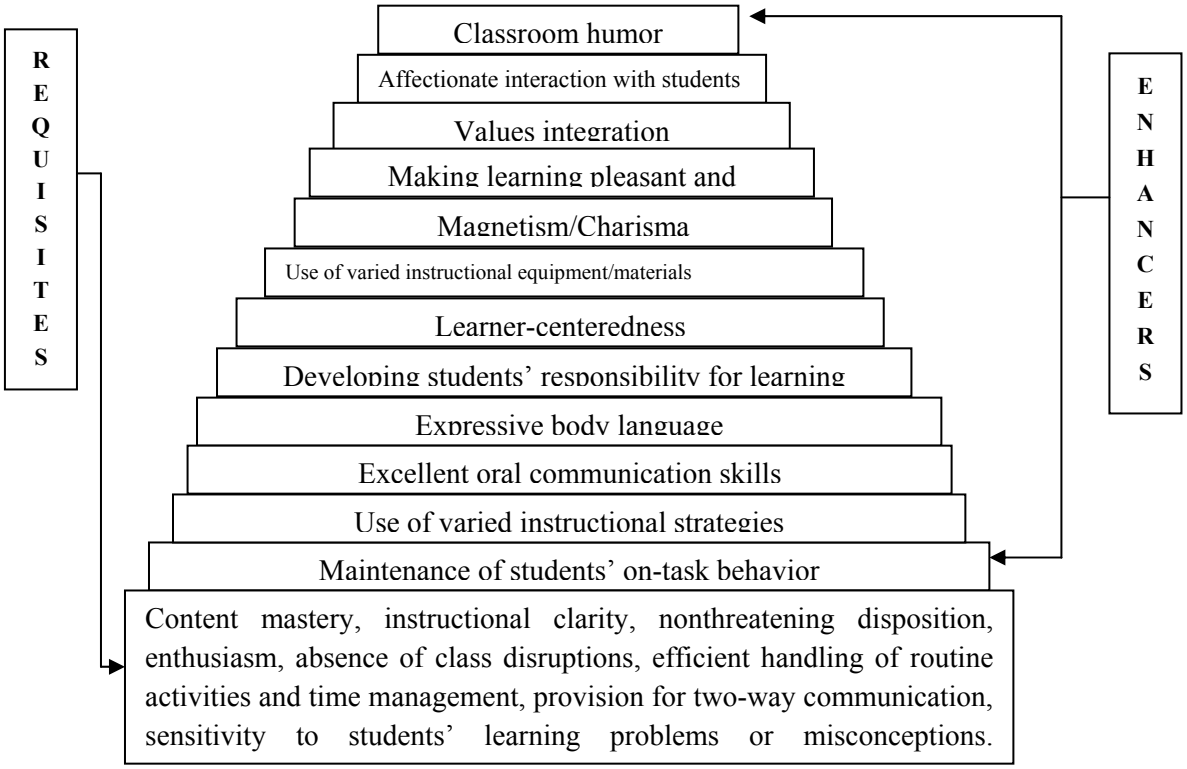

Figure 2: A Pyramidal Model of Teaching Expertise in Higher Education

Phase 2. Expert Teachers' Epistemologies of Teaching Adult Learners

This phase of the study focuses on the epistemologies of expert teachers in higher education institutions in the Philippines. It was done as a follow-up study of phase one, to verify if the model,

which emerged from qualitative analysis of the classroom practices of the experts, are manifestations of their epistemologies regarding effective teaching of adult learners.

Epistemology, an area of philosophy, is concerned with the nature, sources, and limitations of knowledge. Certain types of statements have a special epistemological status; that is, these statements do not need any justification. This study proposes that a personal model of self-in-practice enacts a teacher's individual pragmatic epistemology (i.e., the experience of epistemology in everyday life as a teacher) hence; a teacher is in a natural condition that warrants getting sufficiently reliable information about teaching from him/her. In addition, this study is based on the assumption that expert teachers in higher education are reliable sources of knowledge about teaching adult learners effectively, hence their statements have a special epistemological status.

For this phase of the study I employed phenomenography, a qualitative research approach to describe the qualitatively different ways in which people experience, understand, and conceptualize specific phenomena or situations. Phenomenographic studies provide answers to the questions, "What are the different ways of experiencing phenomena? How are these related to each other?

When a person experiences a particular phenomenon, he or she focuses on some aspects of the phenomenon (i.e., some aspects are discerned), whereas, other aspects are not in focus, and hence are not discerned (Runesson, 1999). Runesson explains the relationship between variation and discernment, by pointing out that the ability of people to experience a phenomenon is related to the composition of human consciousness. In other words, the different ways a group of people see a particular phenomenon, leads to a discernment of the aspects of the phenomenon they focus on. For this reason, phenomonography is also defined as a study of variation in the different qualitative ways a particular group of people see, experience, and understand the same phenomenon. However, phenomenographers have found out that although the same group of people may focus on different aspects of the same phenomenon that they experience, their different ways of understanding the phenomenon are in logical relation to one another. Hence, a phenomenographer not only identifies descriptive categories of variations in people's conceptions, experiences, or understanding of phenomena, but also deciphers the internal relations among those categories. Therefore, aside from answering the question, "What are the different ways of experiencing phenomena?" a phenomenographer also seeks answers to the question, "How are these related to each other?"

The outcomes of a phenomenography are descriptive categories of variation about the phenomenon (which in this study is effective teaching of adult learners) with two dimensions. The first is the structural dimension or the aspects of effective teaching conceived, experienced, or understood by the group of participant teachers, and how these conceived elements are related to each other. The second is the referential dimension: the meaning given by the participants to what they conceive as effective teaching (Marton & Booth, 1997).

In the present study, six categories of variations of effective teaching are constructed from the epistemologies of the participant teachers: These are:

1. Effective teaching is a scholarly function;
2. Effective teaching is teacher-directed;
3. Effective teaching is learner-centered;
4. Effective teaching is fusion;
5. Effective teaching is caring; and
6. Effective teaching is a spiritual function.

Let me explain each of these conceptions of effective teaching, aided by representative responses for the purpose of amplification.

Effective Teaching is a Scholarly Function.

This view of effective teaching is equated with thorough, systematic planning, instructional skills, continuing professional growth and development, professionalism, and excellence.

Effective teaching as a scholarly function is well-planned, systematic, and devoid of class disruptions:

"Teachers should always come to class well prepared, with a well-organized schedule of activities for every class hour so that there will be no dull moments, which give rise to disciplinary problems."

As a scholarly function, teaching requires instructional variety, thorough class preparation, and punctuality:

"Prepare your lessons well and be armed with a diversity of teaching approaches and techniques. Be punctual and thorough in your class preparation."

There is no room for mediocrity; teaching as a scholarly function is marked by excellence.

- *"I am that type of person that has a high sense of personal pride. In everything I do and venture – I see to it that I give my best."*
- *My professor at the University of Wellington, N. Z. always told us "not to believe in what our teachers say." As a result of such philosophical comment, I always strive to do my best in order that my students will believe in what I say.*

Teaching as a scholarly function is practicing professionalism: adhering to professional conduct and role modeling.

- *"I love teaching, doing work in a passionate manner. I manage time; promote discipline, competence and professional conduct while inspiring effort and excellence among my students."*
- *"Role modeling is important, believing that children nowadays have more need of models than of critics. Modeling on the part of the teacher is of prime importance in values transmission."*

Teaching as a scholarly function demands keeping abreast with the latest information and new developments in one's field of expertise.

- *"Be always prepared; keep abreast of developments in your field of expertise, as well as with the demands and challenges of the time."*
- *"You can't teach what you do not have. Read more and update on subject matter and teaching strategies. I read a lot in my field."*
- *"I never aspired to become an expert or outstanding teacher. I simply did my best, and exhausted all possible resources, to improve/polish my craft of teaching."*

The experts' view of effective teaching as a scholarly function finds expression in the Pyramidal Model developed in the first phase of the study. Specifically, the view that effective teaching is well-planned, systematic, and devoid of class disruptions is supportive of two essentials of teaching expertise exemplified in the Model: *efficient handling of routine activities and time management* and *absence of class disruptions*. Effective teaching as keeping abreast with the latest information and new developments in one's field of expertise is expressive of another essential; *content mastery*. On the other hand, the view that effective teaching requires instructional variety provides a conceptual underpinning to *the use of varied instructional strategies*, one of the enhancers of teaching expertise.

Effective Teaching is Teacher-directed.

Effective teaching as teacher-directed considers teachers as content experts who should exhaustively impart their knowledge to their students:

- "*An expert teacher is one who can thoroughly impart his knowledge to students."*
- *"The teacher should speak lesser than the students, but the students should be given guidelines so that they will not speak out of turn*."

Effective teaching as teacher-directed entails setting guidelines and sticking to particular strategies that work.

"Give daily quizzes for check up, homework-oriented. Always teach where the children are, then follow-up test, teach, and finally test again. In other words, the 3 T's in teaching: test-teach-test."

Effective Teaching is Learner-focused.

This view is the opposite of the pedagogical, teacher-directed orientation of teaching adult learners. The learner-focused conception places the learner at the core of instruction.

- *"My philosophy in teaching is, begin where the students are; adapting instruction (strategy, methodology) to the intellectual level of the students; to be patient. Students do not learn at the same rate."*
- *"Be prepared, plan your lessons carefully. Be creative. Think of your objectives and see if these objectives meet their [student's] needs. Prepare materials and activities suited to your class."*

Learner-focused teaching makes provision for active learning:

- *"Facilitate learning. Let them [students] do the searching. Guide them well."*
- *"I use collaboration, interactive strategies that encourage students not only to examine the facts and conventions but also to question them critically."*

Learner-focused teaching develops student self-awareness and learning potential.

- *"I consider that one of the most important tasks of the teachers is to awaken in the student a sense of self, an awareness of his/her capabilities and talent."*
- *"Identify students' strong points, develop them further, reach out to them, and bring out the potential and the very best in them."*

The epistemology that effective teaching is learner-focused gives credence to *learner-centeredness* as an enhancer of teaching expertise based on the Model that has evolved in the study.

Effective Teaching is Fusion.

Effective teaching is not limited to the use of creative or innovative teaching approaches. Time-tested effective traditional teaching approaches have as much place in the classroom.

"Keep growing in the profession so that you can make the best from two worlds, fusion for tradition and innovation; a beautiful blend of time-tested methods and techniques."

This particular conception of effective teaching of adult learners comes closest to what Knudson terms humanagogy; the blending of pedagogical and andragogical views about teaching.

The conception that teaching is fusion is additionally viewed in the context of authenticity, i.e., the teacher's behavior in the classroom is a projection of his/ her inner self and personality.

- "*There is no distinction for me between your teaching and personality – it is the reflection of yourself."*
- *"Effective teaching is congruence in what I say and do with firm kindness and discipline."*

Effective teaching is integrating students' learning goals with the teachers' instructional goals:

"My students are for me, interesting people, and I enjoy listening well to their thoughts, feelings, and insights. Listening to where they are in the lesson and where they want to go with it are keys to my success in the teaching profession. If I am able to listen well to them, then I can design my motivational activities better, so I can guide them to where I would like them to go with the lesson."

Effective teaching is enabling student's development in different aspects of growth: intellectual, physical, social, spiritual, and emotional:

- "I encourage my students to make use of their creativity, to be balanced, meaning in the perspective of mental, physical, spiritual, and emotional well being."
- "Teachers should develop students in their totality – social, intellectual, physical. They should also integrate values in teaching and enlighten students' minds."

Effective Teaching is Caring.

Effective teaching as caring is characterized by empathy. This is reflected in understanding the predicament of students who have less in life, in making themselves available to these students especially in times of need, and in helping them plan their future.

- *"I empathize with students, particularly with the poor ones."*
- *"I want to help students chart/determine their future. I like to be with students especially those who need help, and those who are poor."*

Teaching as caring is demonstrating patience, fairness, and respect for student dignity, regardless of ability levels.

- "*Students are in my class to learn; hence I am patient and nurturing of the slow learners, and eager to give the necessary materials for a full understanding to the quick learners.*
- *"Effective teaching is showing respect for, and regarding students as individual human beings."*

Teaching as caring is manifested in parental love, tempered with discipline. This view about effective teaching goes beyond treating students with respect and positive regard to touching their hearts as a parent does.

- "*My students feel comfortable with me. They treat me like a father.*"
- *"I listen a lot and treat each student as a particular person that should be given much love, respect, and understanding. I carry a "parent" heart… teaching students through congruence of what I say and do with firm kindness and discipline."*
- *"There is camaraderie between me and my students, a wholesome relationship, but there is respect. When I'm angry, they feel afraid of me. In class, they know I mean business. Outside the class, they can approach me, even joke with me, but the respect is there."*

Effective teaching viewed as caring is manifested in the classroom in what I labeled *"affectionate interactions with students,"* one of the twelve enhancers of teaching expertise derived in the Model.

Effective Teaching is Spiritual.

Finally, effective teaching is viewed from an existentialist Christian perspective; aimed at students' spiritual development, through role modeling. As a role model, the teacher's responsibility goes beyond the intellectual development of the learners to moral and spiritual formation, and appreciation of God's creations.

- "*Effective teaching is teaching that extends beyond developing student cognition to spiritual role modeling.*
- *"Aim not to teach your subject, but to form a whole complete individual who will also wish to serve others and God in others."*
- *"Teaching is making students appreciate the wonders of God's creation thorough creative activities."*
- *"Teaching is striving to imbibe the Gospel values in your life, so that as you teach, you will lead people to follow Christ."*

From this perspective, teaching is viewed as a reciprocation of what comes from, and henceforth, should be returned to the source of it all.

- *"It is a gift that springs from, and is returned to a caring, loving Spiritual Being."*
- *"Effective teaching is a reciprocation. God gave us talents and the opportunities to help develop people physically, intellectually, socially, and emotionally. We should do your best to share this gift for His glory.*
- *"My teaching at its best is my gift to God."*

Implicit in the conceptualization of effective teaching as spiritual is *values integration*, an enhancer empirically deduced from the classroom practices of some expert teachers. Going beyond values integration, this conceptualization reflects, on the part of a particular group of participant expert

teachers, "a strong spiritual life where faith is practiced and transmitted" using the words of Nemet, S.J. (n.d., par 116, retrieved May 15, 2008 from http://eapi.admu.edu.ph/eapr95/nemet.htm).

A summary of the referential (meanings) and structural aspects (categories) of the epistemological orientations of Filipino outstanding teachers concerning effective teaching in higher education is presented in Table 1. The structural dimension refers to aspects of teaching effectiveness being focused on, as evidenced by he variations brought about by different epistemologies. The referential dimension refers to the overall meaning of teaching effectiveness, based on the teachers' epistemologies.

Table 1: Referential and Structural Aspects of the Conceptions of Effective Teaching.

Structural Dimension (Aspects of effective teaching being focused on and how the elements of this phenomenon are related to each other)	Referential Dimension (The meaning given to what is perceived concerning effective teaching)
1. Effective teaching is a scholarly function.	
Preparation Excellence Continuing professional growth and development Professionalism	Effective teaching is a scholarly function that demands thorough preparation, excellence, continuing growth and development, and professionalism.
2. Effective teaching is teacher-directed.	
Imparting of knowledge Setting of guidelines Adherence to particularly effective teaching strategies	Effective teaching is imparting of knowledge to students, setting guidelines to promote student decorum; and adherence to tested teaching strategies that promote learning.
3. Effective teaching is learner-focused.	
Diagnosis Adaptation Guidance of students toward self-awareness and actualization Provision for active learning	Effective teaching is learner-focused. It starts where the students are, and guides students toward self-awareness and the actualization of their potential through active engagement in learning.
4. Effective teaching is fusion.	
Manifestation of the congruence between the teachers's inner and projected self. Fusion of students' and teacher's goals Use of both traditional and innovative approaches Promotion of students' holistic development	Effective teaching is fusion. It is a projection of the teacher's inner self, manifested in his/her classroom teaching and in what s/he says and does. It is the fusion of the teachers' instructional and of the students' learning goals, a blending of time-tested and of innovative teaching approaches, and the promotion of the holistic development of the learners.
5. Effective teaching is caring.	
Empathy Patience, fairness, and respect for student dignity Parental love, tempered with discipline	Effective teaching is caring; characterized by empathy, patience, and respect for student dignity. It is demonstrating in words and in action, parental love, tempered with firm kindness and discipline
6. Effective teaching is spiritual	
Beyond cognition Spiritual role modeling A gift/an offering	Effective teaching is spiritual. It goes beyond the development of student cognitive skills, to spiritual formation; leading the students towards service, living the Christian way of life. Effective teaching is appreciating God-given talents and giving Him back a gift, teaching at its best.

Discussion

From the emergent model of Filipino teaching expertise which surfaces in the study, a number of implications for teacher preparation, testing, development, policy making can be drawn.

A primary consideration, based on the results of the study is the improvement of the curricular and instructional programs of teacher-training institutions. There is a strong indication that oral communication skills and expressive body language greatly contribute to teaching expertise, along with dynamism, charisma and magnetism. In view of this, there is a need for a course on emphatic oral delivery (i.e., voice projection, use of pauses for emphasis, vocal variation in pitch, tempo, and volume), meaningful facial expressions, gestures, and movement. Prospective teachers should be fluent in the medium of instruction and should be lively, enthusiastic, and dynamic. There is also a need to provide prospective teachers with learning opportunities for the development and clarification of a personal educational philosophy that can guide their day-day-today decisions later on as teachers.

Most of the expert teachers in the study are mixed-brained who are adept in the use of both left-brained and right-brained techniques of teaching. In this light, provision of activities on brain integration and lessons on creativity in the curriculum can be of great help to prospective teachers. Moreover, students should be exposed to teacher role models. In this light, effective and responsible teachers should be assigned to handle the major courses and the internship program. Ineffective teachers who have lost their zest and commitment for teaching have no place in schools, especially in teacher-training institutions.

Teachers in teacher training institutions, and in other higher educational institutions for that matter, should exact responsible learning on the part of the students. They should refrain from giving straight lectures entirely lifted from textbooks, and from spoon-feeding students that suppress self-expression, exploration, independent thinking, creativity, and discovery. Instead, they should provide extensive opportunities for independent learning, because such is the demand of the teaching profession. Equally important is for them to develop among education students, an interest in professional readings and a passion for continuous learning. Professional readings should be part of course requirements, especially in the foundation education courses and in the major courses.

The model of teaching expertise that has emerged in the study can serve as the focal point in reviewing and improving classroom observation guides and teaching performance evaluation forms. Subsequently, post-observation conferences may be fine-tuned to the essential and enhancing teaching practices and attributes that may be identified as areas of weaknesses. The model can also guide the conceptualization of a faculty needs assessment form and the design of a faculty development program tailor-suited to identified needs.

The different domains and elements of expert teaching can also be used as inputs in improving the curricular program for education students. Mere knowledge and understanding of what makes for expert teaching will not be enough. Theoretical/conceptual knowledge should be accompanied by actual applications, especially during internship or practice teaching.

Neophyte teachers have much to learn from the experts. However, when these experts leave the teaching profession, they leave nothing behind them to guide beginning teachers in the practice of their profession. For this reason, their classroom practices and behaviors should be documented for posterity. Moreover, considering that they are valuable human resources, their services may be extended, past retirement age so long as they are willing, and if their health so permits.

Aside from the emergent model of teaching expertise developed in the study, it provides insights regarding teachers' conceptions of adult teaching that are rooted in the culture of the Filipino people; conceptions that are "Filicentric," if I may use the word. The second phase of the study started with the initial question, "Andragogy or humanagogy?" Many theorists believe that the andragogy-pedagogy classification is not perfect, but they cannot agree on a viable alternative either. This prompted Polson (1993) to ask, whether the adult learner is a single entity for whom there is one best way to teach, or one best way to learn. To this question, he gave an unequivocal negative response, explaining that there is no agreement in the literature as to what constitutes an adult learner. His stand finds support in the present study.

There is no particular teaching model unanimously singled out by the Filipino outstanding teachers. Their conceptions of effective teaching in higher education range in a continuum, with teacher direction at one pole and learner – focus at the opposite pole. This finding supports Davenport's (1987) contention that teachers of adults may be, at different times, teacher - directive and learner-centered; authoritative and facilitative. Thus, going back to the original question, andragogy or humanagogy? There is no definitive, unconditional answer. The answer is relative, depending on the teacher's pragmatic or experienced epistemology of success in teaching. As Pratt

(1998) pointed out, many educators of adult learners do not see themselves as andragogical facilitators, possibly owing to their own personality and personal preference for a directive teaching style.

A significant finding of the study is that teacher epistemologies of teaching adults in formal school settings yield two categories of descriptions that are absent in Eurocentric and Northern American worldviews of teaching adult learners: teaching as caring, and teaching as spiritual. Teaching as a caring function finds support in the Africentric affective way of obtaining and demonstrating knowledge, and the maintenance and enhancement of harmonious interpersonal relationships. The second conception of effective teaching, that of teaching as spiritual also finds support in the Africentric perspective of teaching adults that focuses on spirituality, in the light of their conception of the cosmological view of interdependency rooted in the universal link, which for them is the spirit of the creator.

Teacher beliefs have been identified as central impediments to educational reform and innovations in educational practice (Chan & Elliott, 2000; Pintrich, 1990; Tilleman, 1995). The findings of the study point to the congruence between the expert teachers' epistemologies of teaching adult learners and their classroom teaching practices and behaviors from which the proposed model of teaching expertise has emerged. Simply put, what they believe in about teaching finds expression in the way they handle the classroom situation and carry out their teaching function. Hence, if an HEI were to adopt a particular worldview of teaching adult learners, then faculty development programs should have as an essential and major component, inducing change in teachers' conceptions or ways of seeing that particular worldview. Personal pragmatic epistemologies cannot be changed overnight.

The present study has generated several hypotheses regarding the emergent model of teaching expertise and epistemologies about effective teaching of adult learners. Replications involving expert teachers in other countries will reveal if those hypotheses are culture fair or culture- specific. Whether the same model of teaching expertise will hold for other populations, who may not be as successful as the sample of the study, is similarly worth verifying. Lastly, this study has raised epistemological issues regarding teachers' beliefs and orientations; pointing out the need for examining the results of the study in a broader multi-cultural education context.

References

Beauchamp, G.A (1981). *Curriculum theory*. Itasca, Illinois: Peacock.

Bookfield, S. Adult learning: An overview. In A. Tuinjman (Ed.) (1995). International Encyclopedia of Education. Oxford, Pergamon Press. (Forthcoming). Available in http://www.nl.edu/academics/cas/ace/facultypapers/StephenBrookfield_AdultLearning.cfm

Davenport, J., III. (1987, March). *A way out of the andragogy morass* . Paper presented at the conference of the Georgia Adult Education Association, Savannah, GA.

Howard, B.C., McGee, S., Schwartz, N., and Purcell, S. (2000) The experience of constructivism: Transforming teacher epistemology. *Journal of Research on Computing in Education (32)*, 4, 455-462.

Knudson, R. S. (1980). An alternative approach to the andragogy/pedagogy issue. *Lifelong Learning: The Adult Years*, 3 (8), 810.Marton, F., & Booth, S. (1997). *Learning and Awareness*. New Jersey: Lawerence Associates.

Nemet, L. (n.d.). Enculturation of catechesis and spirituality in the documents of the Catholic bishops' conference of the Philippines. Available: http://eapi.admu.edu.ph/eapr95/nemet.htm

Oser, F.K., Dick, A., & Patry, J. (Eds.). (1992). *Effective and responsible teaching.* San Francisco, California: Jossey-Bass.

Pintrich, P.R. (1990) Implications of psychological research on student learning and college teaching for teacher education. In W.R. Housten (Ed) *Handbook of Research on Teacher Educaton.* pp. 826-857. New York: Macmillan.

Polson, C. J. (1993, September). *Teaching adult students* (Idea Paper No. 29). Manhattan, KS: Center for Faculty Evaluation & Development, Division of Continuing Education, Kansas State University.

Pratt, D. D. (1988). Andragogy as a relational construct. *Adult Education Quarterly*, *38*, 160-171.

Reyes, F.C.(1994). Brain research: Implications for instructional improvement. *Tanglaw*, 2 (2), 15-24.

Shulman, L.S. (1986). Paradigms and research programs in the study of teaching.In M.C. Wittrock (Ed.), *Handbook of research in teaching* (3rd ed.) (pp. 1-36). New York: Macmillan.

Runesson, U. (1999). The pedagogy of variation: Different ways of handling a mathematical content. PhD dissertation summary. [On-line]. Available: http://www.ped.gu.se/biorn/phgraph/civil/graphica/diss.su/runesson.html.

Tilleman, H. (1995) Changing the professional knowledge beliefs of teachers: A training study. *Learning and Instruction, 5,* pp 291-318.

Weinert, F.E., Helmke, A., & Schrader, F.(1992). Research on the model teacher and the teaching model. In F.K. Oser, A. Dick & J. Patry, (Eds.), *Effective and responsible teaching* (pp. 249-260). San Francisco, California: Jossey-Bass.

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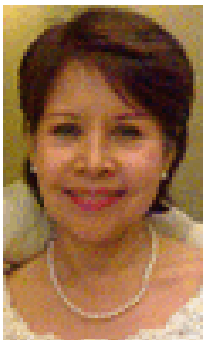

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(E.12)

Facilitating Communication between Students and End-Users in Collaborative Design Projects

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Abstract

User interface design is exploratory and evolutionary in nature. A user interface evolves through cycles of design, evaluation, and redesign to meet users' requirements. Such an iterative process is driven not only by the need for further refinement but also by feedback from end-users. Hence, user participation in a timely manner is vital for students to finish their projects on schedule. However, students and users are often geographically dispersed and under conflict schedules. It is difficult to arrange direct communication between them. Annotations are known as an effective technique for collaborative writing. We in this paper describe our effort in developing a web-accessible annotation system oriented to collaborative user interface design. With this system, students can post the current version of their design for users to view and evaluate. Users use annotations to make comments and their feedback motivates students to redesign the user interface. In addition, students and users can use annotations to discuss relevant issues. As a consequence, it makes possible for students and end-users to communicate whenever and wherever they need. A unique feature of our system is the use of a database to store annotations separately from design documents. Using a database allows students to trace discussion threads. More important, it allows the instructor to monitor project progress and collect information for evaluating individual students in a team, for example, how often each student participated in the project as well as in which part and to what extent one made contribution to the project.

Introduction

User interface design is exploratory and evolutionary, accomplishing its objectives via iterative design and evaluation of user interface prototypes (Sharp, 2007). Such a design process is driven not only by the increasing level of fidelity, which refers to how well the current user interface design reflects the functionality, completeness, and polish of the final product, but also by feedback on the current design from end-users since the ultimate intent is to develop a product that helps its end-users achieve their goals. As such, end-user participation in a timely fashion is vital for students to complete collaborative design projects and gain valuable experience in a limited time frame. However, students and end-users are often geographically dispersed and under conflict schedules. It is difficult to arrange direct communication between them as needed.

Annotations are known as an effective technique to support asynchronous collaboration around text documents (Cadiz et al., 2000; Weng, 2004; Brush, 2002). A variety of annotation systems are available; some of them are intended for instructional purposes. We in this paper describe our effort on developing ComAssist (Communication Assist), a web-based annotation system, to facilitate communication between students and end-users in collaborative user interface design. Unlike most annotation systems, ComAssist allows students and end-users to exchange their thoughts and discuss design issues in the context of diagrammatic documents.

Other important features of ComAssist include: (1) flexibility in accommodating diverse forms of user interface prototype -- students can choose any prototyping tool they consider as appropriate, even using different ones at different design stages; (2) storing annotations in a database, separately from the annotated documents, allowing instructors to monitor project progress and also acquire additional information for evaluating individual students in a teamwork situation.

ComAssist is a practical software application with modest complexity. It involves a range of design issues, including software design methods, object-oriented programming, databases, software architecture, web applications, and program development environments. As a result, the system provides an exceptional opportunity for us to develop a comprehensive case study on software design and development for instructional purposes. Our experience shows that students are well motivated

when they learn from a software application that they use (Tao & Nandigan, 2006). Hence, we treat ComAssist as a dual-purpose project.

The rest of this paper is organized as follows. Section 2 discusses related work with focus on annotation systems used in an educational setting. Section 3 provides an overview of ComAssist. Section 4 describes its support for communication between students and end-users in collaborative design and Section 5 its use of a database to aid instructors. Finally, section 6 concludes this paper.

Related Work

Annotations are extra information associated with particular points in a document. When reading, writing, or making comments on a document, annotations provide a means to record thoughts and ideas in the context of that document. As such, annotations are a valuable element of a learning process (Cadiz et al., 2000).

Annotations serve for personal needs in various ways, including marking important portions, adding interpretive remarks, and tracing progress through interesting sections (Brush, 2002). When shared among people, annotations support asynchronous collaboration, for example, collaborative writing with iterative reviewing and revising activities (Weng, 2004).

A lot of document-processing systems provide the capability to annotate or comment a document. Annotation systems are also available for instructional purposes. CommonSpace provides support for the interaction between students and teachers in a writing process (Gipson-Fredin & Floren, 1999). CoNotes allows a large number of students to ask questions and discuss problems of common interest in a distributed fashion (Davis & Huttenlocher, 1995). Using an annotation system helps students improve their performance in learning and also establish a greater sense of community among them (Gay, Sturgill, & Martin, 1999).

While CommonSpace is a stand-alone application, CoNotes provides a web-based front-end for publishing and annotating HTML documents. Web-based annotations make possible for people to communicate, even if they are geographically far apart. Usually, web-based annotations are stored separately from the annotated documents (Brush, 2002). Storing annotations apart from the annotated documents makes possible to analyze those annotations and obtain an insights into relevant activities (Cadiz et al., 2000; Charles & Tao, 2006).

Annotations are also used to assist developers in developing software requirements. A case study shows that a large development team used Microsoft Office 2000 to publish the spec of a software product on the web, allowing those who would be affected by the product to read and discuss it through "in-context" annotations. Such a practice helped the development team develop a better product (Cadiz et al., 2000).

Annotation systems mostly are based on text documents (Brush, 2002). Since the annotated document is text, an annotation can be linked to any specific portion of content, such as a paragraph, sentence, word, or even character. However, annotation systems are not available for diagrammatic or graphical documents, such as design documents for software products, because there is no easy way to specify an arbitrary portion of a diagram or graphic for annotations to be attached.

In addition, it is worthy noting that wiki-based environments are increasingly used to support collaborative learning activities in an educational setting, due to its simplicity and flexible nature (Rafaeli, 2006; Bruns & Humphreys, 2007). A wiki is a collection of web pages designed to enable anyone who accesses it to contribute or modify content, using a simplified markup language. Students and instructors can provide feedback on existing content and also add supplementary content. Different from ComAssist, co-authors of wikis all have the same capability and play the same role with respect to their collaborative work.

System Overview

An interactive application usually provides several screens to support user's tasks. Since visual elements on a screen collectively work for certain tasks, the screen as a whole provides the context in which design issues on its layout and visual elements can be addressed. As a consequence, what is needed for collaborative user interface design is the capability to link annotations to individual screens, rather than portions of them. Such a special characteristic leads to a feasible solution for

ComAssist, although applying annotations to diagrammatic documents in general still is an open question.

As mentioned above, we want to create an annotation system to support collaborative design. We also intent to develop a case study for instructional purposes. With the dual purpose in mind, we document ComAssist using notations compliant with industrial standards so as to not only assist software development but also produce artifacts readily usable in the case study.

Functionality

We create a use case diagram, a UML (Unified Modeling Language) notation (Booch, Rumbaugh, & Jacobson, 1999), to describe the basic functionality of ComAssist. In a use case diagram, what is expected from a system is described by who are using it and what objectives they want to accomplish. It is an intuitive notation for presenting a big picture of a system.

In Figure 1, a large rectangle denotes the system boundary, separating what lies inside from what outside of it. Stick figures as well as a small rectangle denote actors -- external entities that need to interact with the system. Ovals denote use cases that describe what the system is required to do. And lines associate actors with use cases that they participate in.

As shown in Figure 1, ComAssist provides support for students to post a user interface prototype, for end-users to view the prototype on display, and for both of them to write and view annotations. As a result of posting a prototype or writing an annotation, ComAssist sends a notification to other team members. Moreover, ComAssist stores annotations in a database and allows instructors to query the database.

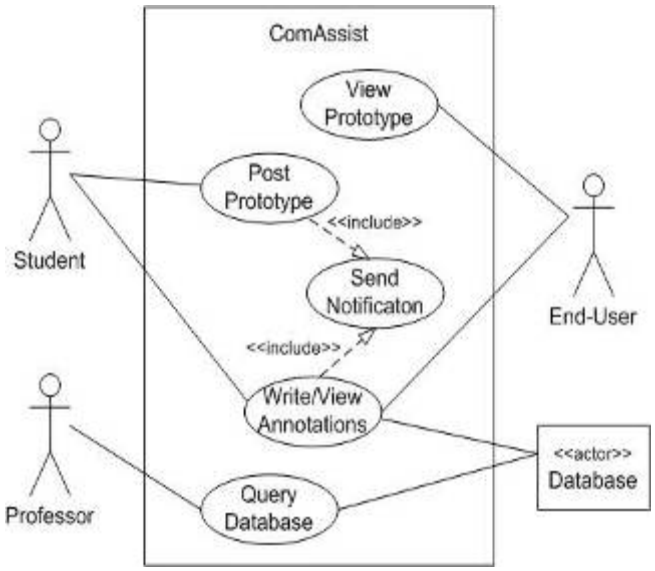

Figure 1: Use Case Diagram.

User Interface

Figure 2 shows the main window of ComAssist, which contains three panes, namely, Navigator (the left-hand one below the toolbar), Screen Display (the right-hand one below the toolbar), and Annotation Viewer (the bottom one).

Screen Display shows a screenshot of the user interface under development. It begins with the main screen and then switches to another one upon the user's request. Navigator lists the names of all screens and enables navigation between screens. Screen Display shows the screen whose name in Navigator is selected.

Annotation Viewer shows a list of annotations associated with the screen on display. A vertical scrollbar located on the left side of the pane provides a convenient way for the user to scan the list and select what one wants to look at.

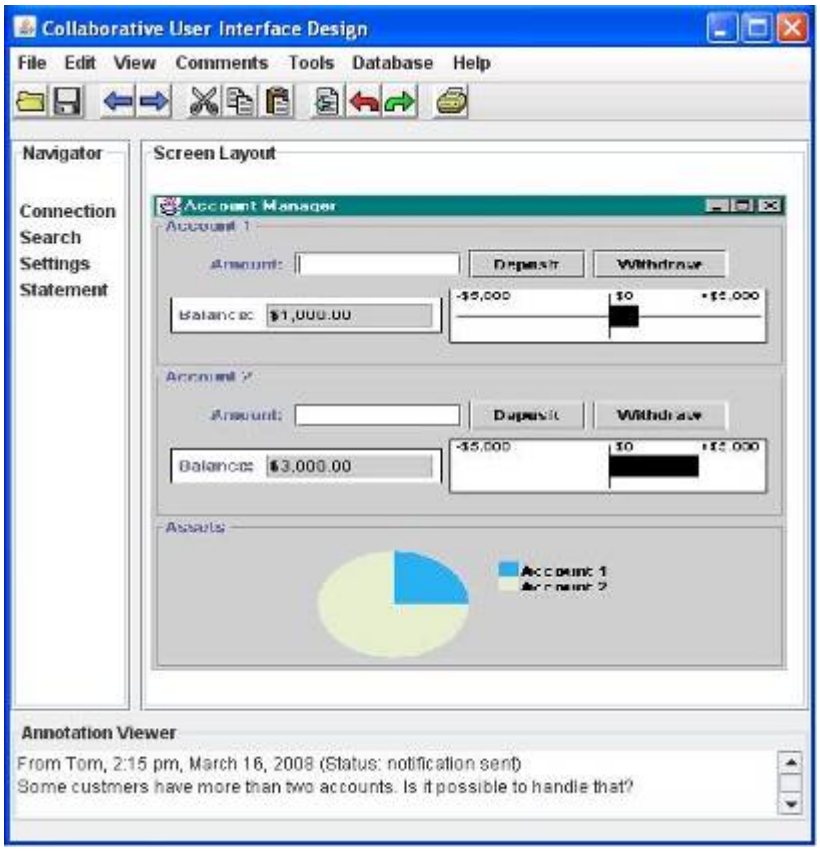

Figure 2: User Interface.

In addition, the user can use the toolbar or menu bar to bring up a dialog and write an annotation in it. Writing a new annotation ends up with sending a notification automatically to other team members. A notification capability as such is indispensable for asynchronous collaboration.

A large variety of prototyping tools for user interface design are available (Baumer et al., 1996; Virzi, 1996). Students may use different tools at different stages of user interface development (Frank, Naugler, & Traina 2005). As such, ComAssist has to be able to accommodate various user interface prototypes.

Our solution is to allow Screen Display to show a screenshot as part of an HTML document. In other words, what a HTML document can hold can be shown there. HTML is a format widely used for web presentation. Using HTML documents to deliver screenshots offers considerable flexibility for ComAssist.

Facilitating Communication

An activity diagram, also a UML notation, shows a sequence of activities, some of which may be parallel, for a procedure, process or workflow.

In Figure 3, we use an activity diagram to illustrate the workflow of collaborative user interface design, which is necessary for understanding the role that ComAssist plays.

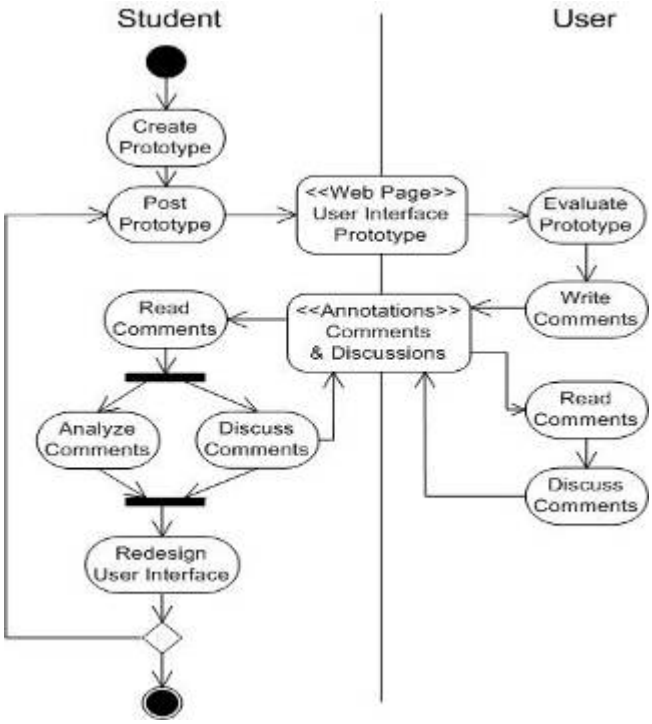

Figure 3: Activity Diagram.

In an activity diagram, the workflow begins with a filled circle and ends with a hollow circle containing a small filled circle. Ovals denote activities and arrows transitions between activities. Several outgoing transitions from a horizontal bar lead to parallel activities and several incoming transition to a horizontal bar are where parallel activities merge. Also rounded rectangles denote objects that are produced and used by activities, a diamond represents a decision point where branches occur, and a vertical line separates activities of different participants in the workflow.

As shown in Figure 3, students create a user interface prototype and post it for end-users to view and evaluate. End-users then write comments on the prototype via annotations. Students subsequently read and analyze their comments to determine how to improve the current design. In the meantime, students may need to have discussion with end-users in order to gain sufficient understanding on what end-users want. Once they know what needs to be done, they redesign the user interface and post a new prototype. Activities as such will iterate as many times as necessary until the requirements are met and end-users are satisfied.

As a matter of fact, ComAssist can also support communication among students, especially during activities “Analyze Comments” and “Discuss Comments”. Since end-user feedback is a driving force for such an iterative process, discussions among students is often a continuation of discussions with end-users. With ComAssist, students can exchange ideas and thoughts as needed.

Assisting Evaluation

ComAssist stores annotations in a database, separately from the annotated document. Figure 4 shows a schema diagram for the relational database in ComAssist. A relational database consists of several tables. Each table contains a number of records with values in several pre-defined fields. In Figure 4, a rectangle depicts a table with its name on the top (in dark background) and field names below. A field name preceded by PK is a primary key for the containing table. An arrow depicts a referencing relationship between appropriate keys in two tables. For convenience, we in the diagram apply an arrow directly between two tables, rather than between field names, since it is quite obvious to identify the implied fields. Referencing relationships make possible to find related information in different tables.

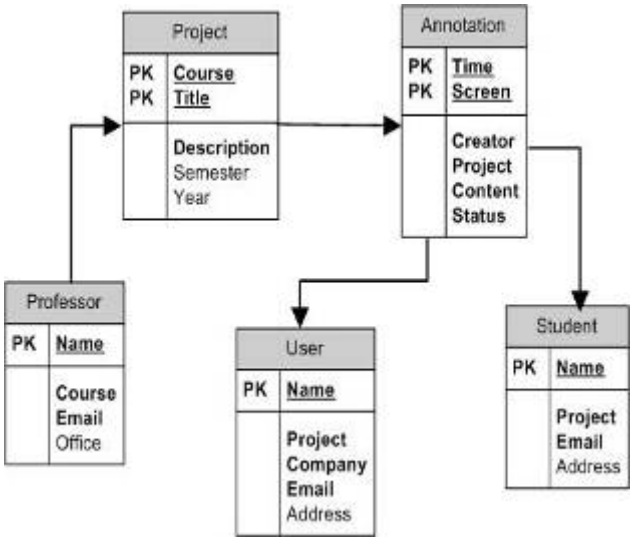

Figure 4: Database Schema Diagram.

Figure 4 is self-explanatory. Briefly, a professor may supervise a few projects. Each project is associated with a set of annotations made by participating students and end-users. Each annotation contains data such as creation time, associated screen, creator, content, and status.

Such a database allows students, end-users, and instructors to trace discussion threads. More important, it makes possible for instructors to monitor project progress and acquire performance indicators of individual students in a teamwork situation, for example, how often each student participated in one's project as well as in which part of the project one made contribution. Obviously, it would be difficult to evaluate individual students without those indicators.

Note that these indicators can be automatically generated by running pre-defined queries, but what they provide is a measure of participation, rather than the quality of participation. Some students may have participated in all activities but made little substantial contributions. It could be even worse if students knew how data in the database would be used. Since the quality of participation is also a criterion to determine individual performance, these indicators alone might not be sufficient. Instructors may have to examine contents of the stored annotations in order to determine how much contribution each student made. However, it requires instructors to browse all annotations associated with a semester-long project, which is quite time consuming.

Summary and Future Work

ComAssist is a web-based annotation system for instructional purposes. Using it would encourage students and end-users' participation in collaborative projects and also aid instructors in supervising such projects.

ComAssist is a work in progress. We need to use it in our user interface design class to determine if its effectiveness is as expected and also find out its limitations. Additionally, ComAssist raises a few issues that need further research.

An application's user interface evolves in the design and development process. As the user interface evolves, existing screen may be combined, split, or removed. Each annotation is linked to a

unique window. As a change occurs, ComAssist may lose track of which screen that an annotation is linked to. For example, when a sreen is split into two, it has to decide where annotations on the original screen should be placed. Similarly, when a screen is removed, relevant annotations could become orphaned (Brush, 2002). Furthermore, it may be necessary in some cases to support annotations on more than one screen (Zheng et al., 2006).

In addition, what ComAssist shows is a screenshot of the user interface under development. It is largely static even though a limited navigational capability is provided. While it is fit for diverse forms of user interface prototype, ComAssist is unable to take full advantage of executable prototypes. We would like to have end-users interact with an executable prototype in the way it should be, for example, navigating from one screen to another through the toolbar the prototype provides. Here, the key is to integrate an executable prototype as a component in ComAssist and synchronize annotations with the annotated screen. Certain techniques, such as aspect-oriented programming (Tao, 2007), may be helpful.

ComAssist is an attempt to explore broader applicability of annotation systems. Although it is restricted to a specific domain, we believe our experience would be beneficial to those who seek tool support for collaborative work around diagrammatic or graphical documents in education.

References

Baumer, D. et al. (1996). User Interface Prototyping – Concepts, Tools, and Experience. Proceedings of the 18th International Conference on Software Engineering.

Booch, G., Rumbaugh, J., & Jacobson, I. (1999). The Unified Modeling Language User Guide. Addison-Wesley.

Bruns, A. & Humphreys, S. (2007). Building Collaborative Capacities in Learners. Proceedings of the 2007 ACM International Symposium on Wikis.

Brush, A.J.B. (2002). Annotation Digital Documents for Synchronous Collaboration. Technical Report 02-09-02, Dept. of Computer Science and Engineering, Univ. of Washington.

Cadiz, J.J., Gupta, A., & Grudin, J. (2000). Using Web Annotations for Asynchronous Collaboration Around Documents. Proceedings of the 2000 ACM Conference on Computer Supported Cooperative Work, 309-318.

Charles, R., & Tao, Y. (2006) Evaluating Student Participation in Open Source Software Development with an Annotation Model. Proceedings of the 4th International Conference on Knowledge Sharing and Collaborative Engineering.

Davis, J., & Huttenlocher, D. (1995) Shared Annotation for Cooperative Learning. Proceedings of the 1995 Conference on Computer Supported Cooperative Learning.

Frank, C., Naugler, D., & Traina, M. (2005). Teaching User Interface Prototyping. Journal of Computing Sciences in Colleges, Vol. 20, No. 6, 66-73.

Gay, G., Sturgill, A., & Martin, W. (1999). Document-centered Peer Collaborations: An Exploration of Educational Uses of Networked Communication Technologies. Journal of Computer Mediated Communication, Vol. 4, No. 3.

Gipson-Fredin, J., & Floren, G. (1999). Common Space as a Collaborative Writing Program. Available at http://www.miracosta.cc.ca.us/home/gfloren/OT-CS.htm.

Hundhausen, C., Balkar, A., Nuur, M., & Trent, S. (2007). WOZPro: A Pen-Based Low Fidelity Prototyping Environment to Support Wizard of Oz Studies. Proceedings of ACM CHI '07, 2453-2458.

Rafaeli, S. (2006). Wiki Uses in Teaching and Learning. Proceedings of the 2006 ACM Internaitonal Symposium on Wikis.

Sharp, H., Rogers, Y., & Preece, J. (2007). Interaction Design: beyond human-computer interaction. New York: John Willey & Sons, Inc.

Tao, Y. (2007) Toward Computer-Aided Usability Evaluation for Evolving Interactive Software. Proceedings of the International Workshop on Reflection, AOP and Meta-Data for Software Evolution, 21st European Conference on Object-Oriented Programming.

Tao, Y., & Nandigam, J. (2006). Open Source Software as the Basis of Developing Software Design Case Studies. Proceedings of the 36th IEEE Annual Frontiers in Education conference.

Virzi, R. (1996). Usability Problem Identification Using Both Low- and High-Fidelity Prototypes. Proceedings of ACM CHI '96, 236-243.
Weng, C. (2004). Asynchronous Collective Writing through Annotations. Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work, 578-581.
Zheng, Q., Booth, K., & McGrenere, J. (2006). Co-Authoring with Structured Annotations. Proceedings of ACM CHI '06, 131-140.

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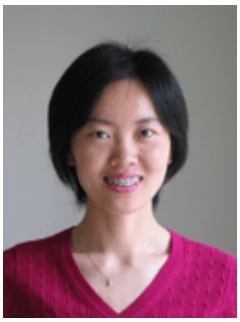

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(E.13)

Maria de Fátima Goulão, To teach to learn in the society of the knowledge: What it means to be Professor? The growing integration and use of the technologies of information and communication inside the school community, in general, puts new pedagogical challenges and compels to the redefinition of the different partners roles in the educative process. These technologies can be faced as reinforcement to the traditional methods of education, or as a form of renewal of the learning chances. In the last one we can point out the e-learning. Meaning, to teach and to learn in a virtual educational context. The potentialities of its use are proportional to the changes that the same provokes in the pedagogical level. Teaching in a system of education with these characteristics implies that the professor must be prepared to face the challenge to establish a continued and efficient relation with the student, must have preparation to handle the distance teach-learning situation and must know how to compensate the fact that there isn't a relation face-to-face - to know the student, to support him, to stimulate him, to help him. It competes to the professor designing and structuralizing the educative process in open and flexible way that allows diversified boarding's, in which are inserted motivated, dynamic and current resources and didactics material. To this teach – learning situation must be inherent an interactive and cooperative methodology and resource to some communication channels. The professor has its action divided in 4 areas: Pedagogical, Social, Technical and Organizational.

(E.14)

Rosamaria Cisneros Kostic, The Paradoxical Stage of Teaching- What makes the classroom similar to the Flamenco Performance Arena? The art of Flamenco dancing lives and dies on stage. Flamenco is a political art form that offers insight into the elusive culture of the Gypsies. This paper looks at the relationship of dance and education and how the mind/body connection can construct an identity that allows students to engage in critical thinking and active reflection. Identity in my classroom is constructed through the Four Gypsy Ps (Passion and Patience)(Presence and Practice). The paradoxical nature of Flamenco dance and the similar negotiations made within the world of teaching, run parallel to the paradoxical stage that exists within the classroom. My paper takes an interdisciplinary approach to the symbolic imagery of Gypsies while it explains that dance is human behavior composed, which can highlight intolerance, discrimination and gender issues. Dance is a series of motions with an organized intention that has an aesthetic and inherent value. I explore how flamenco is culturally patterned and connected to the human history of the Gypsy culture and the Romani injustices. Dance is an empirical indicator of the body's history and my paper reveals that the classroom is a stage where teachers can dance with the Four Gypsy Ps and engage in critical thinking dialogues.

(E.15)

Yong Se Kim; Jung Ae Park, Toward a Creative Design Learning Framework: Creative designers bring about products that are new, useful and elegant, thus create values. Such magical capabilities and how such capabilities are formed have been subjects of many recent research efforts. It is important to establish a concrete concept of design creativity and to find distinct cognitive processes for design problem solving in design creativity education. We have conducted research work toward design creativity education so that various underlying cognitive elements of design creativity education are identified and then these design creativity elements can be enhanced through training methods reflecting individual learner's cognitive personal characteristics. Recently we devised a visual reasoning model to investigate the cognitive interaction among elementary steps of visual reasoning. In this paper we attempt to make a small step toward how semantically adaptive supports for creative design education could be realized. We argue that diverse context building aspects and their elements interact with designer's cognitive reasoning, and identifying and analyzing these interactions could help in devising such supports. We present a very preliminary sketch toward such supports by using a model of design reasoning obtained from a visual reasoning model together with personal creativity modes and cognitive elements of creativity as well as cognitive process strategies.

(E.16)

Al-Zoubi A. Y., Jarir Nsour and Hatem Bakhiet, Design and Implementation of Remote Experiments for an Electronic Engineering Laboratory: A remote laboratory was developed for measurement, analysis, design, and simulation of typical common-emitter amplifier electronic circuits. The main goal of this online lab is to provide students with hands-on experimentations using modern computer tools for the purpose of quality education of a laboratory course in electric and electronic circuits at Princess Sumaya University for Technology. The experiments were part of the circuits and electronics Lab, which is a junior EE laboratory course, which correlates with the knowledge obtained by students from basic theoretical courses such as electric circuits and electronics. Traditionally, all of the lab experiments in this course were based on equipments, devices, methods and techniques for measurements, data recording, and result analysis. This usually makes experiments time-consuming and inefficient, and therefore, greatly limits the effectiveness in the students' understanding of fundamental concepts and theories from the hands-on experimentation. This paper presents a methodology for the improvements and changes improvements of the course by developing a completely computer-assisted measurement, analysis, and design environment that incorporates LabView programming language and National Instruments data acquisition system.

(E.17)

Parents' perception about socio-emotional competences in Portuguese gifted children

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Abstract

Based on international studies about emotional and social development of gifted children (Reis & Renzulli, 2004; Neihart et al., 2001), we present a study about parents' perceptions about emotional and social competences. In this context, and assuming that emotional and social functioning of gifted children constitutes a crucial dimension of gifted children's development and adjustment and considering parents as special observers of continuous development and life span of children, we develop a study with 22 Portuguese parents of gifted children and 217 non gifted children. We apply Bar -On Emotional Quotient Inventory: Parents Version (EQ-i:YV; original version of Bar-On & Parker, 2004), Social Competence Test for Children: Parents Version (PACS-Pa, Candeias *et al.,* 2008). This study examines the differences between the perceptions of parents of gifted and non-gifted children about their Social and Emotional Competence dimensions (Adaptability, Interpersonal, Intrapersonal and Stress Management).

Keywords: Parental Perceptions, social competence, emotional competence, gifted children.

1. Giftedness characteristics and socio-emotional competences

Giftedness is an individual potential for exceptional achievement in one or more domains, according to Mönks and Mason (2000), and high ability youth are generally, at least as well adjusted, in social and emotional terms, as any other students (Candeias, 2004; Reis & Renzulli, 2004; Neihart et al., 2001). Unlike other children, gifted and talented students may face sources of risk for their social and emotional development (Candeias, 2004). Parents are special observers of emotional and social competences of their children because they have a continuous perception of children's development and life span. This work is focused on the description of the differences between parents' perceptions of gifted and non-gifted children concerning Social and Emotional Competence dimensions (Adaptability, Interpersonal, Intrapersonal and Stress Management).

Usually the gifted students were identified through a variety of methods that may include testing, observation, or performance analysis. While there is not, until the moment, any simple way to identify the talented child, studies made with talented students' characteristics showed similar results within the identified population and these studies helped design the development of appropriate curricula for their special needs. (Newland,1976). Not every gifted student has the same needs or traits, but research has shown added characteristics as being more common in gifted students than in non-gifted students' lives. In the academic domain, above-average creativity, advanced meta-cognitive skill, high measured ability, and extraordinary intrinsic motivation are traits commonly found in those identified gifted. (Brown, 2006). In the present work, we choose to use the definition used by Mönks and Mason (2000), "giftedness is an individual potential for exceptional achievement in one or more domains" (p. 144), because of its widely encompassing nature.

The creative thinker frequently demonstrates the ability to identify and to solve problems with a larger fluency degree, creativity, originality and effectiveness than his/her less creative peers (Callahan, 1991). Meta-cognition or the ability to drift, monitor and evaluate a solution for a problem, can manifest itself as advanced abilities like relating ideas, self questioning, self-reflection and organization (Barrel, 1991). Intellectual high ability, also means the talented child can apprehend concepts much faster than most of his/her friends; concepts that are usually attributed to a combination of inherent ability and appropriate encouragement, education and training (Brown, 2006). Finally the motivation level that some students make use of determines the effectiveness of their intellectual abilities, cognition and creativity because the highly motivated students will manage to apply their academic talent more than the students with low motivation and, then, it will more intellectually be able to achieve (Lens & Rand, 2000).

In general, the characteristics of high creativity, meta-cognitive thinking, intellectual ability and motivation are advantageous to the individual that possesses them, but they can present special difficulties for a talented child whose talents can be understood badly by themselves or by their educators. The problem can frequently be minimised with education intervention itself (Brown, 2006).

The gifted children also have some additional psychosocial needs because of their intellectual advance, such as the need to validate their own ability, cope with conflicting expectations, and find positive, supportive relationships (Enerson, 1993). Many gifted children find their outstanding abilities to be confusing and setting them apart from their peers. Consequently, they tend to hide or minimize the use of their talents in order to be accepted by their peers and fit into proscribed social roles (Buescher, 1985; Ford, 1989; Frey, 1991).

Gifted students need to take ownership of their giftedness before they feel comfortable using their talent productively (Buescher, 1985; Frey, 1991). Furthermore, in order to maximize the use of their talents with self-effectiveness, gifted students must include their talent as part of their self-identity (Frey, 1991).

The concept of socio-emotional competence is closely associated to social and emotional intelligences, seen as a perception capacity, to understand and to work with emotions, on the one hand, and, on the other hand, to allow emotions to facilitate his/her thought (Mayer & Salovey, 1990, 1993, 1997; Mayer, Salovey & Caruso, 2000; Goleman1995). The concept of emotional intelligence is rooted partly in the concept of Thorndike's social intelligence (1920), and in Gardner's multiple intelligence theory (1983). Thus, the concepts are too close and both contribute to the development of socio-emotional competences.

The development of the several capacities during one's life span, results from the relationship with the environment. In the same way, emotional intelligence also grows through the relationship with the environment. Being the family the first social environment where the child has the opportunity to express itself as a person, several studies have been demonstrating that, through a warm relationship and affection between parents and children, associated to a dynamic communication, the family assumes a great importance in this area of development (Dasen, 2002; Silva, 1999). Children have a better understanding about things when they do it with their parents, doing things such as, playing games, chattering and listening to stories. This leads to a child's intellectual and socio-emotional growth. There is a relationship between parents' behaviour and children's behaviour. Demanding and highly verbal children stimulate parents to have more conversation and read more stories aloud. Likewise the parents who talk a lot to children are, themselves, verbal people (Freeman, 2000).

2. The importance of parents' perception about socio-emotional competences

Most studies on the effects of the social environment on children's development examine factors that are supposedly similar for all the siblings in the family, such as social class, marital conflict or pressure to perform.

The studies on the effects of the social atmosphere in the children's development examine factors such as social class, matrimonial conflict or the pressure to perform. But children are neither passive nor unbiased recipients.

Gifted children are possibly more sensitive than the others, however. In some situations, they seem to be emotionally stronger, with lower levels of anxiety, more highly productive and more highly motivated (Freeman, 2000).

Parents are prepared to take care of normal children and, when the child is different (gifted) the parents tend to experiment confusion feelings, insecurity and anxiety on how they should deal with the child and on what they can do to help. In a study developed by Pérez (2000) about the perceptions of parents of children with high intellectual capacities, it was stated that there exists a great variability in the form and degree of problems or difficulties. This study revealed that the gifted children, in general, get on well with their families, don't benefit of greater family attention due to their high capacities and their parents are very likely to feel very proud.

Relatively to the life in community, the study of Pérez (2000) shows that half of the parents inquired noticed that their children tend to make friends easily. Nevertheless they prefer the company

of adults or of older children. Even so, they consider that these children have a tendency to be isolate and they prefer their intellectual activity to interactive games with friends.

In a study accomplished by Candeias et al. (2003), with gifted Portuguese children, it was verified that parents of gifted children explicitly require help in areas ranging from understanding the complexity of giftedness characteristics (need and potentiality), family relationships, support to an integral and balanced development and to a better social integration. These data are corroborated by Pérez (2000) and by Pires, Matos and Candeias (2008).

Other studies show that the support to parents through enrichment programs for children's and parents' supporting groups result in positive parental perception of the effects of the children's changes at the level of socio-emotional competences (Pires et al., 2008).

The parents mention noticing that after attending this type of programs, the children develop new friendships with their peers and better self regulation behaviour. Besides, they report to have increased their level of trust and motivation for the pursuit of more challenging tasks. These results have been observed by several authors (Feldhusen & Dillon, 1994; Olszewski-Kubilius & Lee 2004).

According to a study of Olszewski-Kubilius and Lee (2004), parents felt that social interaction enabled their children to develop interpersonal and leadership abilities while sharing academically challenging experiences with peers. Parents also report that the programs created an important connection between home and school by serving as a basis for parents and children to discuss and interact over a positive experience at school. Other positive outcomes perceived by parents were increases in their children's self-concept and self confidence as well as higher self-esteem; an increased zeal for learning more positive attitudes towards school, and greater task commitment. Children also reported that as a result of the program, they were better prepared for college and future carriers.

In summary, with this study we intended to examine the differences between the perceptions of parents of gifted and non-gifted children, regarding Social and Emotional Competence dimensions (Adaptability, Interpersonal, Intrapersonal and Stress Management).

Methodology

Participants

All participants were Portuguese parents; 217 are parents of non-gifted children from regular classes and 22 are parents from gifted children identified within special educational teams. The study was conducted from April to June, 2007.

Procedure

The administration of the questionnaires took place during a single fifty-minute session and in the presence of the researcher. Responses to the questionnaires were provided on a total voluntary basis. Collected data were analyzed through SPSS 16.

Measures

– **Bar On Emotional Quotient Inventory: Parents Version** (EQ-i:Pa; original version of Bar-On & Parker, 2004).

Emotional Intelligence dimensions were measured by EQ-i:Pa. This instrument is made up of 38 items and provides an indicator of perceived emotional intelligence levels. The participants are requested to evaluate the extent to which they agree with each of the items on a 4-point Likert-type scale that ranges from "Never" (1) to "Always" (4). The original scale is made up of six scales: *Intrapersonal, Interpersonal, Adaptability, Stress Management, General Mood, Positive Impression* (Bar-On & Parker, 2004). In Portuguese studies (Candeias et al., 2008) the questionnaire has great validity of construct, proved by factorial analyses, in which the multidimensionality of the questionnaire is shown, pointing out four dimensions: *Adaptability, Intrapersonal, Interpersonal scale, and Stress Management.* Candeias et al. (2008) found an internal consistency of .84 for Total EQ-i:Pa (Total EQ), and .79 for Adaptability scale (EQ-AS), .81 for Intrapersonal scale (EQ-PI), .78 for

Interpersonal scale(EQ-IS), and .71 for Stress Management (EQ-SM), improving the full version questionnaire properties.

– **Social Competence Test: Parents** (PACS- Pa, Candeias *et al.,* 2008):

Social Competence parents' perception was measured by means of the PACS-Pa. The participants are expected to analyse five interpersonal problem-situation (in a verbal format), in which the participants were requested to evaluate their child's *social competence performance and facility*, on a 1-to-3 Likert scale, in which 1 is "Poor" and 3 is "Excelent". Candeias et al. (2007) found an internal consistency of .71 for PACS-Pa, and points out a global interpretation from the dimensionality of the questionnaire, based on analysis of the validity of construct, proved by factorial analyses.

Results

A ANOVA One-Way was carried out to determine if there are differences in the groups of parents of gifted and non-gifted children concerning the variables studied, particularly, with respect to the parents' perception of their children's social and emotional competence(see Table 1).

Table 1: Mean levels of the studied variables in the groups of parents of gifted and non-gifted children.

Variables	Non-Gifted Parents Mean(SD)	Gifted Parents Mean (SD)	F	Sig.
Bar-On Parents Total	87,5 (49,2)	97,1 (43,7)	1,142	,286
Intrapersonal	46,3 (5,2)	43,8 (5,0)	5,325	,022
Adaptability	31,4 (4,4)	33,7 (3,7)	6,619	,011
Interpersonal	19,9 (3,8)	21,0 (3,4)	2,038	,154
Stress Management	26,7 (3,2)	25,6 (4,8)	2,658	,104
PACS-Pa	23,5 (3,9)	26,0 (2,6)	2,865	,092

The analyses have revealed significant differences between the groups with respect to the parents' perceptions of the *intrapersonal emotional competence* (p=.022) and *adaptability competence* (p=.011). Parents' perception of gifted children concerning emotional competence shows that these have a higher competence in the adaptability dimensions than in intrapersonal dimensions (gifted children are, then, perceived by their parents as being more competent in adaptability (p=.011).

In relation to non significant results gifted children are perceived as more competent by their parents, both in social and emotional competence, in general, and in interpersonal competence. Such results suggest that parents perceive gifted children as more flexible, realistic and effective in managing change. As Bar-on and Parker (2004) suggest, adaptability is associated to individuals that are good at finding positive ways of dealing with everyday problems. On the contrary, non gifted children are perceived by their parents as being more competent concerning the intrapersonal dimension of socio emotional competence (p=.022), as well as in stress management, in spite of its non significant difference.

Those results could suggest that parents perceive non-gifted children as individuals that understand their emotions and are able to express and communicate their feelings and needs.

Results of the statistical analyses which have been carried out show significant differences in parents' perceptions of social and emotional competences of gifted and non-gifted children.

Gifted children are perceived as showing better adaptability and flexibility to cope with and manage change. Non-gifted children are seen as more competent in intrapersonal expression and communicating emotions, feelings and needs. Results obtained suggest that exposition of gifted children to challenges, given their curiosity, creativity and willingness to learn, improves their flexibility and adaptability to change. These results are in accordance with the results obtained in the study of Candeias, 2004; Reis & Renzulli, 2004; Neihart et al.; 2001. Likewise gifted children use their abilities and talents with self-efficiency as part of their self-identify (Frey, 1991).

In Spite of those results non-gifted children are perceived as more competent in expressing emotions, feelings and needs. Such results are in accordance with some results obtained by Pérez,

2000; Brown, 2006 and Pires et al., 2008, that point out parents' perceptions of gifted children as having a tendency to be isolated. Their preference for isolation and their preference for intellectual activity do not favour gifted children's intrapersonal development.

In conclusion, the results of this study support the hypotheses raised in this article. Parents' perception of social and emotional competences, as parents are special observes of the child's continuous development and their perceptions, points out differences between gifted and non-gifted children's social and emotional competences. Such results could improve a better understanding of gifted and non-gifted child's needs and competences.

References

BarOn, R. & Parker, J. (2004). *BarOn Emotional Quotient Inventory: Youth Version (BarOn EQ-i:YV)*. Multi-Health Systems Inc.

Barrel. (1991). Creating our own pathways: Teaching students to think and become self-directed.In N. Colangelo, & G. A. Davis (Eds.), *Handbook of gifted education* (1st ed.) (pp. 256-270). Boston: Allyn and Bacon.

Brown, F. A., "'"Nerd Camp": Students' and Parents' Perceptions of Summer Programs for Gifted Students" (2006). *Human Development Honors Papers.* Paper 1. http://digitalcommons.conncoll.edu/humdevhp/1

Buescher, T. (1985). A framework for understanding the social and emotional development of gifted adolescents. *Roeper Review, 8*, 10-15.

Buescher, T. M., & Hingham, S. J. (1989). A developmental study of adjustment among gifted adolescents. In J. L. VanTassel-Baska, & P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners: The home, the self, and the school* (pp. 102-124). New York:Teachers College Press.

Callahan. (1991). The assessment of creativity. In N. Colangelo, & G. A. Davis (Eds.), *Handbook of gifted education.* (pp. 219-235). Boston: Allyn and Bacon.

Candeias, A. A. (2004). The influence of the psychological assessment of social intelligence on enrichment programs to gifted and talented students. In, European Council for High Ability (Ed.). *Educational Technology for Gifted Education From Information Age to Knowledge Era*, University of Navarra (Cd-Rom).

Candeias, A., Duarte, M., Araújo, L., Albano, A., Silvestre, A., Santos, A., Arguelles A., Claudino, P. (2003). Avaliação da sobredotação: Percepções parentais. *Sobredotação, 4,1,* 75-94.

Candeias, A. A., Almeida, L. S., Roazzi, A. & Primi, R. (2008). *Inteligência: Definição e medida na confluência de múltiplas concepções.* São Paulo: Casa do Psicólogo.

Dasen, P. & Perregaux, C. (2002). *Pourquoi des approches interculturelles en sciences de l'éducation?* Bruxelles: Éditons De Boeck Université.

Enerson, D. L. (1993). Summer residential programs: Academics and beyond. *Gifted Child Quarterly, 37*(4), 169-176.

Feldhusen, J. F. (1991). Effects of programs for the gifted: A search for evidence. In W. T. Southern, & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 133-147). New York: Teachers College Press.

Ford, M. (1989). Students' perceptions of affective issues impacting the social emotional development and school performance of Gifted/Talented youngsters. *Roeper Review, 11*(3), 131-134.

Freeman, J. (2000). The essencial context for gifts and talents. In K. A. Heller, F. J. Mönks, R. J. Sternberg & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed.) (pp. 573-583). Kidlington, Oxford, UK: Elsevier Science Ltd.

Frey, D. E. (1991). Psychosocial needs of the gifted adolescent. In M. Bireley, & J. Genshaft (Eds.), *Understanding the gifted student: Educational, developmental, and multicultural issues* (pp. 35-49). New York: Teachers College Press.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Goleman, D. (1995). *Emotional intelligence.* New York: Bantam.

Lens, W., & Rand, P. (2000). Motivation and cognition: Their role in the development of giftedness. In K. A. Heller, F. J. Mönks, R. J. Sternberg & R. F. Subotnik (Eds.), *International handbook of giftedness and talent*. (pp. 193-202). Kidlington, Oxford, UK: Elsevier Science Ltd.

Mayer, J. D., DiPaolo, M., & Salovey, P. (1990). Perceiving affective content in ambiguous visual stimuli: A component of emotional intelligence. *Journal of Personality Assessment,* 54, 772-781.

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey D. J. Sluyter (Eds.) *Emotional development and emotional intelligence*. New York: Basic Books.

Mayer, J. D., Salovey, P., & Caruso, D. (2000). Competing models of emotional intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence*. New York: Cambridge.

Mönks, F. J., & Mason, E. J. (2000). Developmental psychology and giftedness: Theories and research. In K. A. Heller, F. J. Mönks, R. J. Sternberg & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed.) (pp. 141-156). Kidlington, Oxford, UK: Elsevier Science Ltd.

Neihart, M.; Reis, S.; Robinson, N. & Moon, S. (2002). *The social and emotional development of gifted children*: *What do we Know?* Waco, Texas: Prufrock Press, Inc.

Newland, T. E. (1976). *The gifted in socioeducational perspective*. Englewood Cliffs, NewJersey: Prentice-Hall, Inc.

Olszewski-Kubilius, P. & Lee, S. (2004). Parent Perceptions of the Effects of the Saturday Enrichment Program on Gift Student's Talent Development. *Roeper Review*, 26 (3) 156-165.

Perez, L. (2000). Educación familiar de los niños sobredotados: necessidades y alternativas. *Sobredotação*. 1, (1), 47-64.

Pires, H., Matos, O. & Candeias, A. (2008). (Des)Encontros de pais com filhos sobredotados. *Psicología y Relaciones Interpersonales*. 20, (1) 4, 417-424.

Reis, S. & Renzulli, J. (2004). Current research on the social and emotional development of gifted and talented students: Good news and future possibilities. *Psychology in the Schools, 41 (1),* 119-130.

Silva, M. (1999). *Sobredotados: suas necessidades educativas específicas.* Porto: Porto Editora.

Thorndike, E. L. (1920). Intelligence and its uses. *Harper's Magazine, 140,* 227-235.

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Publications

- Candeias, A.A., Santo, M.J., Rebocho, M., Cortes, M.J., Santos, G., Chaleta, E., Grácio, L., Pires, H., Dias, C. & Rodrigues, J. (2008). Improvement Research Through Inclusive School – Iris -Reflections about assessment and intervention with students with special educational needs. International Journal of Development and Educational Psychology, 1 (4). (pp.405-416).
- Rebocho, M., Peniche, M., Baldeira, P., Lagartixo, S. & Candeias, A. A. (2005). A teoria das inteligências múltiplas aplicada a crianças com necessidades educativas especiais em contexto educativo. In, A. A. Candeias (Coordenação) (2005).

Edition

- Em Busca da Leitura Perdida, (2001). Evoratipo: Câmara Municipal de Arraiolos. Portugal.
- À Procura da Tradição, (1997). Regiset/ Setúbal: Câmara Municipal de Arraiolos. Portugal.

Presentations

- Social and Emotional Intelligence as Predictors of Social Competence .A study with Portuguese Children (2007). Poster.
- Social Intelligence, Emotional Intelligence and Social Competence, (2007) .- Poster.
- International Association of Cognitive Education and Psychology Conference held July 1-5, 2007 at the Conference Center of the University of Tennessee in Knoxville- Communication: Diagnosis Of Children's Cognitive Potential Based On Multiple Intelligence Approach.
- Communication: "Avaliação Dinâmica de Competências através do Modelo Das Inteligências Múltiplas em Alunos (Regime comum/NEE) do 1ºCiclo do Ensino Básico"-
- Communication: "Avaliação das Inteligências Múltiplas em Crianças do 2º ano de Escolaridade do Regime Educativo Comum e do Regime Educativo Especial".

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Patterns of Physics problem-solving among secondary school students
A metacognitive perspective

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Abstract

Recent work suggests that metacognitive skills play a vital role in problem-solving. Yet, there are only a few studies looking specifically into the role of metacognitive skills in Physics problem-solving, especially among the secondary school students. The research discussed here is an attempt to investigate the patterns of Physics problem-solving among Key Stage 4 (14-16 years old) students in Cambridge through the lens of metacognition using Grounded Theory. In order to match the students with "real" problems (i.e. that are difficult for them but solvable), 148 students from 5 schools were given a Physics Problems Test (PhyPT) consists of 6-8 Physics "problems" and followed by 2 questions to measure the level of difficulty of each problem. Later, 22 students were selected as theoretical sample (at different stages of the research) to undergo a session of individual problem-solving using thinking-aloud and observation by the researcher, followed by retrospective semi-structured interviews. In order to reach the theoretical saturation point, a few more problems were constructed to match the level of difficulty and conceptual understanding of these selected students. The thinking-aloud was being recorded, transcribed and coded using the constant comparative method of Grounded Theory. The analysis of the thinking-aloud protocols was supported by the analyses of data from the interviews, observations using video and analysis of answer sheets. The data analyses further suggested a few hypotheses to look in detail in order to generate more concrete pattern of Physics problem-solving. The repetition of the research in different format of problems and cycles of data collection-analysis produced two problem-solving patterns among the students. The saturated patterns suggest that students show different approaches when facing easy questions and difficult problems. The easy-question pattern is quite consistent and "expert-like" while more metacognitive skills are shown in the difficult-problem patterns. Students resort to means-end, trial-and-error and guessing strategies when facing with difficult problems. While in the easy-questions, the students are more likely to tell the concept involved and search for equation that is relevant to the questions due to the familiarity of the students with the questions. This suggests that training in doing particular types of exercise can help students in answering the questions easily, however, this doesn't mean that students have good problem-solving skills. In solving difficult problems, metacognitive skills help students to understand the problems and check the error by making sense of the answers obtained. Hence, it is a good practice for students to self-talk while solving a difficult Physics problem to improve the problem-solving.

Keywords: Physics problem-solving, secondary school, metacognition, thinking-aloud protocols.

1. Introduction

In 1994, a contemporary science philosopher, Karl Popper (1999) published a book in German entitled "All life is Problem Solving" suggesting that we can never escape from solving problems in our lives as problems arise together with life. This may be an arguable axiom, nonetheless it suggested the importance of problem-solving, especially in Physics education (Larkin & Reif, 1979; Bolton & Ross, 1996).

According to Bascones et al. (1985), "learning Physics is equated with developing problem-solving abilities, and achievement is measured by the number of problems which a student has correctly solved on a test." (p.253). In the 2005 UK A-Levels Examinations, while most of the subjects' pass rates increased, Physics was one of the three subjects (French and German) that decreased by 2% (Ross, 2005). Comparing the latest results of UK GCSE (General Certificate of Secondary Education) - 2006 and 2007, Biology and Chemistry showed improvement (2.3% and 0.7% respectively), in term of the percentage of students obtaining A* to C (BBC News, 2006 & 2007). However, Physics remained the same although research on Physics problem-solving has begun at least 47 years ago (Garrett, 1986).

It may be argued that there has not been any effective general methodology to teach Physics problem-solving (Husen & Postlethwaite, 1994; Mestre, 2001; Reinhold & Freudenreich, 2003).

Although a few researchers (e.g., Savage & Williams, 1990; Heller & Heller, 1995; etc.) have tried to introduce various kinds of Physics problem-solving models, the success of these models has yet to be reported. Furthermore, most of these models are designed for university-level Physics.

2. Constructivism and Physics Education

Watts & Pope (1989) suggested that constructivism is a practical theory that would shape the school Physics curriculum. From the perspective of pedagogical theory, constructivism provides a framework that enables teachers to view students as active learners who construct their knowledge upon the previous knowledge. The most important element of a constructivist view in education is that each student already has his/her own prior knowledge about certain concepts before entering the classroom. Hence, Ernest (1996) suggested that teachers need to be sensitive towards the students' prior knowledge.

In the case of teaching Physics problem-solving from the constructivists view, it is essential to understand how the students solve Physics problems before a more effective teaching method can be designed. Unfortunately, many of the studies in Physics problem-solving were focusing on the successful solvers or Physics expert such as professors, lecturers, graduates and university students in Physics (Simon & Simon, 1978; Larkin & Reif, 1979; Chi et al, 1981; Robertson, 1990; Kuo, 2004, to name a few). It is very common for researchers to investigate the model or pattern of problem-solving among these Physics experts and draw the conclusion that if the school students who are considered as novices can achieve the similar pattern, the students will become proficient problem-solvers as well.

From the constructivists view, it is not a good pedagogical practice to 'force' the students to accept a problem-solving model if they already have their own methods that are more suitable for them. In addition, without understanding how the students solve Physics problems using limited Physics knowledge and experience compared to the Physics experts, it is difficult to build on their previous experience. Hence, there is a need to investigate more in-depth the pattern of Physics problem-solving among these so-called novices.

3. Metacognitive Skills and Problem-Solving

There has been a shift in the theories used to explain general problem-solving, from behaviourism to cognition or information processing model (Mayer, 1991). At present, problem-solving can be viewed from the perspective of metacognition introduced by Flavell (1976).

However, after three decades, the term metacognition has evolved and become difficult to define because there are many different interpretations of metacognition (Manning & Payne, 1996). When a new journal entitled "Metacognition and Learning" was first published, the first paper presented by the editor, Veenman, et al. (2006) raised more questions than answers about the definition of metacognition compare to other similar concepts such as self-regulation, theory of mind, etc.

Therefore, in this paper, metacognition is defined to as knowledge and cognition about cognitive phenomena (Flavell, 1979). It includes the knowledge of general cognitive strategies, and knowledge about monitoring, evaluating and regulating these strategies (Jausovec, 1994). Examples like an individual who decided to jot down one particular point by thinking that he/she might forget about it, according to Flavell (1976) is a form of metacognition.

Although Mestre (2001) has recommended that metacognitive skills should be taught to students to help them in Physics problem-solving, there has yet to be any detailed study looking into the metacognitive aspect of Physics problem-solving among secondary school students. Indeed, most of the research has been carried out in the area of mathematics (Schoenfeld, 1992; Yeap, 1998; Goos, et al., 2002; Kramarski, et al, 2004 to name a few) with only a few in Physics (Heller & Heller, 1995; Henderson *et al.*, 2001; Kuo, 2004) in higher education level.

Thus, there is a need for an in-depth investigation of how secondary school students solve Physics problems from the perspective of metacognition.

4. Research Design

In order to carry out an in-depth investigation in an area which is almost unknown, a qualitative, open-ended yet generalisable method is needed. Grounded Theory (Glaser & Strauss, 1967) stands out from the rest of the qualitative methods because it does not just fulfil the criteria above but also offers essential thinking tools (e.g., coding, constant comparative analysis, theoretical sampling, etc.) to generate patterns through its rigid and systematic analysis procedures (Strauss & Corbin, 1990).

This study can be divided into six phases:

1. Pilot-testing;
2. Selecting sample;
3. In-depth investigation;
4. Data analysis;
5. Refine research; and
6. Writing.

Phase 1 is to establish Physics Problem Test (PhyPT) which contains 6-8 Physics questions that are suitable for Key Stage 4 students (14-16 years old). It also consists of two questionnaires following each question to determine the level of difficulty and familiarity of the students, so that a theoretical sample can be chosen from among 148 students using PhyPT in Phase 2 by matching students with real Physics problems (difficult yet solvable). This is because difficulty is one of the important criteria to ensure that students are solving problems not answering questions or doing exercise. As difficulty is relative to each individual (Gil-Perez, et al., 1990), not all the Physics questions designed will be real problems to all the students.

In Phase 3, 25 students were asked to do thinking-aloud while solving the Physics problems individually. Thinking-aloud is a low-cost research technique that elicits cognitive processes where the informant is asked to speak out (not describe) their thoughts while doing a task (Ericsson & Simon, 1980). They were given sufficient training before data was collected to ensure that the thinking-aloud became an automated process and cognitive effort would be fully directed towards solving the problems.

The thinking-aloud was recorded using a digital video camera and transcribed into thinking-aloud protocol for further analysis together with observation field notes, analysis of answer sheets and a retrospective interview to further understand the cognitive and metacognitive processes of the students.

In Phase 4, the process of data analysis using Grounded Theory started from open-coding, axial-coding to selective-coding (refer Strauss & Corbin, 1990). These were further scrutinised using the constant comparative method (Glaser & Strauss, 1967) until there were no more new categories, in another words the analysis has reached the state of theoretical saturation and a new theory/pattern was established. If this was not achieved, further data collection using a theoretical sample and refined method design in Phase 5 would be carried out bring the researcher back to Phase 1. The present study involved three stages of research design, data collection and analysis. It should be noted that these phases did not happen in a sequence. While some were repeated, others occurred concurrently, in particular Phase 3 and 4.

5. Data analysis

In an attempt to keep the length of this paper concise, the present report will only focus on the data obtained from two students (refer Phang (2006) for further details). Eddie and Fiona are both Year 10 students from the same school and had to answer four questions each After the retrospective

interview, Eddie's impression was that three out of the four questions had been difficult while Fiona only found two hard. As a result, Eddie only solved three and Fiona two of the four problems.

5.1 Eddie

In each protocol, after Eddie had read the problems, he started to make tentative plans to solve the first parts of the problems (refer Appendix A, Problem 1: lines 12-15; Problem 2: 9-13; Problem 3: 7-12). He would then carry out his tentative plans, either calculating or arranging information, and then proceeded to make the next plan (Problem 1: 26-27; Problem 2: 19; 25-27; Problem 3: 22-23; 47-51). He ended his calculations with an interpretation of his final answer that he derived (Problem 1: 41; Problem 2: 31-45; Problem 3: 147-152).

In Problem 2 and 3, he constantly checked his answers and reflected upon his current situation of problem-solving process. When asked why he did so in the retrospective interview, he said that it was because he felt that his answers were not very logical. In Problem 2, he repeated "100 metres in 20 seconds" 3 times (Problem 2: 35-41) because he was unsure of the meaning of this mathematical answer. In Problem 3, whenever he obtained a mathematical answer, he stopped to check and reflect upon it (Problem 3: 29-31; 36-42; 92-104; 122-135). The pattern of Physics problem-solving for Eddie can be summarised as shown in Figure 1.

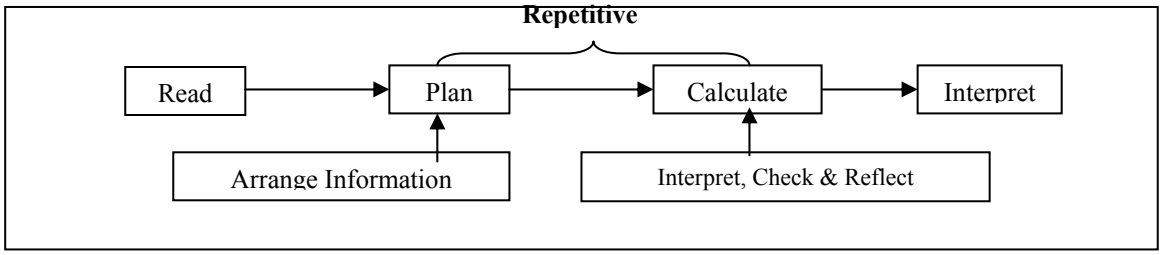

Figure 1: Pattern of Physics problem-solving for Eddie.

In addition, Eddie showed many metacognitive elements in planning, checking and reflecting his answers and calculations. Table 1 shows examples of the metacognitive statements in Problem 3. More metacognitive statements were found in the most difficult problem (Problem 3), when he was unsure of his answer, *Just check that now if I got that different from the first time*. And when he was sure of the checking, he said, *Yeah so I think I got that right.*

Table 1: Examples of metacognitive statements of Eddie in Problem 3.

In the step of…	**Thinking-aloud protocol**
Planning	10 Well I'll try to find the common one 11 Which is I'll do 2 multiply by 3 which equals 6 22 So, I'll convert 6 minutes into hours 23 It would be easier (see also examples in lines 50-51; 59-60; 86)
Checking	36 Seems too much 37 To be able to do in 1 hour 38 That's definitely too much to do that in 1 hour 99 So it doesn't make sense 100 So I'm just got to go back to the stage where
Reflecting	29 It seems quite a lot to me 30 Per hour 31 But I think I've got it 32 So I'll carry on also in lines 96; 132-134.

Metacognition seemed to help Eddie to stop and think about his answer and recheck it. Were the problem to be difficult, he would be more careful in reading the problem, take more time in interpreting the meaning of the answer and check to see if it made sense.

5.2 Fiona

In the case of Fiona, after she had read the problems, she started to interpret the meanings (Appendix B, Problem 1: 9-13; Problem 2: 7-12). Indeed, she tried to understand the meanings of the problems before she started to plan (Problem 1: 11-15; Problem 2: 7-11) and then executed the plan. In both of the problems, she identified an equation and rearranged the variables to find the intended variable (the time) (Problem 1: 17-29; Problem 2: 26-29).

Next, she calculated and then checked her answers (Problem 1: 39-44; Problem 2: 40-45). The checking helped her to identify errors or think of another way to solve the problem. From the analysis of her answer sheet for Problem 1, she tried two ways to ensure that she used the correct equation (in full terms and in symbols) and two ways to calculate "Jenny's" time (100/5.4 and 100/(100/18.5)). Hence, she had the ability to think of another way to solve the same problem. In the interview, when her solution was being questioned, she quickly suggested another solution. Below is an extract of the interview after she solved Problem 2:

> **Why did you look for speed when the question is asking for time?**
> Cause, because using speed you can find out time. I think, I just remember it. Cause, um, well probably if you work it out, 9000 divided by 800 and then, um timed that by 2 and 9000 divided by 900 and then times 3.

Fiona constantly checked her answers during calculations (Problem 1: 55-60; 76-81; 98-99). Finally, she ended her problem-solving by interpreting the meaning of the final answer to ensure that it made sense to her which she confirmed during the interview. Figure 2 illustrates Fiona's pattern of Physics problem-solving.

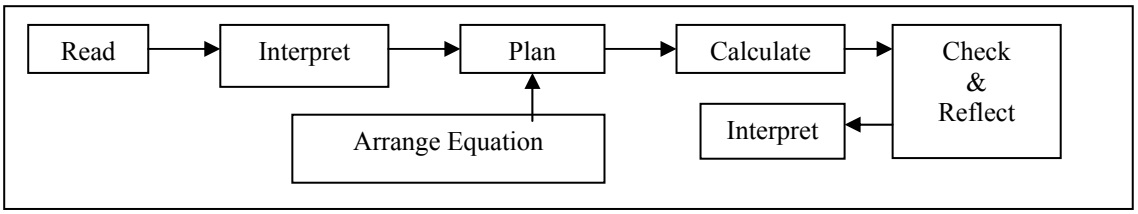

Figure 2: Pattern of Physics problem-solving for Fiona.

Fiona demonstrated great deal of metacognitive statements when she was checking and reflecting her answers (see Table 2). In Problem 1, she could not make sense of the time taken by 'Cynthia' (see Problem 1 in Appendix B) who Fiona thought was the fastest runner among the three runners because 'Cynthia' had the smallest value calculated in a question before it. After double-checked the answer in Problem 1, she finally realised that her mistake lied in the fact that she did not put the unit of "speed" for the answers in the question before it, which caused her to think that the values were time. She said,

108 *Ou!*
109 *Jenny*
110 *No, um*
111 *Sophia*
112 *If I write down the unit I would have understood it*

Table 2: Examples of metacognitive statements of Fiona in Problem 1.

In the step of…	**Thinking-aloud protocol**
Reflecting	36 To make it more accurate you have to do 43 Oh, no, that would be right 44 Ok, um 45 So I'll do the same for Sophia (see also in 72; 78-80; 95; 102-103; 111; 119 in Appendix B)
Checking	41 I'm not sure if that right 42 I'm gonna do it again 55 I think I've done this wrong 56 Cause 57 Um 58 I got a 59 Cynthia takes the most amount of time 60 Which is wrong 63; 65-67; 76; 81; 85-87; 98-99.

5.3 A more general pattern

By comparing the patterns of all the students, a more general pattern of Physics problem-solving can be generated as shown in Figure 3. A simplified pattern of problem-solving can be considered as reading the problem, followed by planning and finally calculation (denoted by double-lined arrows). These are the three parts of the pattern that have been obtained from all the students. It can be interpreted as a linear pattern of the problem-solving.

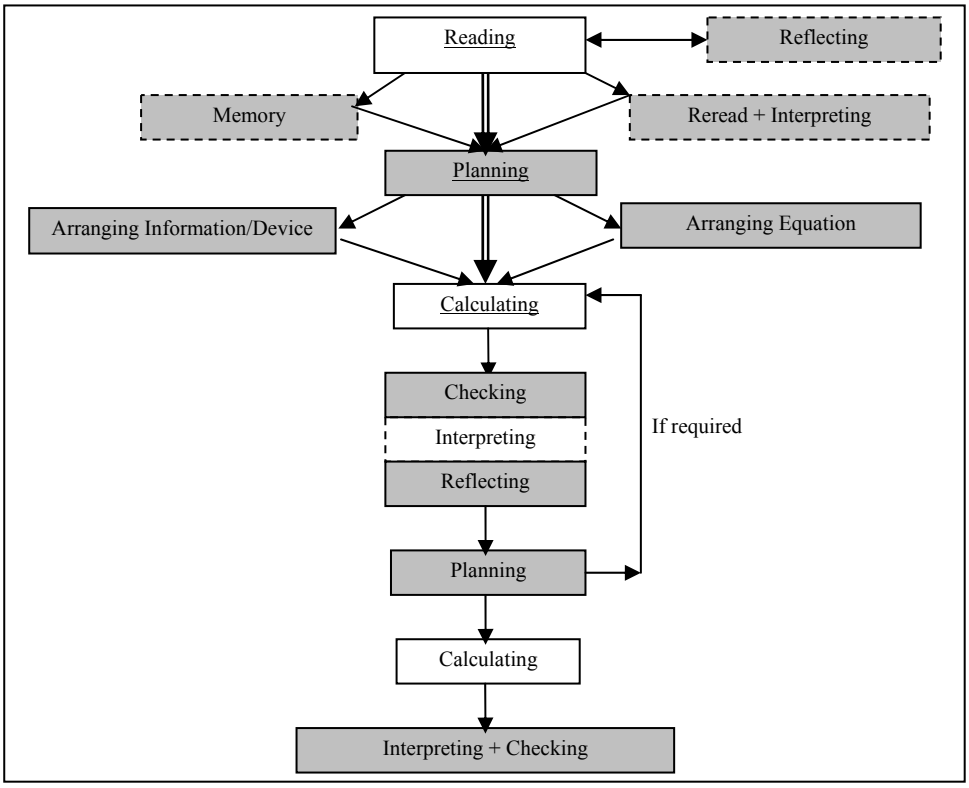

Figure 3: A general pattern of Physics problem-solving of the students.

Metacognitive elements are found at several steps in the pattern represented in Figure 3 (denoted by shaded-boxes). Appendix C provides a complete list of problem-solving processes and metacognitive skills in each process. This list is constructed through the rigorous coding and constant comparative method of Grounded Theory.

The use of memory, a metacognitive skill is exemplified by the students trying to match the problems with previous experience using the key words or features of the problems. Almost all the students showed metacognitive statements during planning and goals setting. They thought about what to do and used "if…then" sentence structure in this step (e.g.: Eddie, see Appendix A – Problem 2: 10-13). In the step of interpreting, metacognitive skills play a role in self-questioning about the meanings, trying to make sense and looking for a logical reason for the mathematical answer.

In the step of checking, metacognitive skills play a role in identifying errors and ambiguities in the calculations and answers. While in the step of reflecting, the students stopped and tried to monitor the progress of problem-solving and understand the current situation by self-questioning or pondering. In the final step of problem-solving, metacognitive skills helped the student to check the final answer by reminding him/herself to do the checking. From this study, metacognitive skills can be defined as the skills employed to think of one's thinking which are explicit during self-questioning.

6. Conclusion

From this study, many students have demonstrated metacognitive skills in Physics problem-solving in most of the crucial steps of problem-solving. The ability to monitor, regulate and evaluate

their mental processes in Physics problem-solving among the students showed that students applied higher order thinking skill. The students under studied had varying degree of achievement in Physics, yet they produced similar patterns of Physics problem-solving. The mastery of Physics knowledge really differentiated the quality of the solutions generated from their problem-solving processes. In general, these so-called novices have competent problem-solving skills in facing Physics problems in school. They use heuristic strategy like trial-and-error to reach a solution and always try to refer back to their experience in problem-solving to help them.

It is hoped that this research can provide new insights into how secondary school students solve Physics problems, especially if metacognition is taken into account. Finally, it would be of interest to carry out further instructional design on improving the students' problem-solving skills and metacognitive skills based on this deeper understanding of how the students go about finding solutions to Physics problems.

References

Bascones, J., V. Novak & J.D. Novak (1985). 'Alternative instructional systems and the development of problem-solving skills in physics.' *European Journal of Science Education* 7(3): 253-261.

BBC New (2006). Retrieved 29 May 2008, from http://news.bbc.co.uk/1/shared/bsp/hi/education/06/exam_results/gcse_fc/html/all_subjects.stm

BBC News (2007). Retrieved 29 May 2008, from http://news.bbc.co.uk/1/shared/bsp/hi/education/07/exam_results/gcse_fc/html/all_subjects.stm

Bolton, J. & S. Ross (1996). 'Developing student physics problem-solving skills.' *Physics Education:* 176-185.

Chi, M.T.H., P.J. Feltovich & R. Glaser (1981). 'Categorization and representation of physics problems by experts and novices.' *Cognitive Science* 5: 121-152.

Ericsson, K.A., & H.A. Simon (1980). 'Verbal reports as data.' *Psychological Review* 87: 215-251.

Ernest, P. (1996). 'Varieties of constructivism: their metaphors, epistemologies and pedagogical implications.' In: P.F.W. Preece(ed.) *Perspective on constructivism*. 73-92. Exeter: University of Exeter School of Education.

Flavell, J.H. (1976). 'Metacognitive aspects of problem solving.' In: L.B. Resnick(ed.), *The nature of intelligence,* 231-235. NJ: Lawrence Erlbaum Associates.

Flavell, J.H., (1979). 'Metacognition and cognitive monitoring – A new area of cognitive-developmental inquiry.' *American Psychology* 34: 906-911.

Garrett, R. M. (1986). Problem-solving in science education. *Studies in Science Education, 13*, 70-95.

Gil-Perez, D., A. Dumas-Carre, M. Caillot & J. Martinez Torregrosa (1990). 'Paper and pencil problem solving in the physical sciences as a research activity.' *Studies in Science Education, 18*, 137-151.

Glaser, B.G. & A.L. Strauss (1967). *The discovery of grounded theory – Strategies for qualitative research*. London: Weidenfeld & Nicolson.

Goos, M., P. Galbraith & P. Renshaw (2002). 'Socially mediated metacognition: Creating collaborative zones of proximal development in small group problem solving.' *Educational Studies in Mathematics* 49: 193-223.

Heller, K. & P. Heller (1995). *The competent problem solver, a strategy for solving problems in physics, Calculus version*. 2nd ed. Minneapolis: Mcgraw-Hill.

Henderson, C., K. Heller, P. Heller, V. Kuo & E. Yerushalmi (2001). 'Instructors' ideas about problem solving –Setting goals.' Paper presented at the Physics Education Research Conference, July 25-26, in NY, US.

Husen, T., & T.N. Postlethwaite (1994). *The international encyclopaedia of education (Vol. 8)*. 2nd ed. Oxford: Pergamon.

Jausovec, N. (1994). 'Metacognition in creative problem solving.' In: M.A. Runco(ed.), *Problem finding, problem solving & creativity,* 77-95. New Jersey: Ablex Publishing Corporation.

Kramarski, B., Z.R. Mevarech & M. Arami (2002). 'The effects of metacognitive instruction on solving mathematical authentic tasks.' *Educational Studies in Mathematics* 49: 225-250.
Kuo, V. (2004). 'An explanatory model of physics faculty conceptions about the problem-solving process.' Ph.D. diss., University of Minnesota.
Larkin, J.H. & F. Reif (1979). 'Understanding and teaching problem-solving in physics.' *European Journal of Science Education* 1(2): 191-203.
Manning, B.H., & B. D. Payne (1996). *Self-talk for teachers and students*. Needham Heights, MA: Allyn and Bacon.
Mayer, R. E. (1991). *Thinking, problem solving, cognition*. (2 ed.). New York: W. H. Freeman and Company.
Mestre, J.P. (2001). 'Implication of research on learning.' *Physics Education*, 36(1): 44-51.
Phang, F.A. (2006). 'The patterns of Physics Problem-solving from the perspective of metacognition' M.Phil. diss., University of Cambridge, UK.
Popper, K. (1999). Camiller, P. (translator). *All life is about problem solving*. London: Routledge.
Reinhold, R., & M. Freudenreich (2003). 'Learning with simulations and their effect on problem solving in the domain of physics.' Paper presented at the National Association for Research in Science Teaching (NARST) Annual Meeting, March 22-26, in Philadelphia, US.
Robertson, W.C. (1990). 'Detection of cognitive structure with protocol data: Predicting performance on physics transfer problems.' *Cognitive Science,* 14: 253-280.
Ross, T. (2005, 18 August 2005). More a grades than ever at A-level. Retrieved 1 December 2005, from http://education.independent.co.uk/news/article306734.ece
Savage, M. & J. Williams (1990). *Mechanics in action-modelling and practical investigations*. Cambridge: Cambridge University Press.
Schoenfeld, A.H. (1992). 'Learning to think mathematically: Problem solving, metacognition and sense-making in mathematics.' In: D. Grouws(ed.), *Handbook for research on mathematics teaching and learning*, 334-370. NY: Macmillan.
Simon, D.P., & H.A. Simon (1978). 'Individual differences in solving physics problems.' In: R.S. Siegler(ed.), *Children Thinking: What Develop?* 325-348. NJ: Lawrence Erlbaum Associates.
Strauss, A.L. & J.M. Corbin (1990). *Basic of qualitative research: Grounded theory procedures and techniques*. Thousand Oaks: Sage Publications.
Swanson, H. L. (1990). 'Influence of metacognitive knowledge and aptitude on problem solving.' *Journal of Educational Psychology* 82(2): 306-314.
Veenman, M.V.J., B. van Hout-Wolters & P. Afflerbach (2006). 'Metacognition and learning: conceptual and methodological considerations.' *Metacognition and Learning* 1(1): 3-14.
Watts, M. & M. Pope (1989). 'Thinking about thinking, learning about learning: constructivism in physics education.' *Physics Education* 24: 326-331.
Yeap, B. H. (1998). Metacognition in mathematical problem solving. Australian Association for Research in Education 1998 Annual Conference, Adelaide, from http://www.aare.edu.au/98pap/yea98408.htm

Appendix A – Thinking-aloud protocol of Eddie

Problem 1

1 Jenny is the winner of a 100 metre race
2 Sophia is the winner of a 800 metre race
3 And Cynthia is the winner of 500 metre race in your school
4 They all claim they are the fastest runner in the school
5 Jenny use 18 and a half seconds to finish the race
6 Sophia 144 seconds
7 And Cynthia 500 seconds
8 So tell me who is the fastest
9 Jenny does 100 metres in 18.5
10 Sophia does 800 metres in 144
11 And Cynthia 15 hundred metres in 500 seconds
12 So I'll divide
13 To find how fast they all run per metre
14 I divide
15 All of the time by how far they run
16 So
17 Jenny run a 100 metres and got 18 and a half
18 Seconds
19 So
20 Per metre
21 She… It would take her
22 Um
23 18 and a half seconds per 100 metres
24 It would be
25 (go get calculator)
26 Well, I change my mind
27 I decide to that I'm gonna find how quick they all run in 100 metres
28 So Jenny runs a 100 metres in 18.5 seconds
29 If Sophia run 800 metres in a 144 seconds
30 I do it 144 divided by 800
31 Equal 0.18
32 To 18 seconds
33 And
34 Cynthia
35 Runs
36 1500 metres in 500 seconds
37 So
38 I divided 500 by 1500
39 To get 0.3 recurring
40 Which is 33 seconds
41 So I think Sophia is the fastest runner

Problem 2

1 The record of the 100 metres
2 By 4 relay
3 In your school is 89.9 seconds
4 Jenny is the first runner in your team
5 Followed by Cynthia and Sophia
6 If they all run at their usual speed in question number 2
7 You as the last runner how fast should you run at least to beat 0.1 seconds of the record
8 Um
9 Well, I'm thinking again
10 If I find out
11 How long each of them takes to run their 100 metres
12 I'll be able to find out the remaining time which is the time I have to run
13 And then go 0.1 faster to beat it
14 So
15 I've got Jenny running in 18.5 seconds
16 Sophia in 18
17 And Cynthia in 33.3
18 So
19 If I'm taking out away from 89.9
20 89.9 take away 18.5
21 Take away 18
22 Take away 33.3
23 Leaving with 20.1
24 So
25 I know that if I want to beat the record
26 I need to do it in 20 seconds
27 So I should run
28 Mm…
29 I should run a 100 metres in 20 seconds
30 So
31 I should run
32 I've got
33 To beat the record I must run
34 20
35 I must run a 100 metres in 20 seconds
36 So
37 A 100 metres in 20 seconds
38 10 metres every 2 seconds
39 So
40 20
41 A 100 metres in 20 seconds
42 I have to run 10 metres in 2 seconds
43 And 1 metre in 0.2 seconds
44 So 0.2 metres per second
45 Yeah

Problem 3

1 You can cycle 800 metres in 2 minutes
2 Your friend can cycle 900 metres in 3 minutes
3 In a 9 kilometres race you want to finish it at the same time with your friend
4 If your friend starts cycling at 8.30 am
5 What time should you start cycling to reach the finishing line together
6 …
7 Try to find out
8 I can cycle 800 metres in 2 minutes and my friend 900 metres in 3 minutes
9 So
10 Well I'll try to find the common one
11 Which is I'll do 2 multiply by 3 which equals 6
12 And find how far we can both cycle in 6 minutes
13 So I'll do 800 multiple by 3
14 Which is 2400
15 So I can go 2400 metres in 6 minutes
16 And my friend can go
17 900
18 Times 2
19 1800 metres in 6 minutes
20 So
21 My friend starts cycling at 8.30 am
22 So, I'll convert 6 minutes into hours
23 It would be easier
24 So I multiply that by 10
25 And multiply that by 10
26 So every hour my friend can cycle 18000 kilometres
27 Yup
28 18000
29 It seems quite a lot to me
30 Per hour
31 But I think I've got it
32 So I'll carry on
33 And I can cycle
34 24000 kilometres
35 Per hour
36 Seems to much
37 To be able to do in 1 hour
38 That's definitely too much to do that in 1 hour
39 Oh, it's 18
40 It's metres
41 Not kilometres
42 Yeah
43 18000 metres per hour and 24000 metres per hour
44 Um
45 So
46 Ok
47 So if he is doing 18 kilometres per hour
48 And I'm doing 24
49 And he is leaving at 8.30
50 Well I'll
51 See how long it takes him until finish
52 So
53 If you does 24000 metres per hour
54 And a 1000 metres in a kilometre
55 24000 divided by a 1000
56 Nop, 18000 divided by 1000
57 Um
58 He starts cycling at 8.30
59 And I'm doing
60 Just find out how long it takes him
61 He got to go 9 kilometres
62 And if he can do
63 18000 metres in an hour
64 Then he can do 18000 divided by a 1000 kilometres an hour
65 So he can do 18 kilometres an hour
66 And if the race is 9 kilometres
67 Then 9 is half of 18
68 So I divide an hour by 30
69 Which is 15 minutes
70 So it's gonna take him 15 mintes
71 So he is gonna finish at 8.45 am
72 Now, me
73 I go 24000 metres per hour
74 So I go 24 kilometres per hour
75 So
76 If it is 9 kilometres
77 24 divided by 9
78 Which is
79 2.6
80 2.7
81 So
82 The 24 kilometres in an hour
83 I cycle 9 kilometres
84 So
85 20…
86 So I'm trying to find out how long it would take me to do 9 kilometres
87 So do 24 kilometres in one hour
88 24 divided by 9
89 Which is round to 2.7
90 So then I do
91 2.7 kilometres
92 Wait
93 24 kilometres an hour
94 9 kilometres it would take me 27 minutes
95 That's took him
96 I'm confused myself now cause I
97 It's taking me longer
98 But I cycle quicker per hour
99 So it doesn't make sense
100 So I'm just got to go back to the stage where
101 Right
102 He can do 18000 metres every hour
103 No
104 Which way is the question now
105 I can do 18000 metres every hour
106 Which means
107 I can do
108 If there is a 1000 metres in a kilometres
109 To find out how many kilometres you can do in an hour
110 I divide 18000 by 1000
111 It's 18
112 Yes
113 So I can do 18 kilometres per hour
114 If the race is 9 kilometres
115 I divide
116 Well a half of 18
117 You do 18 kilometres in an hour
118 You do 9 kilometres in half of that time
119 Which is 30 minutes
120 So I think
121 I'll be done at 9 am
122 Just check that now if I got that different from the first time
123 He's going at 18 kilometres per hour
124 Divided that by 2 you get 9
125 Divided an hour by 2 and you get 30 minutes
126 Yeah so I think I got that right
127 So I get there at 9
128 It's gonna take me until 9 am
129 If my friend starts cycling at 8.30
130 He…
131 Well
132 Well, I'm thinking he
133 Well
134 I'm thinking the back way well take me half an hour

135 The back way will take me 30 minutes
136 Now he starts cycling at 8.30
137 And
138 If he can go 24000 kilometres per hour
139 It would take him
140 He can go
141 Sorry 24 kilometres an hour
142 It would take him 26
143 27 minutes to round it up
144 To do the 9 kilometres
145 So I say I would have to leave
146 I'll do 30 takes away 27
147 Cause 30 is how long it takes me
148 And 27 is how long it takes him
149 So I need to leave 3 minutes before him
150 He starts cycling at 8.30
151 I'll start cycling at 8.27
152 I think

Appendix B – Thinking-aloud protocol of Fiona

Problem 1

1 The record of the 100 metres time 4 relay
2 Each run 100 metres
3 In your school is 89.9 seconds
4 Jenny in question number 2 is the first runner in your team
5 Followed by Cynthia and Sophia
6 If they all run at their usual speed as in question number 2
7 As the last
8 You as the last runner
9 How fast should you run to beat 0.1 second of the record
10 0.1 fast second faster than the record
11 So
12 Ok
13 They each run 100 metres
14 Then
15 The speed in metre per second
16 And
17 Speed equals distance divided by time
18 Then
19 Um
20 Um
21 The time equals distance divided by speed
22 So that means the time equals
23 Um
24 Distance divided by speed
25 Wait
26 Speed times time equal distance
27 So
28 Yeah
29 Time equals distance divided by speed
30 A…
31 So
32 A 100 divided 5.4
33 Well
34 Divided
35 Well
36 To make it more accurate you have to do
37 100 over 18.5 to get the answer for Jenny from question 2
38 So
39 And that equals
40 18.5
41 I'm not sure if that right
42 I'm gonna do it again
43 Oh, no, that would be right
44 Ok, um
45 So I'll do the same for Sophia
46 Sophia is 100 divided by 5.5 recurring
47 So
48 Um
49 18
50 And then Cynthia
51 Will be 100 divided by 3
52 Which equals to 33
53 …
54 Point
55 I think I've done this wrong
56 Cause
57 Um
58 I got a
59 Cynthia takes the most amount of time
60 Which is wrong
61 Cause she is the fastest
62 Um
63 Maybe got formula wrong
64 To write the formula
65 Cause I need
66 Speed equals distance over time
67 But then you can move that
68 Speed times time equal distance
69 And then
70 Divided both side by speed
71 Get time equals distance divided by speed
72 I'm not sure what is wrong
73 …
74 I'm not sure
75 …
76 Maybe this one is wrong (no. 2)
77 Um
78 I think that was fine
79 Um
80 I think
81 Or maybe I could try doing from the information I got here
82 1500
83 Um
84 Divided by 15 is 100
85 So if I divided this with 15 as well
86 I would get the seconds to take it to run 100 metres
87 I'll try that
88 So for Cynthia
89 It would be
90 500 divided by 15
91 Which is 33.3
92 And Jenny
93 Would be
94 18.5
95 I'm getting the same answer
96 Sophia is
97 144 divided by 800
98 On no
99 That's wrong
100 144 divided by 800
101 18
102 I don't know
103 I can't understand why it doesn't work
104 From here it seems like Cynthia is the fastest (no. 2)
105 But from this one (no. 3)
106 Seems like Sophia is the fastest
107 Because she run 100 metres using the least amount of time
108 Ou!
109 Jenny
110 No, um
111 Sophia
112 If I write down the unit I would have understood it
113 Ok
114 So I'll finish that
115 So
116 Ok I add them up
117 I get
118 33.3 to 18.5 to 18
119 Which go
120 69.8 seconds
121 Um
122 So
123 If I
124 Take that from 89.9
125 I get
126 20.1
127 Um
128 That would be the time I would be running
129 But have to beat it by 0.1
130 So I have to run in 20 seconds
131 Yeah

Problem 2

1 You can cycle 800 metres in 2 minutes
2 Your friend can cycle 900 metres in 3 minutes
3 In a 9 kilometre race
4 You want to finish at the same time with your friend
5 If your friend starts cycling at 8.30 am
6 What time should you start cycling to reach the finishing line together
7 Ok
8 Um
9 So your
10 Your friend can cycle 900 metres in 3 minutes
11 You can cycle 800 metres in 2 minutes
12 So I think I need to work out with the speed
13 So 800 divided by 2 is 400 metres per minute
14 And 900 divided by 3 is
15 Um
16 300 metres per minute
17 So
18 Um
19 What time should you start cycling to reach the finishing line
20 Um
21 How long is the race
22 Ou, 9 kilometres
23 Right
24 So 9 kilometres
25 Times
26 Speed equals
27 Speed equal distance over time
28 So
29 Time equals distance over speed
30 So um
31 800 divided by 400
32 No um
33 9 kilo
34 9000
35 That's metre
36 Divided by 400 is
37 Um
38 20.5
39 And that's you
40 And then 9000 divided by 300
41 Is
42 27 I think
43 I sort of check it
44 No, 30
45 Ok
46 So
47 A… ok
48 So
49 30
50 So
51 Take from 30 minutes
52 It takes you 22.5
53 So therefore
54 30 take
55 30 take 22.5 is the difference
56 Which would be 7.5
57 And then
58 So you need to leave 7.5 minutes later than him
59 So the time you need to start cycling is
60 8.37 and 5 seconds
61 am

Appendix C – List of problem-solving processes and metacognitive skills

Category	Sub-category	Metacognition	Description	Example*
Reading – the question	**Reading 1**	-	cognitive, understand the question, usually the first reading	If you are cycling from you house to the school which is 3 km away in a velocity of 5 m/s what is the latest time you should start cycling if you don't
	Reading 2	Monitor understanding/goal Reflect understanding	read (usually second reading) the question to further understand and find some clues (including the goal)	I just need to read through again Fran wears a slipper with the total area that touches the beach is 90 cm^2
	Reading 3	Checking answer	with **Checking 4**	And so To beat 0.1 seconds
	Reading 4	Regulating plan	with **Analysing 2**	In a 9 kilometre race You want to finish the same time as your friend If my friend starts cycling at 8.30
	Reading 6	Monitor understanding	with **Analysing 9**	Ian's weight is 68.25 Write that down 68.25 kg Jane's weight is 38.5 kg Kate's weight Is 52.5 kg
Reflecting – on the question	**Reflecting 1**	Monitor memory	remembering the question (as done or not done before, task	Oh I think I know this question because I remember it
	Reflecting 2	Regulating problem-solving process Reflecting answer	Realise mistake (make correction)	That's probably better thing to do than
	Reflecting 3	Reflecting on task	Difficulty of the problem (Task variable)	So this is very mathematical
	Reflecting 4	Reflecting on person	About ownself (personal variable)	Oh I don't know I don't think I can do this cause I have to
Analysing – what could be done	**Analysing 1**	Monitoring related concept	searching for the possible concept [time, distance]	To make the smallest impression You have to have the lowest weight Because you are not exerting much force on the ground
	Analysing 2	Monitoring and regulating concepts	show *understanding* by *rewording* the question in own words [which means] representation	So if I just do a diagram here
	Analysing 3	Monitoring understanding	the variables to match the possible equation/formula	So 9000 metres Um In 5 metres a second Which um Time is
	Analysing 4	Monitoring problem-solving process	the *current situation* [I got, I have] what I've done so far (calculated/interpreted not directly from the	So now I've got How long it would take them In second to run
	Analysing 7	Monitoring goal/plan	analysing *goal*, how to reach the goal	So you want the Same depth So you want the Heaviest person with the smallest area

	Analysing 8	Reflecting on planning/answer	*error/mistake*	Ok that does not make any sense Cause She obviously took more than 0.3 seconds to do that
	Analysing 9	Monitoring understanding	*key information* (variable)	Writing down or underline or circle the key information
	Analysing 12	Regulating understanding	converting into something easy	Oh in a 9 km race So that's how many metres That would be 9000
Planning – what need to be done	**Planning 1**	Regulating plan/goal	determining the goal	And we'll find who has the fastest
	Planning 2	Monitoring understanding and then regulating plan	**Analysing 3** and then do algebra (**Arranging 2** the equation)	So that's speed equals distance over time So do the distance divided by that
	Planning 3	Regulating plan	know exactly what to do next	Know what to do And now I want to divide
	Planning 4	Reflecting plan	(Trial & Error) say what to do next unsurely, do whatever that seems logical	But I'll just do it anyway
	Planning 5	Regulating plan/subgoal	determining the subgoal(s)	I will find out what my new record first
	Planning 6	Reflecting plan Monitoring problem-solving processing	improve the plan (another way)	Ok it's a different way of doing it now
	Planning 8	Monitoring understanding	Need to arrange the information (**Analysing 9**)	Um I write down each of their names and their speeds
	Planning 9	Regulating plan	Converting into something easy	Minute could be converted into second
Calculating – carry out the plan	**Calculating 1**	-	simply just calculation (cognitive)	Doing calculation
	Calculating 2	Checking answer	calculate and at the same time do **Checking**	1500 divided by 500 is 3 m/s so Yeah So 3 m/s
	Calculating 3	Monitoring problem-solving process	with **Justifying**	So it's 1500 times 4 because It's 1500 and it takes 4 seconds So that's 6000 metres
	Calculating 5	Monitoring problem-solving process	Emphasis on the units (cause checking)	Equal em 69.8 seconds Second
Answering – the question	**Answering 1**	-	answering the question or reach the goal	Stating the answer
	Answering 2	Monitoring problem-solving process	reaching subgoal, restating the answer	That's Sophia and Cynthia
Interpreting – give another meaning	**Interpreting 2**	Checking answer	the meaning of the answer [that would be a car's speed]	So I am cycling faster than them
	Interpretin	Reflecting answer	logic of the answer	That can't be right
	Interpreting 4	Reflecting answer	Put in the units to understand the meaning	What you call Seconds
Checking – go through again, either answers, steps, plans, etc.	**Checking 1**	Checking answer	simply just look back again (recap)	I think that's right (Nick 4)
	Checking 2	Checking equation	checking the logic of the equation	Checking Equation
	Checking 3	Checking answer	checking the answer by **Interpreting**	Which seems about right Cause Jenny only 0.1 m/s slower than her So yeah

	Checking 4	Monitoring goal	**Reading** to see if the goal is achieved as required by the question	Yeah I think that's right Put them in order from the deepest to the shallowest
	Checking 5	Reflecting plan	checking the plan/analysis	144 divided by 800 or is it the other way
	Checking 6	Checking answer/plan	checking the steps, go back and do again	Make calculation again using the same way to check the answer or steps
	Checking 7	FOK	FOK, turn back and	Sense a mistake
	Checking 8	Checking answer	another way of calculation to check	Checking using another way
	Checking 9	Checking answer Monitoring problem-solving process	**Reading 2** if misread or miss the clue/cue of the question	Go back and read the important part of the question to follow the calculation
Testing – think of a plan and check if it's working	**Testing 1**	Checking plan	Arrange the equation and try if it works	So I'm going to do trial and error
Justifying	**Justifying 1**	Reflecting	Using *because/cause* to justify the reason to do something or thinking in such a way	This is because...

***The examples when quoted out of the protocols lose their contexts hence may not appear to be as the descriptions.**

About the Author

(E.19)

Rachel Zahn, Balance as a Function of Intelligence: proprioception and its relationship to excellence: New and profound discoveries in cognitive neuroscience, such as neuroplasticity and mirror neurons, have recently been rapidly "packaged" and applied to learning theory. For those who have working experience with adult gifted children, there is a more direct line of research now gaining visibility, namely the importance of balance and the part it plays in human performance. Neuroscientists call it the "sixth sense", or "the brain's sense of movement". As background we introduce the functional anatomy of balance which involves cooperation of the proprioceptive, vestibular, and visual systems. Following touch, the vestibular system is the next most precocious sensory skill, playing an important role in neurological development from embryo through puberty. We then address the effect of the fear of falling and failing and of chronic states of stress on balance and coordination. The most important intellectual and emotional *un*-learning necessary for high performance excellence concerns the so called "Mind-body problem", namely the dissociative cognitive patterns that have emerged from culturally embedded dualism (mind versus body). Neuroscience now recognizes the error of dualism and a great debate rages about the *embodiment of mind.* The durable success of high performance training of adults, whether in the arts, sports, or intellectual creativity, depends upon the *re-embodiment* of mind, for which we present three methods with a long and successful track record in helping high performers. The key conclusion in this paper is that these successful "sixth sense" techniques may be integrated in school curricula, suitably adapted for children, with a smoother and easier process unencumbered by later mind-body dissociation.

About the Author

Rachel Zahn having completed extensive theatre training at Maryland University and Catholic University, also graduated from the American Center for the Alexander Technique (1969). During the 1970's, she also studied proprioceptive training with Moshe Feldenkrais, Charlotte Selver, and Elaine Summers. She became an assistant trainer at the Juilliard School of Music in New York and in 1973, was funded by the Ford Foundation, to train actors in the Alexander Technique, at Shakespeare & Company, Stratford England. The 1970's and 80's proved to be a fruitful period of collaboration with psychologists, which produced a unique interdisciplinary approach to the psychophysical process of 'high performance' in actors, musicians, athletes, and original thinkers. Her professional training has never ceased. She is a trained Gestalt- Ericksonian-EMDR psychotherapist as well as a specialist in the psychology of physical rehabilitation.

Her intercultural interests were inspired by an unusual mentoring by the American anthropologist Margaret Mead, who gave her the responsibility of applying Mead's model of global cooperation to practical use. This task motivated her to embark on two doctorates: The relationship between global thinking and intercultural communication (Union Institute, USA) and Pratique psychophysique et problème esprit-corps au 20ème siècle (Université Paris 1, Sorbonne-Pantheon and CREA, l'École polytechnique). The final aspect of Mead's task will be to analyze the affects that discoveries in brain research, such as mirror neurons, will have upon learning theory and educational philosophy. She conducts seminars internationally.

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(E.20)

Jolana Laznibatova; Lubica Vrankova, Grammar and High School for gifted children: Support and Education of Gifted Children in Slovakia: In Slovakia we have a special educational system for intellectually gifted children based around a curriculum of education for gifted children. In the attachment there is information that explains the details of our Project and the different possibilities of our alternative education program that was first establish in 1993. Gradually more schools from bigger cities have joined our Project network. Currently there are 3200 students from 29 cities in Slovakia participating in our network of schools that have complied with our curriculum criteria for being included in our educational program. There is an independent school in Bratislava for children from 6 to 18 years old, that provides educational access to the program from the first grade up to the final exams at the senior level of high school. This Bratislava site functions like as a coordination and methodological center for the whole Project. Our network of schools is connected by common educational methods, rules and procedures. In addition to school pedagogical-psychological counseling is also provide as a part of the program. The result of the combined efforts of all of our experts in the field of the education of the gifted is the creation of additional educational textbooks, methodic materials, written guidelines for working with gifted children are all summarized in the project we call APROGEN.

About the Author

Lubica Vrankova graduated with a degree in psychology in 1983. For almost 20 years she worked in Topolcany at a pedagogical and psychological counseling office where she assisted client children with their educational and psychological difficulties and provided counseling for their parents and teachers. Ten years after she started practicing a new project addressing the challenges of alternative education for gifted children has initiated. Dr. Vrankova thereafter began a close cooperation with Dr. Jolana Laznibatova the author of this project. In 1999 the project was successfully introduced into the educational system in Slovakia. Thanks to the enthusiasm of the parents and teachers of the Topolcany this district became part of the growing network for Gifted and Talented children in Slovakia. Since 2001 Dr. Vrankova has been working at the school for gifted children in Bratislava as a school psychologist. Dr. Vrankova is participating in managing methodological and professional counseling offices and schools. Her activities support the development and education of gifted children in Slovakia.

(E.21)

Pin-Chen Lin, Students' attitude toward science and NOS in Taitung, in Taiwan: The purpose of this research is to comprehend the influence of the background of high school students and teachers. 1380 seventh, ninth, tenth, and twelfth grades in Taitung responded to the scale of the attitude toward science and nature of science by Neuhaus, Sandmann, & Chang (2006), including six subscales, source of science knowledge, certainty of science knowledge, development of science knowledge, justification of science knowledge, importance of science research for society, enthusiasm to work in the field of science research. Data analysis uses chi-square, one-way ANOVA, t-test, and linear regression. The study revealed that the adolescents with different schools, grades, genders, and races had variant perspectives on several items of all subscales. However, 12 of them with positive scientific attitude gave coherencyï,¾contemporary viewpoints except the first subscale in the interviews. Researcher inferred the quality of the statements in the scale resulted in the understanding of the meaning of the themeï,¾source of science knowledge. Moreover, 12 interviewees represented the partial essence of the exploration of science, the only open question in the scale; thus researcher thought it is caused by the inadequate learning of the science.

(E.22)

Ronald Tang Wai-yan, Ethical leadership: the foundation of excellence and creativity in education: This paper is based on an argument generated from a Gadamerian view of the importance of ethics as the basis for nurturing excellence and creativity in the process of education. It postulates that the notion of excellence and creativity be conceptualized as an ethical rather than a technical issue. In light of jazz as a metaphor, Gadamer's philosophy of 'dialogic hermeneutics' will be explored to shed light on the kind of condition or structure within which excellence and creativity could be nurtured where Gadamer's three moments of hermeneutic process: namely, understanding, interpretation, and application will be discussed in details within the context of jazz improvisation.

(E.23)

Violeta Arancibia; D. Preiss, M. MuÃoz; R. Rosas, E. San MartÃn; S. Valenzuela, Use of Creativity Test to identified 6 to 10 years-old talented children of low-income schools in Chile: A novel identification and selection system was adapted using Sternberg and Col theory. This process involved three different tests to detect analytic abilities, assess practical intelligence and determine creativity level of the children (Preiss, Arancibia, MuÃ±oz, Rosas, San MartÃn, Valenzuela, 2007). This Creativity test is one of the first psychological instruments adapted to Chilean population. Among its main features is his friendly design specially targeting the very young and his unbiased with social and economic disadvantaged samples. This test, also, can be used as a comparative measure within large samples, more than 120 subjects. In this test, the subjects are asked to create a product to resolve a difficult problem in a creative manner. The task assigned for this test has been widely used by Sternberg. In the Chilean version, the children should create a toy from a set of stickers that include different shapes, colors and sizes. The sample included 116 public elementary classes of the Metropolitana region of Chile. During the months of May to August the test was run for 4.076 students: 986 first graders, 982 second graders, 1023 third graders and 1085 fourth graders. The results pointed that less than 5 % of all the assessed population got the highest score (4) and approximately 15% of them, got score 3. So, in order to detect highly creative children, the researchers suggest the use of score 4 as a referent.

(E.24)

Specific and creative abilities:

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Abstract

The aim of the present research was to determine whether creative abilities are domain-specific characteristics for a given specific ability. The research covered 255 students with linguistic, musical, visual, mathematical and dancing abilities. The level and kind of creative abilities were evaluated with the Guilford's Alternate Uses Test (AUT) and Jellen and Urban's Test for Creative Thinking. Factor analyses facilitated the differentiation between five first order factors and two second order factors connected with opening and closing information structures. People of different specific abilities revealed different levels and profiles of the factors differentiated. The highest scores were reported for people with linguistic and visual abilities, while the lowest scores – with musical and mathematical abilities. At the same time scores were reported showing similar factor profiles in people with linguistic, visual and dancing skills, whereas individuals with mathematical and musical abilities demonstrated profiles opposite to each other. The paper discusses the results in the context of functional theory of abilities.

Introduction

The classical difference approach defines specific abilities as the characteristics that allow outstanding achievements in specific fields of activity, for example in mathematics, music or visual arts. In this context specific abilities are defined by a set of personality traits (Gagné, 2005, Piirto, 1999, Renzulli, 2005). However, numerous studies point to two kinds of dispositions related to human abilities. The first one, global in character, refers to the mind as a whole, whereas the other one concerns the local abilities, that is the units specialised in the reception and processing of specific stimuli. In the cognitive science approach abilities are understood as the operation of a certain cognitive process, involving the following functions: memory, attention, cognitive strategies and information processing (Necka, 2003, Nosal, 1990, Sternberg, 2007). The above mentioned dispositions correspond to two types of abilities, defined as general and special ones, the latter of which are labelled specific abilities and include artistic, musical and other abilities (Nosal 1990, 1992). A similar problem with definitions can be traced in the theories of creative abilities, which are described as individual characteristics that allow inventing new, original and valuable solutions to a problem, simultaneously involving openness to information, extended and versatile investigation with changes of points of view, restructuring problems and tolerance for ambiguity (Necka, 2001, Stein, 1953, Sternberg, 2007). Some researchers claim, however, that creative thinking is better defined by means of the processing approach and that to refer to a creative mode of functioning or creative strategies for information processing is more appropriate (Necka, 2001, Nosal, 1990, 1992, Sternberg, 2007) than the insistence on separate creative abilities. Not with standing the adopted approach, there arises the question about the general or specific characteristics of creative abilities or the general vs. specific character of creative information processing.

The problem of the general vs. specific creative abilities is not a new one. Joy P. Guilford (1978) located the source of creativity in divergent thinking, manifested through fluency, flexibility and originality of thinking. According to Guilford, divergent production is connected with a specific discipline. The researcher proposes a number of tests which allow to diagnose divergent thinking on figural, symbolic, semantic and behavioural material.

Apart from Guilford's scales (1978), there is also a range of other techniques used to diagnose creative abilities, among others: the Test for Creative Thinking - Drawing Production by Urban and Jellen (Urban, 1996, 2004) and Torrance's tests, which include verbal, drawing, audio and motor tests (Anastasi, 1990).

Research conducted by John Baer (1993) proves that there are several types of divergent abilities connected with the specificity of the processed material. Analysing the test results, the author concludes that divergent thinking varies depending on the field of activity. According to Baer, the cognitive mechanisms forming the basis for divergent thinking are specific to each field. Therefore, it would seem more appropriate to talk of several types of divergent abilities rather than about a single

ability connected with creative thinking. The researcher claims that approaching divergent abilities as general thinking is largely a theoretical construct, which allows an easier conceptualisation of the phenomenon of creativity (Baer, 1999). Both Guilford and Baer suggest that divergent abilities may vary significantly in the context of a specific activity of an individual human being. In fact, according to Baer, they may vary so much that in order to solve different types of open-ended tasks several types of divergent abilities are used. In recent years James C. Kaufman and John Baer (2004) have worked out the Creativity Scale for Diverse Domains. The scale comprises variables connected with creativity defined as general disposition and as characteristics related to the specificity of a given field of activity. Many researchers believe that the tests conducted so far have not justified the thesis about general creativity, because the measurements of creative abilities depends largely on specific abilities of the examined individual (Baer, 1993, Chruszczewski, 2005, Kaufman, Baer, 2005, Limont, 1994, 1996, Matczak, 1994).

The issue of general creativity vs. field specific creative abilities is a central theme of the study by the authors who do research on creativity in the context of the various fields of activity of a human being (Kaufman, Baer (ed.), 2005). The editors of the book propose a dualistic character of creative abilities, claiming that this dualism is related to the level of analysis of these dispositions. When they are considered on an abstract level, they reveal the character of the general thinking process. However, when analysed in the context of specific productions and actions, they show specific domain characteristics (Baer, Kaufman, 2005, Plucker, 2005). Jonathan A. Plucker defines this dualism as a hybrid position of creative abilities that connects general characteristics with simultaneous revelation of specific domain. As to Kaufman and Baer (2005), they emphasise that the issue of general vs. specific creative abilities is connected with the hierarchic structure of the creative dispositions. They argue that intelligence, motivation and environment are of primary importance, general thematic areas are general in character as well, and the specificity of creative ability can be discussed only in the context of a specific field or micro-field.

In order to discuss the issue analysed in this article, it is important to refer to the research done by Czeslaw S. Nosal (1990, 1992), who claims that complex information processing procedures, involving cyclical opening and closing of information structures, form the basis of creative abilities. The researcher argues that creative abilities are hierarchic. The first level comprises metacognition, such as goals or evaluation criteria, the second one is related to the cognitive processes involved in performing a specific task.

The present study

Research questions and hypotheses

The data obtained from research suggests a controversy concerning the character of creative abilities and their dualism. The dualism is related to the issue of the general vs. domain specific nature of creative abilities. The general aspect of creative skills is defined in the context of information processing or its structural character. Specificity is associated with creative abilities identified as divergent creativity involved in solving specific problems or tasks.

The results of experiments presented below assumed that individuals with various specific abilities would show various characteristics of creative abilities. It was expected that the difference will be related to the level of generality vs. specific domain as well as the specific profile of creative abilities

Subjects

The experiment was conducted on 1st and 2nd-year students of languages, sciences, music, visual arts and dance (Table 1) in the age group 17-30. 344 students (201 women, 143 men) were tested. The analysis is based on the results of 225 students (135 women, 120 men). The participants' age and sex were the qualifying criteria for the analysis. Each of the 5 groups contained 25 women and 25 men, with the exception of the group of individuals of gifted dancers, where 35 women and 20 men were tested.

Table 1: Characteristics of participants.

Abilities	Faculty	institution of higher education, school	number of tested individuals			
			F		M	
			Stage			
			I	II	I	II
Linguistic	philosophy, Polish philology	Nicolaus Copernicus University in Torun	42	25	28	25
mathematical	mathematics, computer science	Nicolaus Copernicus University in Torun	42	25	43	25
Musical	artistic education in music	Adam Mickiewicz University in Poznan The University of Zielona Gora	41	25	25	25
Artistic	artistic education in visual arts; interior design; graphic art; painting; sculpture	The Fine Arts Academy in Gdansk Nicolaus Copernicus University in Torun The University of Zielona Gora	30	25	26	25
Dance	ballet school; dance group*	State Ballet Schools in Gdnsk; Lodz; Warsaw; A Dance group in Torun	46	35	21	20
Total			201	135	143	120

Stage I - number of individuals in each group.
Stage II - number of individuals in each group included in the analysis on the basis of the qualification criterion.

Instruments used

Divergent abilities test

In order to assess the level of divergent abilities, Joy P. Guilford's (1978) Alternate Uses Test (AUT) was applied. The participant's task is to make the longest list possible of the uses of an object specified in the instruction. In this case the object was a "bottle."

This test allows identifying divergent abilities by means of three variables: fluency - the number of generated ideas; flexibility - variety of answers; and originality - unique ideas. The above mentioned variables were assessed in relation to answers by all the participants tested by three competent judges. The test was conducted in accordance with the procedure recommended by Guilford within the time limit of 10 minutes.

Creative thinking test

Creative thinking was assessed on the basis of Klaus K. Urban and Hans G. Jellen's (Urban, 1996, 2004) Test for Creative Thinking - Drawing Production (TCT-DP). Urban (1990, 1996) indicates several important characteristics of the creative process, which formed the basis for the construction of the test. These include: insight and sensitivity allowing understanding of the problem; the broadness of perception of available data completed by additional information; searching a solution to the problem, data analysis and its flexible processing and redefining with the help of imagination, knowledge and experience; structuring and synthesising of partial solutions; newness of the elaborated product and its availability and significance to others.

The TCT-DP form is an A4-format sheet with a space limited by a square frame. Outside of it, on the right, there is a small open (3 sides only) square. The space within the frame contains five graphic symbols: a semicircle, sinuous line, straight dashed line, two lines at the right angle and a dot.

The task of the participant is to finish the drawing and give it an appropriate title.

The TCT-DP Test assesses 14 detailed elements: continuations; completion; new elements; connections made with a line; connections made to produce a theme; boundary breaking that is

fragment dependent (use of the 'small' open square); boundary breaking that is fragment independent; perspective; humor and affectivity; unconventionality, a - any manipulation of the material; unconventionality, b - any surrealistic, fictional and/or abstract elements or drawings; unconventionality; c - any usage of symbols or signs; unconventionality, d - unconventional use of given fragments; speed; and one general variable, namely the total amount of points from all the detailed variables.

The test was conducted in accordance with the suggested time limit of 15 minutes.

Procedure

The experiment was conducted in 2002-2004 on 1st and 2nd-year students at institutions of higher education and ballet schools all over Poland (Table 1.). All students agreed to participate in the research and were informed that it was anonymous. During the first stage students from selected faculties took the AUT and TCT-DP tests. During the second stage more individuals of the same age and sex as the previous group but with different specific abilities were tested (Trela, 2006).

Results

The first stage of the statistical analysis was the investigation of the internal structure of the Alternate Uses Test (AUT) and the Test for Creative Thinking - Drawing Production (TCT-DP), using the factor analysis. The analysis showed that the AUT has a homogenous factor structure. The Principal Component Analysis (PCA) allowed to extract one factor, which this study refers to as divergency, which explains 63% variability among observed variables. Factor loadings of all the observed variables of the AUT (Table 2) indicate a high level of the extracted factor. The factor analysis of the TCT-DP, using the PCA with Oblimin rotation method allowed extracting four significant factors, explaining the total 63% variability among observed variables.

The factor referred to as connection contains five indicators, including connections made with a line, connections made to produce a theme, new elements, completion and perspective. The boundary breaking factor includes indicators such as breaking beyond the square frame and incorporating of the small square into the drawing. The unconventionality factor contains indicators such as abstraction and non-stereotypicality. The non-typicality factor includes the observed variables connected with unconventional manipulation, humour and affectivity as well as figural-symbolic connections.

Table 2: Results of the first order factor analysis.

Factors	**Factor loadings of test variables**
Alternate Uses Test	
divergency	fluency, (0,62)*; originality (0,78); spontaneous semantic flexibility (0,88).
Test for Creative Thinking - Drawing Production	
connections	connections made with a line (0,79), new elements (0,74), connections made to produce a theme (0,69), completions (0,65), perspective (0,60),
boundary breaking	extension to the outside of the square frame (0,62), the "small square" located outside the square frame (0,56),
unconventionality	abstraction (0,78), non-stereotypicality (0,78)
non-typicality	unconventional manipulation (0,71), humour and affectivity (0,62), figural-symbolic connection (0,48)

*Factor loadings in brackets

Subsequently, second order factor analysis was performed**,** using the PCA with Oblimin rotation method. This analysis allowed extracting two factors explaining 55% variability among observed variables. The first factor explains 39% variability and the second one 19% variability. The second-

order factors are characterised by relative independence of each other, which is suggested by the low level of correlation between them (r=0,163).

Table 3: Factors extracted in first- and second-order analysis.

factors extracted in the first-order analysis (variables from tests)	description of variables
opening of information structures**	
divergency (0,68)* (fluency, flexibility, originality)	multiple, various and rare solutions
unconventionality (0,68)* (abstraction)	symbolic message of the drawing, introducing surreal or fictional elements into drawings
(non-stereotypicality)	use of elements in an unusual way
non-typicality (0,73)* (unconventional manipulation)	non-standard use of the test sheet
(humour and affectivity)	subjective evaluation of the comic or emotional message of the drawing
(figural-symbolic connections)	introducing symbols into the drawing
closing of information structures**	
connections (0,78)* (perspective)	every attempt at perspectivist approach
(completion)	every case of continuation, through which a new quality is added to the element
(connections made to produce a theme)	occurrence of continued or new elements connected with the drawing
(new elements)	new or independent objects
(connections made with a line)	physical connections of continued or new elements within or outside the frame
boundary breaking (0,76)* (the "small open square" outside of the square frame)	use of the small square
(extension to the outside of the square frame)	intentional extension beyond the frame

The name of the variable in brackets;
* Factor loadings in brackets.
** Factors extracted in the second order analysis

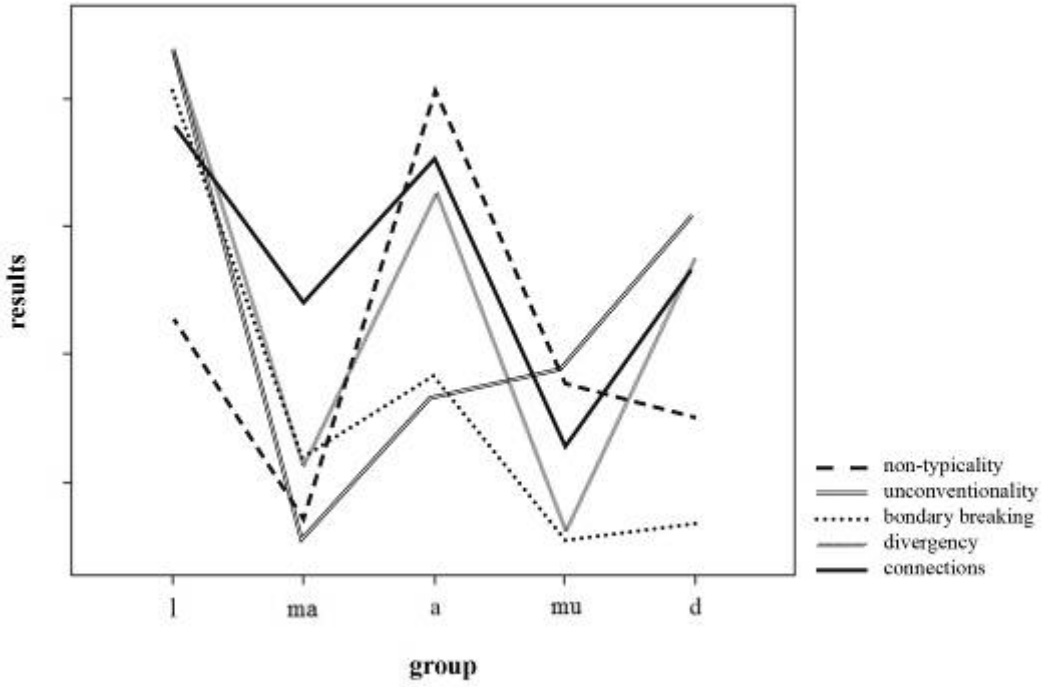
The first order factor (Table 3) contains divergency, unconventionality, and non-typicality. The quality description of this factor contains the following variables: fluency, flexibility, originality, the usage of symbols and rarely used elements, including surrealistic or fantastic ones, humour and affectivity. The description of the first factor indicates its connection to the process of searching for solution strategies, the reorganisation of tasks, using unusual associations and solutions, the acceptance and tolerance for contradictions, complexity and variety. This factor is related to the broad opening of existing information structures.

The second factor contains connections and boundary breaking. Qualitative description of this factor draws on attempts to see in perspective, various types of continuations, connections, new relatively independent elements, creating structures from the elements within the frame, beyond the frame and from drawings of new elements. Because of the qualitative aspect of this factor, which contains structuralisation, ordering and inclusion, it can be referred to as closing of structures.

Results of analysis of variance between the groups

The second order factor analysis allowed extracting two strong factors, independent of each other, which are constituted by five factors extracted in the first-order analysis. The next stage of the study was the analysis of ANOVA variance of the results of individuals with various specific abilities, which was carried out taking into account the results of the first-order factor analysis.

Chart 1: Results of individuals with various specific abilities in relation to the factors extracted in the first-order analysis**.**



Symbols: l-linguistic; ma-mathematical; a-artistic; mu-musical; d-dance.
The chart shows result profiles for each group.

The analysis of variance in relation to the divergency factor shows that the differences in results between various groups are statistically significant $F(9,342)=12.13$; $p<0.001$. The group of linguistically talented students won definitely the highest rates, followed by the visual art and dance groups. The results of the visual arts group do not differ significantly in terms of statistics from either the linguistically gifted (higher result) or the talented dancers (lower result). However, the results of individuals from the dance group differ from those obtained by the linguistically gifted one. The musically and mathematically talented scored the lowest, and the results from the two groups do not differ from each other, yet the statistics show a significant difference from the results of the individuals in the other groups.

The analysis of variance performed in order to specify the differences in relation to the connection factor indicates that these differences are statistically significant $F(9,342)=7.63$; $p<0.001$. The group of linguistically talented students won the highest average rates, followed by the visual arts and dance groups, accordingly. The results of the linguistically talented differ from the average results of other groups with the exception of the average for the visual arts group. However, the results of the visual arts group do not differ from the linguistic and dance groups but do differ from the mathematically and musically gifted. The latter groups scored the lowest and their results do not differ from each other but do differ from the average results of other groups. The mathematically talented also scored low, yet this group's results are not significantly different from the average of the dance group.

The analysis of variance performed in order to specify the result differences in relation to the boundary breaking factor indicates statistically significant differences between the groups $F(9,342)=7.34$; $p<0.001$. The linguistically gifted won the highest average rates for this factor. The result was significantly different in statistical terms from the average results of other groups.

The analysis of variance performed in order to specify the result differences in relation to the unconventionality factor indicates statistically significant differences between the groups for this factor $F(9,342)=16.13$; $p<0.001$. The visual arts group won the highest average rates and the result was statistically significantly different from the average results of other groups. The average scores of the mathematically talented were the lowest, and differed significantly from the averages of the visual arts, linguistic and music groups. The averages of the dance, music and linguistic groups do not differ from each other, neither do the compared averages of the dance and mathematics groups.

The analysis of variance performed in order to specify the result differences in relation to the non-typicality factor indicates statistically significant differences between the groups as far as this factor is concerned $F(9,342)=6.67$; $p<0.001$. The linguistically gifted obtained the highest average scores and their result is significantly different from the average results of other groups. The average scores of the mathematically talented were the lowest, and differed significantly from the averages of the linguistic and dance groups. The averages of the visual arts and music groups do not differ from each other, yet they are different from the average results of the linguistically talented.

Conclusions

As the Table below demonstrates, individuals with various specific abilities obtained various results during the tests. The linguistically talented and the talented in visual arts won the highest rates. The musically and mathematically gifted got the lowest scores. The average results of the dance group are located in-between the remaining groups.

Table 4: Results of the five analysed talented groups, taking into consideration the factors extracted in first- and second-order analysis.

First-order factors	Abilities				
	l	Ma	a	mu	d
opening of structures*					
divergency	5	4	4	1	3
unconventionality	4	1	5	3	2
non-typicality	5	1	2	3	4
closing of structures*					
connections	5	4	4	1	3
boundary breaking	5	3	4	1	2

* shows factors extracted in the second-order analysis

'5' indicates the highest average; '4' indicates a high average; '3' indicates the middle result; '2' indicates a low average; '1' indicates the lowest average.

The comparison of the results within the framework of the factors extracted in the second-order analysis demonstrates the definite superiority of the linguistically gifted group as far as both factors are concerned. The visual arts group also scored high but a low average for non-typicality - the factor extracted in the first-order analysis (see Table 3).

The comparison of the results obtained by the mathematically and musically talented groups shows interesting results. The mathematics group scored relatively high in relation to the closing of structures and divergency factors, while the results of the music group were the lowest for all tested groups in relation to these factors.

The experiment indicates result differences between the groups of various specific abilities. The difference concerns both the score levels and the factor structure of the results.

Discussion

The factors extracted in the second-order analysis correspond with defining an ability as a strategy of information processing, connected with opening and closing of information structures (Nosal, 1990). The results of the tests and factor analyses indicate that individuals of various specific abilities possess different characteristics connected with information processing.

The functional structural theories of ability suggest that creative abilities are hierarchic in nature. The first level contains metacognition related to establishing goals, the realisation assessment criteria, whereas the second one is related to cognitive actions directly linked with a task. The metacognition level is connected with the regulation of actions involving the opening and closing of structures. According to Nosal (1990, 1992), an individual's activity can be focused on closing and limiting of the data pool by creating models and schemata, and verifying them by means of experiments and logical thinking. The second type of actions is connected with aiming at an "ideal" result and universal explanations by opening, redefining and reorganising existing structures as well as accepting and tolerating contradictions. The third direction of regulation is connected with the cyclical, alternating constructing and changing of the structures. The results of our tests, analysed in the context of the creative abilities defined as directing the processes and activities of information processing, suggest that the tested gifted individuals from the literary, visual arts and dance groups display a tendency to cyclical opening and closing of information structures, but may, nevertheless, differ as far as the distinctiveness of the profile is concerned. The mathematically talented, however, tend to close the pools by creating models and then analysing and verifying them in the context of existing theories. The results of the musically gifted individuals point to the tendency for opening structures and aiming at universal explanations, reorganising the existing structures and tolerance for controversies.

Prior research in the field allowed to form a hypothesis about the field specificity of divergent abilities (Baer, 1993, Chruszczewski, 2005, Guilford, 1978, Kaufman, Baer, 2005, Kaufman, Baer (ed.), 2005, Matczak, 1994, Limont 1994, 1996). It was anticipated that individuals with various specific abilities would obtain different results in the verbal Alternate Uses Test. The tests indicate that individuals with literary skills scored very high for divergency, but the visual arts and mathematics groups obtained similarly high results. The results of the dance group were in the middle, whereas the lowest scores were obtained by the musically talented. Therefore, the test results do not confirm the assumed hypothesis about field specificity. Other tests (Chen, et al., 2006) produced similar results which indicate the existence of general creative ability but does not provide us with clear evidence for the existence of field specific components of creativity. The lack of data supporting the hypothesis about the field specific divergent production in our test can be explained by the imperfection of the applied tools. The experiment presented above relied on one verbal divergent production test and one test activating other creative operations. In order to find an answer to the question of generality vs. specificity of divergent abilities, one should carry out experiments using divergency tests including divergent production tasks based on verbal, visual, mathematical, auditory and motor material. It is very difficult at this moment, as Anna

Matczak points out (1994), because of the lack of reliable tools designed for specific field activities. It should be emphasised, however, that the differences in factor profiles in groups of individuals with different specific abilities support the interpretation of creative abilities as skills connected with cyclical information processing. Similar factor profiles of talented individuals in the fields of linguistics, visual arts and dance may indicate a similarity in creative skills for this group of abilities. In contrast, the factor profiles of mathematically and musically gifted individuals are a mirror image of each other. The results connected with similarity and difference of the profiles of the compared groups of specific abilities may indicate the general and specific nature of creative abilities defined as processes and actions involved in problem solving and tasks specific to a given field.

It should also be mentioned that the results indicating varied characteristics connected with the opening and closing of information structures in individuals with various specific abilities may be related to educational syllabi and various strategies used to train students of different faculties. The

scientific (students of mathematics and computer science were tested), dance and music courses require the mastering of specific skills and algorithmic strategies, while the faculties relying on visual arts and linguistic abilities (students of Polish and philosophy were tested) value more heuristic strategies.

The test results confirm the differentiation of creative abilities among individuals with various specific abilities as far as the extracted factors are concerned. The available data also suggests that general creative abilities may be related to the process of opening and closing of information structures, whereas field specificity is connected with local information processing procedures (Nosal, 1990), with the subject area, and the various fields and micro-fields of activity (Kaufman, Baer, 2005). So far, the tests discussed above have not produced results indicating the field specificity of creative abilities. The obtained results, however, make it possible to refocus future research on the characteristics of creative abilities.

References

Anastasi A. (1990), *Psychological testing*. New York: Macmillan Publishing Company.

Baer J.(1993), *Creativity and divergent thinking: A task-specific approach*. Hillsdale: Lawrence Eribaum Associates.

Baer J. (1999), Domains of creativity. In: M. A. Runco, S. R. Pritzker (eds.), *Creativity*. San Diego: Academic Press, 591-596.

Baer J., Kaufman J.C. (2005), Whence creativity? Overlapping and dual-aspect skills and traits. In: Kaufman J.C., Baer J. (eds.) (2005). *Creativity across domains*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers, 313-320.

Chen Ch., Himsel A., Kasof J., Greenberger E., Dmitrieva J.(2006), Boundless creativity: evidence for the domain generality of individual differences in creativity. *The Journal of Creative Behavior.* Vol 40 (3), 179-201.

Chruszczewski M.H. (2005), Teoretyczne problemy z uzdolnieniami oraz pomysl na ich rozwiazanie. In: W. Limont, J. Cieslikowska (eds..), *Wybrane zagadnienia edukacji uczniow zdolnych. Zdolnosci i stymulowanie ich rozwoju.* Vol. 1. Krakow: Oficyna Wydawnicza ,,Impuls'', 87 – 103

Gagné F. (2005), From gifts to talents: The DMGT as a Developmental Model. In: R. J. Sternberg, & J.E. Davidson (eds.) *Conceptions of giftedness.* 2nd ed., Cambridge: Cambridge University Press, 98-119.

Guilford J.P. (1978), *Natura inteligencji czlowieka.* Warszawa: Panstwowe Wydawnictwo Naukowe.

Kaufman J.C., Baer J. (2004), Sure, I'm creative-but not in mathematics!: Self-reported creativity in diverse domains. *Empirical Studies of the Arts,* 22, 143-155.

Kaufman J.C., Baer J., (2005), The amusement park theory of creativity. In: J.C. Kaufman, J.Baer (eds.) *Creativity across domains. Faces oft he muse.* Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers, (321-328).

Kaufman J.C., Baer J. (eds.) (2005), *Creativity across domains*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Limont W.(1994), *Synektyka a zdolnosci tworcze. Eksperymentalne badania stymulowania rozwoju zdolnosci tworczych z wykorzystaniem aktywnosci plastycznej*. Torun: Wydawnictwo Uniwersytetu Mikolaja Kopernika

Limont W. (1996), *Analiza wybranych mechanizmow wyobrazni tworczej. Badania eksperymentalne.* Torun: Wydawnictwo Uniwersytetu Mikolaja Kopernika.

Matczak A. (1994), *Diagnoza intelektu.* Warszawa: Wydawnictwo Instytutu Psychologii.

Necka E. (2001), *Psychologia tworczosci.* Gdansk: Gdanskie Wydawnictwo Psychologiczne.

Necka E. (2003), *Inteligencja. Geneza. Struktura. Funkcje.* Gdansk: Gdanskie Wydawnictwo Psychologiczne.

Nosal Cz. S. (1990), *Psychologiczne modele umylu.* Warszawa: Panstwowe Wydawnictwo Naukowe.

Nosal Cz.,S. (1992), Ksztalcenie dla tworczosci. In: Cz.S. Nosal (ed.) *Tworcze przetwarzanie informacji. Ujecie poznawcze.* Wroclaw Drukarnia Agencji DELTA, 131-141.

Piirto J.(1999), *Talented children and adults. Their development and education.* New Jersey: Prentice-Hall, Inc.
Plucker J.A. (2005), The (relatively) generalist view of creativity. In: J.C. Kaufman, J. Baer (eds.) *Creativity across domains* .Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers, 307- 312.
Renzulli, J.S. (2005), The three-ring conception of giftedness. A developmental model for promoting creative productivity. In: R.,J. Sternberg, J.E. Davidson (eds.) *Conceptions of giftedness.* Cambridge: Cambridge University Press, 246-279.
Stein, M.I. (1953), Creativity and culture. *Journal of Psychology*, 36, 311-322.
Sternberg R.J. (2007), *Wisdom, intelligence, and creativity, synthesized.* New York: Cambridge University Press.
Trela M. (2006), *Zaleznosci miedzy inteligencjami wielorakimi a zdolnosciami tworczymi i postawa tworcza.* Torun: Wydzial Humanistyczny UMK (unpublished PhD dissertation, supervisor: W. Limont)
Urban K.K. (1990), Recent trends in creativity research and theory in Western Europe. *European Journal of High Ability*, 1, 99-113.
Urban K.K. (1996), *Test for Creative Thinking-Drawing Production (TCT-DP.)* by Klaus K. Urban & Hans G. Jellen. Manuel. Frankfurt: Swets and Zeitlinger.
Urban K.K (2004), Assessing creativity: The Test for Creative Thinking – Drawing Production (TCT-DP) The Concept, Application, Evaluation, and International Studies. In: *Psychology Science*, Volume 46 (3), 387-397.

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(E.25)

Evelyne Treinen; Barbot Baptiste, Effect of stimuli on figural divergent thinking abilities among adolescent: Domain generality or specificity of creativity is one of the most controversial issues in creativity research. Indeed, many studies provide support for both positions, but there is a lack of precisions on generality or specificity of creativity within a specific domain of creative expression. In this study, we focused on the effects of different stimuli used in figural divergent thinking tasks. We hypothesized that divergent thinking abilities (in terms of originality and fluency) are specific to the stimulus proposed, and could not be explained by general factors. Our sample consisted of 125 adolescents (91 girls, 34 boys) aged between 16 and 18 years old (mean age .28). In a single test session, participants performed on four divergent thinking tasks (order counterbalanced), using squares, circles, parallel lines and ovoid forms as stimuli. The coding of answers was very satisfactory, since the inter-rater agreement between two independent coders was over 81% . Originality scores were calculated using the frequency of each responses in the sample, then transformed with the Torrance' (1976) scale. Mean originality scores were also calculated using Runco et al.' (1987) formula. Results revealed high correlations for fluency scores (mean $r= 0.65$; $p<0.001$), summarized with a Cronbach alpha of .87, whereas links between mean originality scores were not significant (mean $r = 0.10$). In other words, these results suggest that quantitative aspect of divergent thinking (fluency) is a general aptitude, whereas qualitative aspect (originality) seems to be more task-specific. Implications for creativity assessment and research are discussed.

(E.26)

Saphia Richou, The Millennium Global Prize on the 15 Challenges of the Millennium Project: Educating school children to prepare the future: The Millennium Project Global Prize is an initiative whose aim is to raise awareness of young people in forecasting how the future will be by scriptwriting about 2030 on 15 challenges of the Millennium Project. Launched in 2004 in Mexico City, this award has led to great interest among young Mexicans, and now involves Korean, Venezuelan and Finnish youth. Young French students will be invited to participate in 2008. What better than a contest mobilizing curiosity, intelligence, critical thinking and imagination of young people, to sensitize them, to introduce them to the posture of futurists, as defined by Gaston Berger. "Look ahead, broadly, deeply," "take risks and think about humans". These are the goals of this scriptwriting exercise concerning 2030. The Prospective Foresight Network, the Millennium Project French node launches in 2008 the French version of the Millennium Global Prize. This presentation will provide details on the Millennium Global Prize: www.globalmillenniumprize.org and scenario writing by school children.

About the Author

Saphia Richou is a research Engineer at the Laboratory of Investigation, Foresight, Strategy and Organization (Lipsor) of the Strategic Foresight Chair of CNAM where she teaches methods of strategic foresight to the students in Master LMD: www.cnam.fr/lipsor/
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(E.27)

Models of education technologies at universities

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Abstract

Combined education models provide for a useful combination of presenting and distance forms of teaching using the internet. The author of the article describes some models of education technologies which can be seen in the teaching process in universities today.

Introduction

Combined models of tuition combine by appropriate way attendance and dissociated way of tuition by using the Internet or LAN of given educational institution. From the teacher (or instructor) - student relationship point of view it is possible these traditional models of tuition divide into models managed by teacher - instructively approach and student – oriented models - constructively approach.

Each of these kinds of models has its advantages (pros) and disadvantages (cons). The appropriate option of model depends on kind of subject, level of education, forwardness of students and other conditional assumption. All models of tuition are, in the meaning of educational technology name, divided to processes of tuition preparation, its realization and assessment.

The basic idea of combined models proposal is to define processes which are possible to leave for on-line studies and processes which are effectively to do by attendance. In general it is a deal that students should get the most important elementary knowledge from teacher directly with the personal explanation.

It is appropriate to use the combined models for universities and lifelong education. Moreover the students can come to lesson prepared in advance and they can have creative dialogue with the teacher. Evenly the excessive computer addiction that can be tiring for teachers and quarantining for students is removed.

The big problem also is that nowadays changes in society are so fast and dynamic that thinking of people in some eventualities falls behind to actual statement of society. By that it is made stress in emotional way, which if it is not solved in the long run, it could cause society regresses to old and age corresponding values.

It follows next requirements of school from educational system:

- to assign the development of creativity and humanity of students using educational technologies;
- to integrate lifelong education into organizing structure in all levels of education (for example, on the basis of Open school and Centres of distance education); and
- correctly apply IKT in tuition and by managing of tuition conception by combinated models of tuition and educational portals.

Provided new tuition technologies usage is necessary to realize changes in constituent components of education, in its forms, methods of tuition, in the managing of education process and in the assessment of education quality by the form of Total Quality Management (TQM), in criteria for institutions comparing and self-evaluation.

The point of TQM is to reach the quality progress from education and the control movement to permanent learning and development. The traditional school hands over ready knowledge, ready facts. The traditional school prefers the results of education. TQM is oriented to the processes. From the TQM point of view these factors are important for the quality teaching process:

a) Orientation to customers satisfaction and to the teaching process;
b) Continuous improving of teaching process; and
c) To create a kindly climate during the teaching process.

Continuous improving of teaching process requires from pedagogues to think over constantly, to analyse and evaluate their own work. The part of their work should be systematic approach called PDCA (Plan do check act) cycle. PDCA cycle consists of 4 periods:

a) planning of activity (P – Plan) aimed at improving of education (planning of verify progress and setting up some innovation , even small one, for example innovation in the way of students motivation or students tasking, realization of feed back, curriculum learning , its deepening and so on);
b) realization of plan during the lessons (D-Do);
c) rating of activity by appropriate methods and techniques (C-Check); and
d) analysis, reflexion, evaluation of activity results, the result is new plan of activity and new PDCA cycle (A-Act).

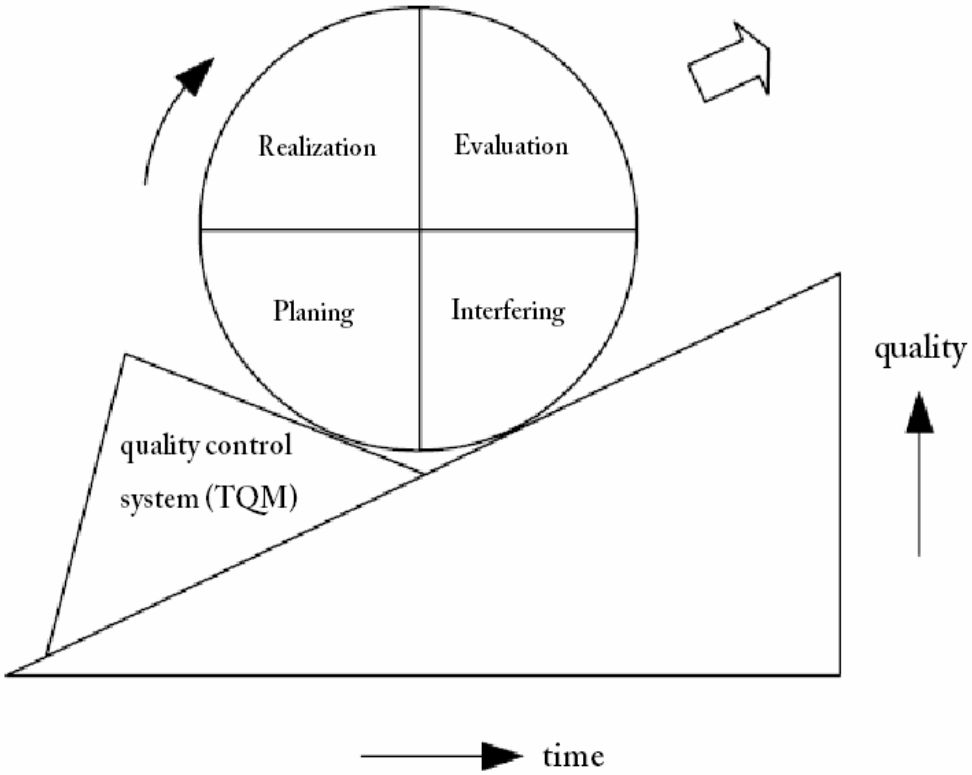

Figure 1: PDCA cycle.

PDCA cycle application brings teacher greater satisfaction from work, professional progress, developing of critical thinking, self-knowledge, self-image, it deepens the understanding of education and tuition importance.

The importace of teaching process development is indisputable for quality education.

It characterizes the key sphere of university work as well as pedagogical development of quality. Tuition proces is connecting and integrating the levels of interaction (students – teachers) and individual level. When we consider the fact that the development of quality is connected mainly with tuition processes, in other words, to enable such tuition processes which have constant impact on

students, in this case the teaching process can acquire the central position. All other fields , such as school development, organising progress, further education for employees, etc. Despite all the facts they are "serving" fields, it means that they should achieve the education correspondent with the quality, or it should be preserved (Arnold, Faber, 2008).

References

Arnold, R., Faber, K. (2000). *Qualität entwickeln – aber wie? Qualitätssysteme und ihre Relevanz für Schule: Einführung und Überblick.* Seelze/Velber: Kallmeyersche Verlagsbuchhandlung GmbH. 114 s. ISBN 3-7800-1000-3

Černák, I. – Mašek, E. (2007). *Základy elektronického vzdelávania*. VŠ učebnica, Ružomberok: Pedagogická fakulta KU, 350 s. ISBN: 978-80-8084-171-3.

Degendorfer, W., Reisch, R., Schwarz, G. (2000). *Qualitätsmanagement und Schulentwicklung. Theorie-Konzept-Praxis.* Wein: öbv und hpt, 134 s. ISBN 3-209-03185-1

Hrdinal, Ľ. (2005). *Cesty ku skvalitňovaniu školského systému*. In Technológia vzdelávania, roč. XIII., č. 9, s. 3 – 9. ISSN 1335-003X

Petlák, E., Komora, J. (2003). *Vyučovanie v otázkach a odpovediach*. Bratislava: IRIS, 165 s. ISBN 80-89018-48-3

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(E.28)

Hassan Sharafuddin, Internet, Information Technology and Higher Education in Yemen: The role of the Internet, information technology (IT) in higher education was the most important debate among educators and policymakers during the past decade. They agree that information and communication technologies are of paramount importance to the future of education. ICT in education initiatives are most likely to successfully contribute to meeting the Millennium Development Goals particularly in alleviating the poverty and reducing the unemployment rate.

About the Author

Hassan Sharafuddin is an associate professor in Economics. He was born in Sana'a, Yemen in 1956. He earned his MA in Economic Development from Vanderbilt University, Nashville, Tennessee, USA in 1981 and his Ph.D. from Cairo University, Egypt in 1990. He has been teaching Economics and Information Economics for 15 years in Sana'a University, Yemeni University and Arab Open University in Kuwait. His recent research interest is in e-Learning, he is the founder and the Dean for Computer Center, Sana'a University (2003-2006). He has been actively involved in ICT projects and in establishing the Yemen Foundation of Information Technology in Higher Education. He has been selected as a member of the SWSA Expert Panel 2005 (World Summit Award). He joined Arab Open University in Kuwait and served as a Program Coordinator and Course Chair for Business Program (2006-2008). He also served Saba University as a consultant in distance learning. He has several publications and has participated in numerous professional conferences

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(E.29)

Prompt and Relevant Feedback in e-Learning

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Abstract

The role of constructive and detailed feedback in self-assessment has a deep impact on student learning. In the absence of direct communication with the tutor, immediate feedback for learner is important. Many e-Learning systems have provided feedback by means of marks, static textual format, or links to the correct answers, forgetting how to provide methods that promotes active and long-term engagement with the learning task. Course goals can only be met if students get good feedback and have the opportunities to use it. Focusing on learning programming, this paper describes a proposed automated feedback system that enables learners to get immediate feedback on their understanding and allows them to trace JAVA programming codes. Starting from the student\'s perspective, the system allows the learners to adapt their pace of studying; thus becoming an effective tool to facilitate deep approaches to learning. Unlike other software, the proposed system utilizes Java Debug Interface (JDI) to give synchronized dynamic feedback to learners by focusing on students\' choice of learning. It allows learners to step through the program code and get detailed description on each line until the program terminates. The proposed system enables students to engage with the learning activities as if there is someone present to explain them.

Keywords: Distance Learning, Feedback, Self-Assessment, Virtual Learning Environments.

Introduction

Quality learning outcomes are achieved when students adopt the deep approaches to learning. This can be encouraged by teaching and assessment methods that promote an active and long-term engagement with the learning task [1]. The concept of feedback is a key element in student learning, because of its relation to achieving learning goals. Goals can be met only with good feedback and opportunities to use it [2].

The crucial part in student learning is the quality of student engagement with the feedback and not the quality of feedback itself [3]. In order to achieve the high quality feedback, it should be timely, sufficient and focus-driven on learning, and be linked to the purpose of the assignment, clearly understandable to the students [3]. On the other hand, students have to receive and act upon the feedback to improve their learning. If there is no feedback given to students, its lack can be a key element of their failing [4].

Today, delivering instruction to students in higher education is accomplished through the use of technology-based materials to deliver instruction and face-to-face sessions to assess students learning. These sessions help students to have the chance to get feedback and learn from their instructors and peers. Conversely, a distance learner is deprived of face-to-face communication or immediate feedback. Learners need individual feedback in order to understand and learn.

This paper investigates the development of software to support student assessment and feedback. The rationale of this paper is to meet the needs of students with an emphasis on how they can use the automated interactive feedback to support their learning.

Background

There are many systems that enable instructors to provide assessment and feedback to students. Some of the recently used ones are: QuizPACK[72] is a system, to author and deliver Web-based dynamic parameterized quizzes for programming-related courses [5]. The system randomly generates a question parameter and compares the student's answer with the result of running the parameterized code. System feedback is limited to saying whether the answer is correct

[72] http://www.sis.pitt.edu/~taler/QuizPACK.html

or not. QuizGuide[73] is a system similar to QuizPACK, but uses the adaptive navigation support to show students which topics are currently the most important and which require further work [6].

MyCodeMate is a web based assessment associated with specific textbooks and allows compilation and execution of programming codes. It doesn't support checking of correctness, but provides an explanation for wrong answers when submitted [7].

CodeLab is also a web based assessment that allows students to practice on short answer programming exercises, focusing on a particular programming idea or language construct. The system judges the correctness of the answer and offers hints when it is incorrect [8].

Other systems use simulation to provide a rich learning experience for students [9]. TRAKLA2 is a framework that assists visual algorithm simulation exercises to support data structures using applets. Students use a graphical user interface to understand the underlying concept of data structures [10].

Blayney and Freeman's system uses spreadsheets and programming to develop questions and feedback in the format of automatic marks and comments [11].

Questionmark Perception[74] is an assessment management system that enables instructors to author, schedule, deliver and report on surveys, quizzes, tests and exams.

Existing e-Learning environments like Blackboard and Moodle provide automated feedback for students by means of marks, textual answers or links that are given when the students have given wrong answers.

Recently, Questionmark Perception has been connected to Blackboard to make a combination of course management and computerized assessment.

The following sections describe a new automated feedback system that helps students to understand the logic of programming and enables them to follow their needs in their learning.

Initial experiment

An initial experiment was applied to support students' learning program [12]. The experiment has been applied to a group of students who have been attending an introduction to java module in Bradford, UK and King Abdul Aziz University in Jeddah, Saudi Arabia. The experiment covered the following:

- Students were supported by giving a complete assessment and feedback using the Questionmark Perception software.
- Students were assessed at regular intervals at the end of each component of the course.
- Students were able to practice these assessments at their own pace and time.

The assessment questions were chosen carefully to cover the objectives of that module. Each assessment could be repeated by the students with a random variation in the questions posed. The feedback was designed to help the students understand the main objective of the question.

For those questions requiring programming steps, an applet traced the code with different random values, giving the chance to the students to understand the concept from different viewpoints. See Fig. 1 for the applet design. When the student runs the code, the generated output in the applet is a verbal description for each line executed in the code.

To ensure the quality learned by the students and to follow up students' performance, for each formative assessment there was a timed quiz given to students that covers the same group of objectives covered in that assessment.

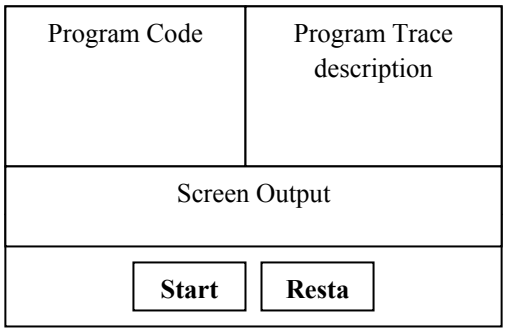

Figure 1: Applet Design

The following figure draws the overall concept of the formative assessment used.

[73] http://www2.sis.pitt.edu/~taler/QuizGuide.html
[74] http://www.questionmark.com/

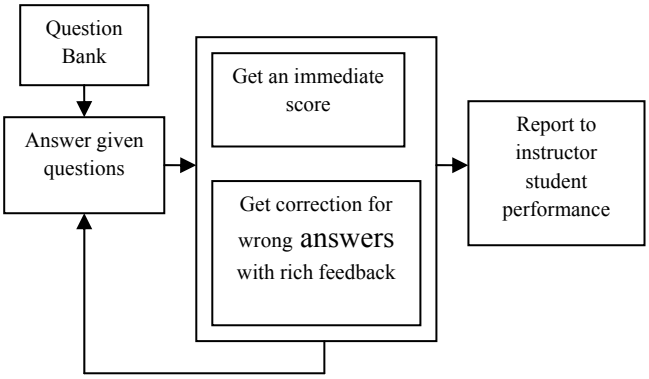

Figure 2: Formative Assessment Diagram.

The experiment provided good results, but the limitation of used applets posed important questions for instructors and learners as well [9]. What if the students wanted to follow the program trace description for other codes to learn? How can we beat the time and place barriers to keep their motivation high to learn.

This brings us to the necessity of a system that carries out immediate feedback for students and enables them to adopt deep approaches to learning. This theory can be applied to any type of area, but in our system we will focus on learning java programming.

The following section introduces a prompt and relevant feedback system to support students learning.

The System

The proposed system follows the previous experiments to support students learning. Unlike the previous tested applets and other feedback programming software, the proposed system generalizes and synchronizes student feedback. It generalizes the feedback by allowing the students to have the choice of code which synchronizes by giving an immediate translation to the selected programming code.

The new system enables students to load their choice of code, compile it and start tracing as if there is someone like presents for them to explain. It allows learners to step through the program code and give a detailed description of each line of the code.

The system uses Java Debug Interface[75] (JDI) to trace the code algorithm sequence and variables. It uses the debugger trace to simulate a verbal description for learners. After the program is loaded, JavaCompiler class is used to carry on the compilation process. The student will be given a report on either the success of the compilation process or a notification of any compilation errors to correct. The software then, runs the JVM which runs and traces the generated class.

The traced data that is generated reflects the program behavior and monitor the program variables. These collections of data are used to merge with the actual program analysis to produce a verbal description of each line in the code. The system covers the translation for the basics of java programming like control statements.

Figure 3 is a snap shot for the developed software. It shows the main functions of the system. The left panel contains the actual loaded code and the right panel contains the program description. The Start and Restart buttons will be activated only if the loaded program is compiled and free from errors.

By clicking the Start Button, students can step through the code as they need. If they press the Restart button, they can restart tracing the code all over again.

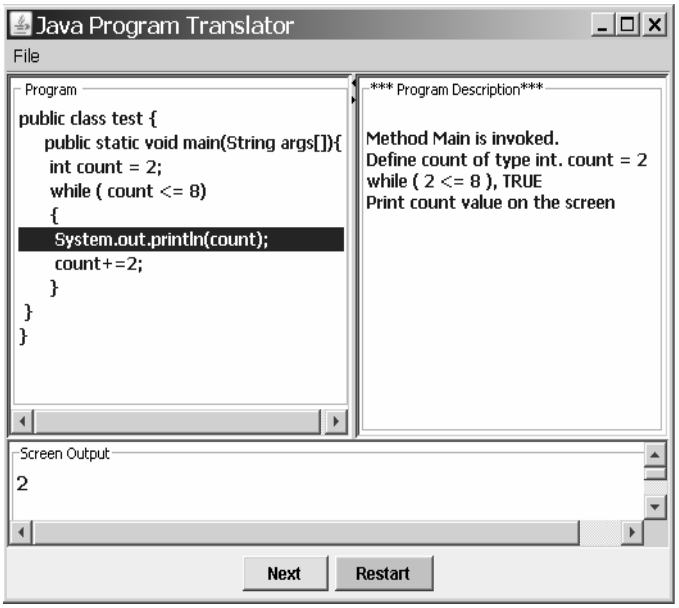

Figure 3: Application Design.

[75]http://java.sun.com/javase/6/docs/jdk/api/jpda/jdi/index.html

Conclusion and Future work

This paper has discussed the use of a proposed automated feedback system and how such a design influences the learning process. The students can benefit from open automated assessments and feedback at their own time and pace. Synchronizing and visualizing feedback has a deep impact on student learning because it supports the deep approaches to learning theory.

The simulation of this work has been carried out using applets in our first experiment. Students were able to step on each line of the code and have a clear explanation of its functionality. The new software will allow learners to adapt to their personal needs of learning.

The effort reported here represents the specification of the new system which is under development. The software will be tested on a group of students and data will be analyzed to test the efficiency of such a system.

References

[1] P. Ramsden, *Learning to Teach in Higher Education*. 2nd ed. London: Routledge, 2003.

[2] Grant Wiggins. (2008, Jan 22). Feedback: How Learning Occurs. Available: http://www.authenticeducation.org/bigideas/

[3] Cordelia Bryan and Karen Clegg, "*Innovative Assessment in Higher Education,*" in *Plastics*, 2nd ed., vol. 3, J. Peters, Ed. New York: Routledge Taylor & Francis Group, 2006.

[4] J. Debuse, M.Lawley, R. Shibl. (Winter 2007). "The Implementation of an Automated Assessment Feedback and Quality Assurance System for ICT Courses". *Journal* of information Systems Education, vol. 18(4), 491-500.

[5] Sosnovsky, S., Shcherbinina, O., and Brusilovsky, P. (2003). "Web-based parameterized questions as a tool for learning", In: Rossett, A. (ed.) Proceedings of World Conference on E-Learning (E-Learn 2003), Phoenix, AZ, USA, November 7-11, 2003, AACE, pp. 309-316.

[6] Brusilovsky, P., Sosnovsky, S. and Shcherbinina, O. (2004). " QuizGuide: Increasing the Educational Value of Individualized Self-Assessment Quizzes with Adaptive Navigation Support", In: Nall, J. and Robson, R. (eds.) Proceedings of E-Learn 2004, Washington, DC, USA, November 1-5, 2004, AACE, pp. 1806-1813.

[7] Gotel, O., Scharff, C., and Wildenberg, A, "Extending and contributing to an open source web-based system for the assessment of programming problems," in *Proc. 5th international Symposium on Principles and Practice of Programming in Java* (Lisboa, Portugal, September 05 - 07, 2007). PPPJ '07, vol. 272. ACM, New York, NY, 3-12.

[8] Dragan Mirkovic, S. Lennart Johnsson, "CODELAB: A Developers' Tool for Efficient Code Generation and Optimization," International Conference on Computational Science 2003: 729-738

[9] Thomas, R. C., Milligan, C. D. (2004, 28 Sept). "Putting Teachers in the Loop: Tools for Creating and Customizing Simulations". Journal of Interactive Media in Education, 2004 (15).

[10] Lauri Malmi, Ville Karavirta, Ari Korhonen, and Jussi Nikander, (September 2005). "Experiences on automatically assessed algorithm simulation exercises with different resubmission policies". Journal on Educational Resources in Computing, vol. 5, Issue 3.

[11] Blayney, P., & Freeman, P. (2004). "Automated formative feedback and summative assessment using individualized spread sheet assignments". Australian Journal of educational technology, vol. 20, No. 2, pp.203-31.

[12] I. Alansari, A. Konstadopoulou, R.J. Fretwell. "Modeling Effective Self Assessment and Feedback to Enhance Distance-Learning". Proceedings of the Eighth Informatics Workshop for Research Students (2007), pp 20-22.

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(E.30)

Manzil Maqsood, Developing a Quality Maturity Process Model to improve the use of ICT in Primary School Systems of Developing Countries: The purpose of this research is to develop a process maturity framework comprising mature, customizable and easy to implement quality processes that could guide schools of developing countries in successfully implementing, evaluating and sustaining their ICT-supported primary education programs keeping into consideration their indigenous contexts. Influenced by the Capability Maturity Model, the intent is to have a process-based approach to successfully implementing sustainable ICT-supported educational infrastructure in developing countries. The study focuses on primary education because it is the foundation upon which any education system is built. The motivation behind this study is to develop a reference framework that could enable economically underprivileged countries of the world to modernize their education systems by integrating the use of ICT in their primary education systems and bridge the ever so vast digital divide. Most developing countries have low literacy rates and complex socio-economical conditions; they are not as mature in their ICT endorsed educational infrastructures as their counterparts in developed countries; they have inadequate and insufficiently trained professionals and resources to carry out improvement activities in the use of ICT in classrooms; they have socio-economical and cultural contexts entirely different from those in developed countries. Therefore, their primary education systems are in dire need of modernization and improvement. The proposed framework would enable educational leaders, policy makers and managers in developing countries to improve the quality of their existing education processes, particularly in the context of utilizing ICT in teaching and learning at primary levels. The study would involve selection of schools representing a substantial population of the schools in the selected developing countries. The proposed framework would be applied on these schools in order to verify and validate the processes developed in the model. Feedback from educational leaders and practitioners involved, as well as lessons learned while implementing the models in these schools would further improve and refine the framework. The improved and refined framework would enable similar schools to assess the quality of their use and integration of ICTs in their primary curriculum, teaching practices, student capabilities, teachers' professional development and overall sustainability of the program. This assessment would further allow schools to improve themselves along the five distinct maturity levels defined by the framework.

(E.31)

Instructional Design Based on Humanistic Views

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Abstract

In this study science and technology leads to distinctive research operations. The influences of social, cultural and economic potential of new technology will affect human life, in affective domain, logic(thinking) and behavior . The necessity for monitoring research strategies for achieving ideals in Islamic world will be declared. Most researchers believe that only the development of applied researches holds promise for new science and technology which has possess human life. This viewpoints may be ended to social crises .Therefore introduction of a this theoretical model that can adjust possibilities with humanistic relation in Islam and other situations have the best relation with humanistic values. Here a new pattern will be introduced. Although much work remain to be done. Islamic researchers, based upon this framework can create ways to calculate influence and ratio of each defined category of subjects at different conditions during research operations and policy making decisions.

Introduction

It is believed that obtaining economic needs for social life of human being, will bring *peace, wealth , health* and ….But in the real life, deny or lack of attention to *political, cultural*, *and economic variables*, are restrictions for such kind of understandings (World Bank, 1986). Strategic policies related to research and development (R&D) have been made based on the specific view towards science and technology. With regard to science, we may think of, at least, three thoughts and it is much important to become familiar with them in order to plan and develop research processes in the Islamic World.

According to the first insight, science is equal to the existing real world. Therefore, a research emphasized on observable and experimental subjects, is called scientific. In this situation, we are not able to think of non-experimental objects. Research strategies are only applicable for existing observable situations. We can also not take advantage of science in a strategic way for theoretical and applied research methods. The main reason is related to the impossibility of exchanging spiritual needs of quantitative ones. It is also not possible to bring harmony to the sub-divisions.

In the second view, research activities are all blended together. However, during the analyze parts of a subject, one character is investigated apart from the other related variables. Research instruments are also not qualified for non-experimental objects. Since we think of science in rational view we may end up with something without any equivalent in the external world. Thus, to be brief, the meaning of ratio in scientific researches is like cracking an atom.

In the third view, it is possible to explain one variable and find its ratio with the other variables. In this view, we design a research model with another definition, which will be used in a different way, comparing to the past. In short, we will end up with a new model with a different definition which is to apply a new way for developing research methods. Therefore the case is not equal to the experimental world. The center of attention is the usage of a real situation in quite a different way. Each subject (variable) can be used in such a time and place that helps it to fix its position as a whole unit. Since we are talking about applied research, we come up with different ideas of the word as a unit such as *freedom*. The useful level and degree of subject materials are not equal in the insights stated above: The third model of research strategies is presented in the Islamic world, which is neither experimental, nor ideal. Still, applicability is quite separate from technology because of the different influences of political, cultural, and economical level. All of the different research topics in this model are under regular interactive processes and are measurable, too.

Velayat, in society is not equal to *Governing*. Here we concentrate on research variables, such as feelings in the area of science and technology.

What Should be Done?

The following points are to be considered:

We need to specify and identify the position of research along with what should be done and what shouldn't.

There is a need for redefining external symbols and examples.

Today's human does not accept himself what he thinks others should accept. Why and how did we reach to this position? In short, the history of science and technology is the answer. In the past centuries, before the invention of James Watt Steam Machine, man insisted over humanistic science, since the 17th century, man has also overcame the nature without paying attention to the humanity. Therefore, personal advantages and profits came into the first priority and spiritual development took the second position. Culture went under the logics and thoughts of human character. In South Korea, for example, obtaining the *prize* itself in an area such as Mathematics became a national goal for *youth*. The major question is: Whether or not we will reach a safe end by accepting such believes. This means that we take advantage of science only for the sake of science. While the fact that science serves as a guide for the improvement of human life, seems that we have lost the original key, mainly because of the following factors:

1-The percentage of foreign graduate students in developed countries has increased. Most of these students study applied science[xxvi] and stay in the same country after their graduation and only a few of them come back to their homeland. During the last two decades, more than one third of such students were studying engineering and only less than %4 were engaged in various fields of education.

Now, we may think that technology, mainly experimental science, may overcome other sciences. It is important to know that the printed materials, mainly articles, of Islamic scientists in international journals are close to %1.

2-The Vancouver Agenda (1989)[xxvii], indicated two different researches in sciences for reach and poor countries.

3-The Office of Evaluating Technology, established in 1972, published research priorities, including the role of water supply, food supply, health, technology and population, technology and job opportunities, etc in the future. All of these topics define the materialistic way of applying technology.

4-Research expenses based on GNPs indicate the difference in the percentage of budgets allocation for R&D in various countries[xxviii].

Budgets Allocation for R&D

Table 1: The difference in the percentage of budgets allocation for R&D in various countries.

Country	Percentage
U.S.	2.6
England	2.4
France	2.1
Germany	7.5

5-The research shows that the fund specified for research in developing countries is lower than developed countries and also the number of researchers[xxix] . For instance, the number of researchers (per 1000), are 334 persons in the U.S.[xxx], 601 in Japan (part-time is also included), 362 in Germany, 230 in France and 310 in England[xxxi].

6-The fund priority for research indicates that near %41 is for updating industry, %21 for research on the better work conditions or situations, %18 for researches on defense and national security, and so on[xxxii].

In October 2005, WSIS agenda ended up with a new way of producing soft-ware, for the application of developing countries. Therefore, theses countries are account as consumers, not innovators or creators of materials or soft-wares.

The above factors are just examples of the present situation and indicate the necessity for planning and developing research methodology for the Islamic world and other developing nations. According to Professor Abdul-salam, a few countries like India, China S. Korea and etc. came up to this sensitive point. Apart from that, the 3rd world academy of science is also developing such kinds of process.

Furthermore, there are two effective and influential research centers that came up to the followings;

1- Scientific researchers' insist of not accepting and applying orders without paying any attention to cultural factors.
2- Scientific concentrations towards ways to overcome experimental studies based on the fundamental developments.

Here in our country most of the researchers are engaged in research at different universities and research centers. We do not believe that innovation is restricted by researchers of developed countries. We believe in hard working to end up with better results and taking advantage of science and technology. So, a non-Islamic model may not be useful for our progress. And a new model is suggested in this article.

The Suggested Model

In this main philosophical mode, the systematic ways of research is capable of uniting various descriptive research principles (fundamental or applied). Then, in the Islamic societies, researchers are guided towards specified objectives and goals.

You may ask whether there is any difference in defining developing and evaluating a research in Islamic and non-Islamic countries or not? If so, what are the differences? Dose the selected subject bring limitation? And so on. You may also ask whether an Islamic researcher is free to apply a research method, regardless of were it came from?

I hope to cover partially the questions in this new methodology of research, defining the model and its rules and harmonizing them. In order to do so, researches are suggested to link their work to a major and original base of Islam.

Model is made of theoretical subjects with regards to their inter-relations. We recognize it with or without harmony between the relations to subjective and experiential situations or stated objectives. While *Progress* is made of quantitative increase of subjects. And finally *Development* is made of both quantitative and qualitative increase in order to come up with research factors for changing the situation from one way to the new positions.

The Major Elements of Suggested Model

There are four basic parts involved in this model:

1- The definition of original variables and the relations between them and their subdivisions based on the main goal of the research;
2- Exchange ways based on time and place towards the research goals;
3- Administrating research mainly, during the exchange of one situation to the other; and
4- Getting acquainted with the influence of research factors, during the exchange period of subjects, by classifying concepts and basic research elements.

In short this model talks about the followings:

1- The definition of sets and the method of relation between them. According for a research to reach its goals and identify a set, we need to describe its model, its present situation, recognizing its problems, and defining its predictable functions.

First there is a need to clarify the present dimensions of development, including *capacity*, *direction*, and *function*. Thus a research unit will be described through these three aspects. The new model includes at least three criteria. At the beginning, we need to identify them to be united.

Then, the ways of defining the relations between the above mentioned factors, will be specified through geometric progression, and will be applied in all research aspects in a unit.

Finally, in this process, each research element is defined and the relation between them will be considered in order to reach the goal.

All the three aspects (capacity, direction and function) are identified as bellow:

Capacity is the level of motives. *Direction* is equal to our cognition. *Function* is related to observable and measurable behaviors.

At this point the structure of elements involved in research will be identified. It consists of three related parts, including main, and it is important to remember that none of the research elements in the world of Islam are away from the function of God, which is the main subject. Second level of subjects is related to Prophets and Imams. The third subject is human-being who is able to exchange nature for innovation and new situations. The secondary objectives are factors under the control of human. Some people who are under the control of others belong to this group. (Figure 1)

Elements in Bringing New Situation

Figure 1: Structure and dimension of Development.

Characteristics of Development			
Capacity			
Direction			
Function			

2- Changing time and place to reach goals: There are two vertical and horizontal basics (structure) for developmental progress. These two factors are related together. No factor can work without using its capacity. However the degree and levels of each factor is possible to be lower than its total capacity. This means that it is possible for a subject, in applied situations, to work in a lower step comparing to the social levels. Therefore research cognition is also in the domain of materialistic world. The researcher is not in the position of non-materialistic position. Therefore the lack of attention towards the goals leads to a lower step of development.

Each development progress is identified by its direction which is materialistic or non-materialistic. We should put into the consideration the direction of the decision-making of research process .Also there is necessary to put all sub-divisions & parts to getter. This means that we are not able to do research without inter-relating to other principles. Applicability is along with the capacity & its direction. After the changing situation, we reach the development. In this way, the three factors including the capacity, direction and, are blended together towards the high level of humanistic values. Change of time and place is defined by the following example. When a researcher confronts with a new idea or question, will search based on the needs assessment of the society, mainly his/her organization and continue the necessary research frame works. He explains the new idea with the administrator and request facilities for the research. Following the regulations and approval of the proposal research equipments will be prepared. The researchers try to find the results, using logics. In this case the development will take place, mainly because of the increasing the researcher knowledge and the higher position of the administrator of the organization.

At the end the results will be the bases for the evolution of new rules with geometrical ratio and facilitate development progress.

In each step, when a researcher is evaluating development. Geometric ratio and speed of development is exchangeable because it may be analyzed and bring up new subjects to be studied

The influence degree of a topic, in various situations is different. You may say that each topic based on the different positions, has different influence which is measurable too.

3- How to conduct a research during the changing period. In this part we are engaged in the followings:

3-1-Describing the ideals.

3.2-Explanation of the objectives along with methods of obtaining each one.

3.3-Preparing necessary hardware and soft-ware for obtaining the objectives.
3.4-compact the social values, cognitions towards the specified goals.

The role of decision-maker is about finding ways to make the society sensitive towards a united ideal. So the managing ethics are needed for research methods. Lack of efficiency of researches, may affect sensitivity towards unity. Perhaps this is the cause for researches in lower level in Islamic countries comparing to the rests. In general all researchers do is related to the recognition of problems either for individual, family and society .Solutions is also related to political cultural and economic dimensions in each society.

Political dimensions include expanding the idea of making research, establish care and give life to Islamic values. Research motivation may raze both in governmental and non-governmental institutions .this aspect shows the directions for values and recognition of research values along with cultural views of the researchers about Islamic values. In this case, relations between culture and technical think of researchers are important. Increasing knowledge and distribution of research results are all related to this view. Therefore the necessity of a kind of publishing center is suggested in this model. Economic aspects are important too. Therefore the research results may bring us ways of gradual cut for imports.

4- paying attention to the effective research factors in changing the even research topics needs criteria.
The suggested model will be defined only when we come up with needed criteria during the exchanging principles, developing a comparative research method and etc. At this time the major question will be about the continuing development. At least we need 27 characters. The capacity, direction and functions

Each one has three levels so 3X3X3, characters need to be calculated then each hypothesized level of 27 characters may be placed under a greater bunch (including 27 characters) and new characters will be established. At last, movement and development will take place based on the geometric ratio.

Finally the educational potential of computer -, based technology is wide ranging. The introduction of new models may not only construct modes of learning process, but

Enabling both Islamic researchers to explore and interact in such a way to support differences in Islamic and non-Islamic arena. Researchers, with wide range of experiences can be accommodated more effectively. They may have interactions through networks and build up social awareness that will be able to spam cultural differences.

References

OECD (1984), Science and Technology Indicators, Resources for R&D., Paris p.21 Federal Ministry of Science &Technology (1977), Faktem-bericht, , 1972, Zum Bunder sh cricht,Forschung, Bonn, pp. 30-37.

Open Doors (1980/81), Institute of International Education, Washington D.

UN (1984), Economic commission for Europe current Development in Science and Technology Policies: Document, Sc. Tech/R152 –July, p.10

UN (1986), world bank, maps. Washington D.C. United States.

UN, (1989) In the 21st Century Canada, Vancouver.

Wsis (2005), Tunis Agenda, UNESCO_WSIS, TUNIS.

About the Author

(E.32)

Sabah Balta, Prospective University Student's Way of Internet Use While Preparing Their Projects: Case of Tourism & Hotel Management Department at the Yasar University in Turkey: Technological developments, as indispensable components of our lives, have been affecting training as well as learning systems. Research indicates that searching and learning takes place best when there is visual, auditory and written information. One good example for such a searching and learning aid is the internet. This paper aims at determining the level of internet use by Yasar University students in preparation for their projects and assignments. The frequency of internet use for academic projects is becoming an increasingly important part of their search process. The findings of the study will demonstrate the degree of internet use of prospective Tourism & Hotel Management students and its effect on the quality of their projects. Key words: Internet, Tourism Students, Projects and Assignments, Yasar University, Turkey.

(E.33)

Abdullah Fahad Almoziraee, Learning from Multimedia Presentation: A Cognitive Load Theory Approach: In most instructional materials, figures and text are presented separately, rather than spatially integrated. According to Cognitive Load theory, integrating this disparate information imposes additional cognitive processing demands that can interfere with learning. Previous work has shown that learning is often facilitated by the use of spatially integrated information sources, but the extent to which this effect generalizes to novel test materials is unknown. In the present study, 59 subjects studied materials in which text and diagrams were either integrated or spatially separate. Subjects in each of these groups were then tested using materials that were either similar to the study materials or were entirely novel. It was hypothesized that the integrated source group would perform better on recall and recognition tasks, and would demonstrate better generalization than the separated source group. The integrated source group performed slightly better than the separated source group on recall and recognition tasks, but not generalization. Implications and potential limitations are discussed in relation to Cognitive Load theory.

(E.36)

Robert D. Knecht, Situational Leadership and Project Scheduling Keys to Engineering Design: Our students identify leadership and management as key topics for implementation in a curriculum on project based, open-ended problem solving. Leadership defines the team's ability to identify stakeholders' needs and implement action to address those needs. In engineering, leadership also evolves from the awareness of the unique attributes that the team brings to a well defined knowledge of the stakeholders' needs. Management speaks to the organization required as the team implements its plan of action. The Pacific International Space Center for Exploration Systems (PISCES) challenged university students to influence operations of a lunar outpost simulation facility. A team of second-year students accepted the challenge and focused its efforts on the basic needs of the first lunar explorers. The team coordinated its leadership skills to address the needs with an emphasis on resource utilization and habitation issue. Developing management skills for efficient and timely decisions, the team implemented a strategy to successfully market this unique and creative design leading to national and international recognition. This paper explores by example the interactions between situational leadership and project management concepts' key tools to the engineering design curriculum. The thesis investigates the benefit of formal discussions of situational leadership and project scheduling to the preparation of a quality product and satisfied team. Curriculum for early engineering design courses evolves into a unique opportunity to bring together concepts from these various areas-of-focus through a creative, open-ended problem solving environment.

(E.37)

Traditional Heritages and Science Influences from Genetics to Education

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Abstract

With the term "*Orthopaidei*a" Meletea (2007): We can define the analogous relationship of the capabilities that any environment offers for early recognition, correct treatment and evaluation of the results, related to one's acquired abilities. "*NOHSHS*" (Greek word that means: mind, thinking etc), contributes to care and to the achievement of "Orthopaideia". The paper will focus in two parallel directions: (a) Use of momentum gained from knowledge heritage and its applications in the provision of care, required for harmonic human development; and (b) Provision of research methods for the factors that are related to one's acquired intellectual abilities.in science, technology, art and sports. History has proved beyond doubt he influence of tradition on human sciences: i.e. Aristotle, Plotinos, Plao, Pythagoras, etc. Furthermore, scientists have established through clinical tests that human education and intellectual development can be achieved by applying studies on the human brain, i.e. Barbara Clark, Jonh Geeak. Finally, scientists involved in the development or evolution of communication sciences i.e. Artificial Intelligence) depend on simulating functions of the human brain and of intelligence, i.e. Marvin Minsky. Starting from the proven and tested knowledge, which is synonymous with human existence and which is modified by the scientific achievements, the author shall seek indicative approaches to terms and especially to those involving characteristics described by those terms. With reference to science in general, and human sciences in particular, the author shall attempt to explain fundamental goals. This will be based on the (bd mode: A classification in behave and define talents), which the author invented/organized, based on another theoretical model, M4 [Meletea 2006]. The ultimate goal is to achieve the optimum result, regarding the development of human interactivity in behaviour and to define human abilities (aptitudes and talents).

1. Introduction: Explaining terminology

With the term "*Orthopaidei*a" Meletea (2007): We can define the analogous relationship of the capabilities that any environment offers for early recognition, correct treatment and evaluation of the results, related to one's acquired abilities.

"*NOISIS*" (Greek word that means: mind, thinking etc), contributes to care and to the achievement of "Orthopaideia".There is a group of words, related to NOISIS, which differ not only in meaning, but also in gender. NOISIS is of female gender. The word Mind (νους is) an old/formal version of the male noun of gender. Brain (μυαλό, pl.: μυαλά) is a noun of neutral gender. Brain (Εγκέφαλος inside the head) is also a noun of male gender.

2. Approaching Universal Languages in Pedagogy

Having worked on the issue of the gifted talented education in an international scale, I have noticed that there are some common goals and common activities, which do not share common definitions nor terms.

An example of using different terminology to refer to the same group of people is the following: Educators use the term "student", paediatricians use the term "child", while psychologists the term "people".

From a humanistic point of view, "Pedagogy" needs to direct the actions applied by the educational systems. Common human values have led researchers to beliefs like "they are humans", "they must be happy", etc. If humanistic values aim at the educational support of children, then the educational systems need to focus on human "harmonic/balanced development, humanistic approaches evaluating the results and the success of educational systems reflecting humanistic standards, human rights and pedagogical quality indicators.

Pedagogy becomes significant in that it comes from the systematic education and training, which direct persons to harmonic development. As a sequence we need to approach also the 3 other concepts such as "*Ekpaideusis*", "Pedagogy", "*Morfosis*" and "*Paideia*".

"Ekpaideusis" (εκπαίδευση) "EDUCATION" comes from the word "paideuo" that has a negative association. In practical and theoretical terms it means pushing human beings to be and make "epitelesis" (achievement) as far as possible.

"Pedagogy" (Παιδαγωγική) is associated with the "agoge" of children. The "agoge" was a rigorous education and training regime undergone by all Spartan citizens (with the exception of future kings). It involved separation from the family, cultivation of loyalty to one's group, loving mentorship, military training, hunting, dance and social preparation. The term "agoge" *(αγωγή)* literally translates as 'upbringing'. Supposedly introduced by the semi-mythical Spartan law-giver Lycurgus but thought to have had its beginnings between seventh and sixth centuries BC, it trained boys from the age of seven to eighteen. The aim of the system was to produce physically and morally steeled males to serve in the Spartan army, men who would be the "walls of Sparta," the only city with no physical defensive walls. Discipline was strict and the boys were encouraged to fight amongst themselves in order to determine who was the strongest in the group.

"Morfosis" (μόρφωσης) is associated with the results of the education system. The word 'a-morfotos' (one without "morfosis") means the person that behaves in ways that do not reflect what the educational systems aim.

"Paideia" (παιδεία), in ancient Greece, was "the process of educating a man into his true form, the real and genuine human nature." It also means culture. It is the ideal in which the Hellenes formed the world around them and their youth. Since self-government was important to the Greeks, Paideia combined with ethos (habits) made a man good and made him capable as a citizen or a king. This education was not about learning a trade or an art, which the Greeks called banausos (mechanical) unworthy of a citizen. It was about training for liberty (freedom) and nobility. Paideia is the cultural heritage that is continued through the generations. "Paideia" is probably best known to modern English speakers through its use in the word Encyclopaedia.

To give an example that can better illustrate the meaning of the above concepts, we all have met people who have not attended any kind of formal school but who demonstrate paradigmatic behaviour, performance and knowledge. We say that these people have "morfosis" and "paideia".

3. Traditional Heritage and Science Influences in Education

Explicit encoding of qualitative understanding of knowledge, starting from *basic concepts*, machine learning techniques and artificial intelligence, helps in the design of reflective educational material, which expands our knowledge of mathematics (Meletea, 2004a). This is also true of other selected issues, from Classical Literature, Art and other subjects.

The interactive simulation educational network can help to communicate heuristic and reflective mental models, in the unique educational needs of Gifted Talented Students and to holistic educational programs, for supporting their harmonic development.

Pedagogy should not aim at oppressing students.

Despite the fact that Aristotle does not admit that youths learn through playing «ου γαρ παίζουσι μανθάνοντες, μετά λύπης γαρ η μάθησις», he advocates that pedagogy should be a source of oppression. Therefore, the joy of learning and the playful nature of education, which are some of the modern, progressive pedagogical methods, hail back to Aristotle's way of thinking. The purpose of pedagogy should be to achieve happiness, but not only in the form of enjoying material or spiritual goods, but also in the form of soul energy, which draws us closer to perfection. Thus, pedagogy's mission is to assist in fulfilling the very purpose of existence, **which is the achievement of happiness.**

Kathie Olsen (2008), neuroscientist, directs her neuroscience research, towards a combination of biology and psychology, *"I take great pride in my science policy work—contributing to science and engineering programs and activities that lead to profound outcomes for the country, particularly in training the next generation of scientists and engineers. It is compelling work. Science and engineering improve our nation's ability to innovate, enable discoveries, develop technologies, strengthen the economy, and improve **our overall well-being"***.

According to Plotinos, "*children must be born with a good physical and mental health, which must be augmented through education*", and according the Entropy (2nd Law of Thermodynamics):

"*Every self-regulated system tends to self-destruct if left unrestrained*". Scientific knowledge has many applications in human thinking and development. Some examples are:

a) Human as a natural intelligence system that has been constructed by many parts and well-connected sub-systems.

b) Human development is a function and confluence of innate abilities and the reflections of the many appropriate environments.

Neurosciences lately play a very important role in Education. John Geake (2007) asked:

- Are there new insights about brain functioning, which can be applied to education?

- Does a better understanding of how our students' brains function helps us in our classroom work as teachers.

After longitudinal research John Geake stated: "*In sum, the education profession could benefit from embracing rather than ignoring cognitive neuroscience. Moreover, educationists should be actively contributing to the research agenda of future brain research*".

And he also stated: *"As an example, we take a model of adaptive plasticity that relies on stimulus reinforcement and examine possible implications for pedagogy and curriculum depth".*

Barbara Clark (2007), also stated: *"Research in neurobiology, psychology, physics, and systems theory provides information that challenges old beliefs and provides clues to the dynamic development of intelligence, the creation of giftedness, and optimization of learning at home and in the classroom". ……."Higher thought processes, synthesis, creativity, and physical well-being are seen to be enhanced by reducing tension and encouraging the use of visualization and imagery. A great many fields now use these methods with positive results. Education needs the support of such findings to bring to students a full actualisation of their abilities and to allow them the use of the power of their own minds".*

For approaching common sense Aristotle, one of the most prominent Greek philosophers, his influence on the history of thought and knowledge is unparalleled. In his "Posterior Analytics", one of Aristotle's treatises **on Logic** is comprised of two books that deal with the methods of **definition and demonstration.**

Sciences "*Episteme*" & Mind "*Nous*", Aristotle's, "*Posterior Analytics*" , was approaching as"

"Νους εν αιεί των αρχών, νους εν αιεί επιστήμης καί αρχή των αρχών"

(As below translated by G. R. G. Mure)

"Now, of the thinking states by which we grasp truth, some are unfailingly true, others admit of error – opinion, for instance, and calculation, whereas scientific knowing and intuition are always true: further, no other kind of thought except intuition is more accurate than scientific knowledge, whereas primary premises are more knowable than demonstrations, and all scientific knowledge is discursive".

Karasmanis (2005) combined activity of Reason and Necessity, "Anagkē and Nous": The Method of Biological Research in the Timaeus, last part (69a–92c) of the Timaeus, where Plato presents his ideas about human physiology but also about biology in general, we find the combined activity of Intellect and Necessity.

According to Aristotle's *Logic* "Logos[76] is the ability of the mind to express and understand abstract concepts".

Marvin Minsky (from MIT artificial intelligence laboratory), who was influenced by classical literature, especially Aristotle, combined in his work on artificial Intelligence elements from Mathematics, Greek thought in modern technology, human intelligence and neural networks, Minsky (1954, 1990).
Minsky's work also Meletea (2004)b, combined: Thinking, Heuristic Programming, Music – Mind – Meaning , Rhythm, etc.

As an example he used a model of Six Levels of Mental Activities trying to answer the question: What enables our minds to generate so many new kinds of thoughts and ideas?

[76] Logos: Reasoning is on approach of the term. To explain the term we use the nearest well know word "Logic". "logos" is also the used for "speech". An explanation given by Aristotle to give an explanation of the term "Logos" he stated that "logos" help people for "been" but "Logos" for the "well been".

Figure 1: The Minsky's, Six Levels of Mental Activities contents.

Minsky (1981), simulating Music, Mind, and Meaning, stated also the following results in his research for improving Artificial Intelligence:

***"Feature-Finders**, listen for simple time-events such as notes or peaks or pulses.*
***Measure-Takers**, notice certain patterns of time-events like 3/4, 4/4, 6/8.*
***Difference-Finders**, notice that figure X is like figure Y, but higher by a fifth.*
***Structure-Builders**, notice that three phrases form a regular "sequence"'"*

Minsky also stated that "*No person has the strength of an ox, the stealth of a cat, or an antelope's speed—but our species surpasses all the rest in our flair for inventing new ways to think. We fabricate weapons, garments and dwellings. We're always developing new forms of art. We're matchless at making new social conventions, creating intricate laws to enforce them—and then finding all sorts of ways to evade them*".

4. Approaching Levels in Behave and Define/Recognize Talents

In Aristotle "*Topika*", and these because the construction of any word (name - term) tried to put in any words the most important characteristics.

Human beings have various common ways to communicate.

These include common "languages" such as mathematical, musical, sign languages, body languages etc.

Aristotle "*After the Physics*" agreed that the "επακτικούς λόγους" inductive research directs to the "Total definition - Global definition", "το ορίζεστε καθόλου".

Concepts can be expressed in every language in the following ways:

a. Typical Definitions (e.g. the mathematical notion of "function" means the same in all languages).
b. Descriptive definitions: Generalising concepts like talent, giftedness, etc. and taking them out of context can create chaos. (As illustrated from the following example, if a 5 year old boy from Alaska and one from Sahara are asked what snow is, their answers will be determined by their experiences, personality, environment and aesthetics).
c. Working Definitions: These can be helpful for certain groups of people but they may mean nothing to the rest of the population).
d. Symbols (e.g. numbers in various numerical systems, words and their semantics, translations of foreign words such as the word theatre which comes from the Greek word "theater" meaning view, can remain the same if translated).

It is the time for educators and facilitators to be able and adapt in order to develop innovations reflecting on the student needs that are always changing, as the rhythm of the students needs is in dynamic interactivity, we must investigate the future of the educational process.

Even students who we would call gifted in mathematics or those who appear to be gifted in mathematics but have some weaknesses, for which we cannot determine the causes. For instance, a 10-year old student with high scores in IQ tests has writing difficulties. Are these caused by possible

dyslexia or has the student developed some different thought patterns, which do not correspond to those of writing? This is one of the main reasons why most countries have developed programmes for supporting the unique needs of gifted talented students.

What could we propose to such a student?

This is only one of the many similar questions and possible answers that arise.

It is therefore imperative that we can identify the students' talents, interests as special abilities and, based on those, to help them formulate a harmonic/balanced personality. A classification that describes the interaction (student - teacher/etc), and/or (children - parents) etc, - proposed by Meletea (2003) - in order to obtain the necessary information from the student's behaviour to identify their talents is described below (in figure 4).

Figure 2: bd Model, A Classification of the Levels in Behave and Define/ Recognize Talents.

Some ideas of Systems that apply scientific knowledge to their life stated, Meletea, (2006)a & (2006)b.

Epilogue

"Humans are choose to know their origin", stated Aristotle, in his *Physics* (introduction), and that **"***Only then we know, when we know the reasons*".

"The role of the scientific knowledge can be an art for human harmonic/balanced developmen. .... Educators need to create their own "golden rules" for their professional development and success in promoting creativity for all students ..... for expanding scientific knowledge for qualitative life", Meletea (2008)b.

References

Aristotle, *Logic.*

Aristotle, Physics, Introduction.

Aristotle, *Politics.*

Aristotle, *Topika.*

Aristotle's "*Posterior Analytics*", Translated by G. R. G. Mure
Available from: http://www.translatum.gr/forum/index.php?topic=7258.0

Clark, B (2007), Growing Up Gifted: Developing the Potential of Children at Home and at School,

Seventh Edition, Publisher Prentice Hall.
Geake, J. (2007) "The Neurobiology of Giftedness"
National Academy for Gifted and Talented Youth, University of Warwick & World Council for Gifted and Talented Youths, (WCGT2007), "Worlds of Giftedness From Local to Global", August 5 – 09, Warwick, England.
Karasmanis, V. (2005) "Anagkē and Nous: The Method of Biological Research in the Timaeus", Rhizai. A Journal for Ancient Philosophy and Science (2/2005), pp.167-182.
Kathie Olsen (2008) Cogito Interview: Kathie Olsen, Neuroscientist and NSF Deputy Director, by Amy Hodson Thompson, *Cogito*, 07.18.2008, Available from: http://www.cogito.org/Interviews/InterviewsDetail.aspx?ContentID=17376
Meletea, E. T. (2004)a. *Greece: Developing of Pedagogical Reasoning to Supporting Gifted/Talented Students – Educational Communicating Networks and Heuristic Modes of Mathematical Knowledge*". The 10th International Congress on Mathematics Education, ICME – 10. Topic Study Group: (TSG4) Activities and Programs for gifted students (04-11 July 2004) Copenhagen, Denmark.
Meletea E. T. (2006)a. ***Fundamental identification, elicitation and representation of Basic Concepts knowledge to advice Gifted/Talented Students, in Art and Mathematics.*** Conference: "Creativity in Mathematics Education and the Education of Gifted Students".
Meletea E. T. (2006)b. *Values from the Greek Classical Literature Reflecting Methods in Gifted Talented Interdisciplinary Education and Harmonic Development*". 10th Conference of the European Council for High Ability: "Values and Foundations in Gifted Education Reflections on the Ethics of Multiple Intelligences" (September 13 - 16, 2006). Lahti, Finland.
Meletea, E. T. (2008)a. *"Policy-Makers Approaching Evaluation Tools and Quality Indicators for the International ICT Networking in Gifted Talented Education".*
The 5th International Conference on Creativity in Mathematics and the Education of Gifted Students, Research and promotion of creativity and the giftedness in mathematics:
Meletea, E. T. (2008)b. ***"****Creating Common Languages in Pedagogy: Mental Models and Structural Niches in approaching Concepts for Harmonic Development of Gifted Talented Students",* The International Conference in Mathematics Education (ICME 11), Monterrey, Mexico. 6 - 13 July 2008, DG 9 Proceedings, Pages: 89-96,
Available form: http://dg.icme11.org/tsg/show/10
Minsky, M. L. (1954). Neural Nets and the Brain Model Problem. Ph.D. dissertation, Princeton University.
Minsky, M. L. (1956). *Heuristic Aspects of the Artificial Intelligence Problem*. Lincoln Lab., M.I.T., Lexington, Mass., Group Rept. 34-55, ASTIA Doc. No. 236885, (M.I.T. Hayden Library No. H-58).
Minsky, M. (1974). *A Framework for Representing Knowledge*. AI Memo 306. Cambridge, Massachusetts: M.I.T. Artificial Intelligence Laboratory. Condensed version in P. Winston, ed. 1975. *The Psychology of Computer Vision.* New York: McGraw-Hill, pp. 211-277.
Minsky, M. (1977). *Plain Talk about Neurodevelopmental Epistemology*. In *Proceedings of the Fifth International Joint Conference on Artificial Intelligence.* Cambridge, Massachusetts: M.I.T. Artificial Intelligence Laboratory. Condensed in P. Winston and R. Brown, eds. 1979. *Artificial Intelligence.* Cambridge, Massachusetts: MIT.
Minsky, M. (1981). Music, Mind, and Meaning, Computer Music Journal, Fall 1981, Vol. 5, Number 3.
Plotinos, "*Apofthemata".*
Aristotle "*After the Physics*" (M 4, 1078b and A 6, 978b).
Aristotle "*Ethical Nicomachean*" (B1, 1-3 and B6, 10-11).
Israel, February 24 - 28, 2008, Available from: http://www.cmeg-5.edu.haifa.ac.il/

(E.38)

Frances R. Spielhagen, Motivation in the Middle: Academic Engagement among Young Adolescent Students: Early adolescence is a critical time, when schools can begin to address the factors that lead to the rising drop-out rates in high schools and plummeting test scores in the middle grades. Therefore, student engagement in early adolescence is an important topic that merits continuous and current examination. This paper will present the results of a study that explored the early stages of the decline in educational achievement and disaffection among adolescents. The paper centers on a quantitative study that explored academic engagement among students in early adolescence (ages 10-13) in a large urban district in the United States where changing demographics and increasing drop-out rates have affected student achievement across all populations. The survey responses of these young adolescents provide a compelling account of their perceptions of how school affects their lives and further understanding of the dynamics affecting the engagement and success of young adolescents as they mature. In many ways, this study confirms what educators know about the factors affecting student engagement. However, this study not only adds to the existing body of research, it provides further understanding of the dynamics affecting the engagement and success of young adolescents. Preliminary findings suggest that the seeds of disengagement are sown as early as age 10. The personal habits of these young adolescents created familiar alternatives to school activities for students when their studies become increasingly more difficult and less interesting to them. Educational policymakers and practitioners can benefit from what these youngsters have revealed about engagement and motivation.

Diagnostic evaluation of competences: A new model based on Complex Systems Theory

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Abstract

The evaluation of Human Resources' competences in a big Organization constitutes a strategic moment for designing and managing effective and efficient training/ educational paths. In fact the Development Plans for employees are based on the capacity of the system to verify the gap between a target competences level and the real state of knowledge and skills. The value of this gap determines the contents and the didactic strategies of the learning proposal. The learning path, in fact, can be as much more precise as the output assessment level is more detailed. The measurement and the quantitative description of gaps involve therefore the definition of theoretical tools to detect the real critical factors, with the aim of optimize costs and rational management of the designing and delivering time. To such purpose, a new analysis model based on Systems Theory has been created with the aim of making the diagnostic activity of competences more rigorous.

In particular, the model foresees four basic components: **(1)** a systemic interpretation of the interconnections among the components of a competence; **(2)** a taxonomy of the elements that constitute competences, integrating Bloom, Anderson, Sternberg, Romiszowski and Marzano's theoretical schemes of evaluation; **(3)** a scheme to quantify the intensity levels of a competence based on complex nets and probabilistic algorithms (Bayes Theorem); **(4)** a formal description of competences according to the international standards IMS RDCEO and HR-XML. The paper includes a theoretical explanation of the diagnostic model and some possible applications in Companies and Universities.

Keywords: Competence, skill, evaluation, taxonomy, e-learning, organizational process, complex systems.

1. Introduction: the "ghost" behind the behaviour

Several years of experience in competence mapping and competence evaluation in big Organizations bring us to believe that an abstract, platonic competence doesn't exist. We mean that a competence that is always valid in each context does not exist. It gains meaning with reference to specific activities inside an organizational process (Wittgenstein, 1953).

This sentence may appear prose, but it is based on a holistic-systemic interpretation of the phenomenon "competence". According to this interpretation a competence, in a specific **organizational context** (interaction system) is the set of individual **abilities** that allow to reproduce **behaviours** oriented to the **goal** - the output of the system - in a definite **time interval** - since it deals with a dynamic system (Ronsivalle, Carta, 2008).

The competence is intended as a "Ghost" carrying out the behaviour in the process and the aim of our research is to define a theoretical frame to measure this "ghost".

1.1. The philosophical question of competences' "measurability"

Due to the atmosphere of impenetrability enwrapping this ghost, two questions arise:

1. Is it possible to assign numerical values to complex phenomena like competences of human beings?
2. What is the logical-mathematical frame to interpret competences in quantitative terms?

The first one is a philosophical question and we won't run the risk to explore the labyrinth of the social sciences' epistemology.

Let us solve the problem pragmatically: the epistemological conventionalism suggests that if quantifying is useful and if we are able to create valid and reliable calculation models then the measurement makes sense. A correct formulation of explicative categories, more than an ontological engagement is recommended.

Certainly it is a philosophical artifice, but it has been terribly useful up to now and we hope it will be in the future.

1.2 The mathematical model

The second big question is the definition of the mathematical frame – the form of values and the calculation model.

This subject needs a more detailed explanation. There are three methodological reflections to underline:

1. In order to measure and elaborate a diagnosis related to a competence, we need to detect its elementary components, the link with the goal and the observable behaviours that make it have sense. The behaviour is the privileged indicator of a competence but it must be interpreted with reference to the possibility to be reproduced in similar contexts. The mere observation of behaviours constitutes the heart of the Performance Evaluation. We propose something different: to measure what makes possible similar performances in similar contexts.
2. Observing a single behaviour is not enough to talk about "manifestations" of a competence as the logic is not one to one. We have to observe more functional behaviours in a certain context and their logical and temporal relations. It means that we have to go back to the plots of a net through the observation of a dynamic system of interconnected behaviours. Only from these indicators we can obtain information to make some inference about competences.
3. This dynamic system of indicators doesn't foresee simple relations among variables since factors are interconnected in a sophisticated and not cumulative manner. The human behaviour and its real effects don't come from the simple algebraic sum of variables. The logics of composition cannot be synthesized through a simple function or a system of equations. It is a non-linear mechanism, a system that can be defined "complex".

In the following pages we will try to develop the above mentioned three methodological reflections.

1.3. The "manifestations" of the ghost in a Company

Let us start with the basic assumption that the ghost – with this name we will refer to the competence, manifests itself through a set of activities by which the subject can demonstrate to:

- perceive, understand and acquire information about a specific context, the characteristics of goals, limits, resources, and rules that govern the environment;
- work out this information according to the complexity levels of final and intermediate objectives and according to the characteristics of the environment;
- define one or more behavioural schemes that are coherent with the information and the final objective (Boyatsis, 1982; Spencer & Spencer, 1993);
- put the behaviour into action in a flexible and adaptable ways, in order to change it, if necessary, in relation to the changes of the factors linked to the context (Wittgenstein, 1953);
- reach the objective in a specific time limit;
- behave in a similar way, in a context that presents similar conditions and objectives; and

- integrate the set of abilities with experience in order to increase flexibility and strategies.

What are the main features of each element of this systemic interpretation of the concept of "competence?" What can we measure/evaluate?

Let us start with an example: the system of competences of an instructional designer manger, who we will call Peter.

2. The Framework of competence

The **organizational context**, the dynamic environment in which the competence is put into action is an interaction system characterized by physical limits and "rational actors" (Elster, 1984). They set the dynamic structure of limits and resources in which the subject performs the behaviour (objective dimension of the context), and, at the same time but in an indirect way, they influence his subjective representation of the interaction system (subjective dimension).

The **interaction system** can be structured in different levels, depending on:

- the information available;
- the risk connected to the human error of the actors involved;
- the processes and standardized procedures that characterize.

An example of interaction system structured at a low level can be represented by jungle. Encoded procedures don't exist in the jungle and the information is almost always incomplete and unavailable.

On the contrary, an interaction system structured at a high level is a total institution (a penitentiary system, a barracks, etc.) of which Goffman (1961; 1974) spoke about.

In this paper we will refer to organizational contexts structured at a middle level (Companies and Public Administrations). In these contexts, the risk of human error can be a significant factor and, therefore, human competences can assume a central role. These organizational contexts can be described in a systemic form according to the logic of process and the sub-division in phases and activities oriented to concrete results (von Bertalanffy, 1968; Scott, 1992).

With reference to our example Peter, let's look at the interaction system.

***Context**: A training Company dealing with counselling and didactic design for learning paths through classroom and/or distance learning.*

***Process**: Didactic macro-design of the learning path according to the theoretical model. The process starts when the client requests a course and comes to an end when the storyboard is delivered.*

It foresees the following six phases:

1. *Design structur;*
2. *Content analysi;*
3. *Concept map;*
4. *Tree of objectives;*
5. *Evaluation system; and*
6. *Storyboard editing.*

3. Objectives and behaviours

In each interaction system (in relation to the various processes) a set of final and intermediate **objectives** are - implicitly or expressly - defined. They constitute the indicators of competence because they allow to record the "ghost" manifestation and to verify its intensity degree and its adequacy to the context.

The context and the temporal dimension of the "competent" behaviour constitute the borderline of the objective, of the output of the system, of the final result. This output includes both the subjective

representation (in which the subject gives meaning to his actions, makes decisions and evaluates himself), and the criteria that allow an external evaluation of the competence.

The definition of an objective and of a - "path" - indicates a passage from a deterministic level to the functional complexity. The subject performs a behaviour thanks to his knowledge and personal skills. Knowledge and skills allow to modify the behaviour according to an adaptive logic, very similar to the logic of an organism in its own life system (von Bertalanffy, 1968; Elster, 1984).

The observable and measurable output of a process often consists in the product of the process itself: a document, an handmade product, a report.

Sometimes the objective can be the action itself, the behaviour or a series of behaviours (Bloom, 1956; Mager, 1975; Anderson & Krathwohl, 2001; Marzano & Kendall, 2007).

Some other time, the final output of a process is another process or a sequence of processes. It depends on the degree of complexity of the interaction system.

With reference to our example Peter: what is the objective of the Company? What is he expected to do?

***Objective of the Company**: The subject must be able to conclude a project which possibly can include the realization of a WBT under certain restrictions (protocol, budget and profit).*

***Expected behaviour**: The subject must be able to efficiently design didactic modules according to:*

- *client needs;*
- *design criteria;*
- *deadlines; and*
- *economic limits.*

4. Knowledge: the substratum of the ghost

As previously stated, a subject in a specific process can have a certain quantity of available and manageable information. This factor is very important for the interpretation and evaluation of behaviours because competences manifest themselves through behaviours that are determined by the variable **Knowledge**.

With reference to the metaphor of competence as a ghost, the knowledge represents the fundamental substance that compose the ghost, the substratum that makes possible its existence. Although not empirically measurable, the knowledge constitutes an essential presupposition for the evaluation of competences and can be described through a particular type of schemes: the concept maps (Novak, 1998).

This variable constitutes the structure of conscious and unconscious knowledge and explicit and implicit knowledge - technical information, theoretical contents, historical data, information on the outside variables, etc. (Nonaka, Takeuchi, 1995). It represents also the system of information and resources that the subject can use when he/she perceives, decodes, describes, represents, elaborates and modifies objects, during the interaction with the context, in order to perform behaviours oriented to the objective (Elster, 1984).

Several theorists of evaluation tend to classify knowledge into four different types, with reference to the objects: facts, concepts, procedures, and principles (Anderson & Krathwohl, 2001). But this subdivision is affected by a series of outside variables, like (a) the educational domain in which these theories developed, (b) a naïve conception of the objects of knowledge, (c) a limited attention to the most recent theories on semantic and neuroscience.

In the following paragraphs, a different categorization of the various levels of knowledge will be proposed. We will do explicit reference to the Mental Models Theory (Johnson-Laird, 1983), and to the predicate calculation, in relation to the different categories of concepts and evaluation typologies.

With reference to our example Peter, he must know the didactic macro design model which means that he must know:

- *the protocol for the analysis of a process;*
- *all e-learning services;*

- *all documents necessary for the project;*
- *all variables of a training programme,*
- *basis of docimology;*
- *the structure of a storyboard;*
- *storyboarding tecniques;*
- *all rules of user-frendliness; and*
- *all phases and criteria to develop a storyboard.*

4.1. The knowledge as a structure of mental models

According to Johnson-Laird's Theory, the human mind constantly produces countless images of the world in which it is immersed. These images of the mind, the so-called "mental models", are internal representations of simple or complex olfactory or auditory perceptions when the subject is in a concert room, concrete physical objects or abstract entities in mathematics, complicated states of things or historical events collocated in time, complex atmospheric phenomena or even other images of images.

The extreme ductility of mental models depends on their symbolic nature and on the functional power oriented to guarantee and to increase the survival possibilities of the human being. The functional power is represented by the possibility to codify again, translate, manipulate, destroy, transform the objects of the representation within the thought, without any intervention on the authenticity of things.

In fact, given a state of things **Q**, the mental model **m()** that describes it, allows the subject a series of fundamental activities. For example the three-dimensional manipulation (in the sleep/wake state), its translation in common language (within an oral or written communication), the transposition of the state of things in an image reproducing its essential characteristics, up to its integration in previous mental models.

Moreover, according to the theory, each specific mental model is a particular "local" representation of the "global" state of "mind system", represented by a **general mental model**. The evolution of knowledge systems can be virtually represented through the evolution of global mental models, which constitute its "states" in different moments.

In case of interactions with the external system (as in a learning process or in normal working activities) the single variations of the state of mind at a local level can imply variations at a global level. These variations can be described through the relationships between local mental models related to specific domains and the global mental model. They can also involve variations in the transition entry function, that is the way according to which the mind system elaborates models starting from the input information.

This means that the creation and the evolution of a mental model - as in the model **m()** of the state of things **Q** – must be taken into account in the integration with a general mental model **M()** that represents the whole knowledge system of the subject and that parallelly evolves.

The interaction between local mental models – is contingent upon the knowledge systems at that moment tied to temporary interactions - and the global mental model of the subject, constitutes the fundamental principle of the human mind's life. As previously stated, this interaction pragmatically implies a systemic consideration of knowledge. The knowledge includes technical-specialistic information, common sense elements and general considerations of the world. All these aspects become crucial factors that influence competent behaviours and that can be broken down and evaluated in a rigorous way.

4.2. The various knowledge levels

With reference to the analysis and evaluation of the knowledge systems, the Mental Models Theory gives some interesting criteria for classification: they are well connected with the systemic logic, that inspires our research.

In particular, with the attempt of defining a mental models taxonomy, let us detect four levels of increasing complexity, connected with the activities of recognition and recall of the human memory.

4.2.1. The atomic mental models

At a first level, the subject retrieves atomic mental models from the long-term memory.

An atomic mental model corresponds to the association of a symbol to a definition. In the predicate calculation it corresponds to the atomic form **x is an A** (that is "x belongs to the class A", or "x has the A property").

The 1st complexity level's categories are the following:

- x
- x = x
- - x
- x □ A
- x □ B

Example: "Quality" means the differentia of the essence. (Aristotle, 350 B.C.)

4.2.2. The Logical Connections

Many knowledge systems foresee sequential ordering associations according to various criteria (for example the chronological criterion).

If the subject retrieves atomic mental models (1st level) from the long-term memory and associates them through elementary logical connectives to generate new integrated mental models, then it is a second complexity level of human knowledge.

This 2nd complexity level's categories are the following:

- x. y
- x □ y
- x = y
- x □ y
- x, y, z, k (ordinary sequence)

Example: A system of co-ordinates of which the state of motion is such that the law of inertia holds relative to it is called a "Galileian system of co-ordinates". (Einstein, 1961)

4.2.3. The Nomic Relationships

The 3rd complexity level is represented by a knowledge systems in which the subject retrieves 1st and 2nd level mental models from the long-term memory. Then he defines integrated mental models in which the logical and deterministic relationships among the various entities are expressed. This integrated mental models foresee the introduction of a series of more complex logical connectives, to define the rules and/ or the nomic connections that determine the relationships among the various models.

The 3rd complexity level's categories are the following:

- x □ y
- x □ y
- x □ y
- x □ y

Example: To every action there is always opposed an equal reaction; or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts. (Newton, 1686)

4.2.4. The Probabilistic Conditions

If mental models include elements and objects interconnected according to probabilistic logic, it is a supreme complexity level of knowledge: the fourth level. It is characterized by a high degree of relationships between concepts related to schemes as for organisms where there is deterministic chaos.

The 4th complexity level's categories are the following:

- p(x □ y)
- p(x □ y)
- p(x □ y)
- p(x □ y)

Example: The Bayes's Theorem

$$P(A|B) = \frac{P(B|A)\,P(A)}{P(B)}.$$

5. The Skill: the competence's vis viva (living force)

According to what we stated above, the mind of a "competent" subject can be assimilated in dynamic system of finite-states (von Bertalanffy, 1968) that generates mental models representing the subject's knowledge in a certain moment.

Some of the various mental models elaborated by the mind, actually represent behavioural schemes that determine the observable behaviours of the subject.

In case of the competent behaviour, these behaviours are immersed in organizational processes and are oriented to achieve specific objectives. Broadly speaking, let us state that they allow the subject to optimally adapt himself to the interaction system, to the environment in which competences manifest themselves - in our specific case, the working domain.

In a Company, inside multinational offices or in a stylist's atelier, the actors, the system characteristics, the material limits, and the dynamic relationships are daily translated by the subject in information. He uses these information to define atomic behaviours, linear sequences of behaviours, strategies of action, up to the maximum levels of complexity of the human behaviour in contexts with countless competing factors.

The degree of sophistication and the huge number of elements that influence the competent behaviour cannot be referred only to the knowledge system of the subject, to the content of information, to the substantia of the ghost.

In the genesis of behaviour it is necessary to take into account another fundamental variable: the individual "**skills**". In fact, if the knowledge represents the substance of the ghost, the abilities constitute the energy forms, the whole "living forces" that make possible the competence to manifest itself through observable behaviours.

We make reference to a whole, since it doesn't make sense to deal with single functions (abilities). Let us refer to a system of functions acting at different levels of control and elaboration of information (cognitive, emotional and psychomotor level). It allows the performing of behaviours connected to a specific competences in a process (Boyatsis, 1982; Spencer & Spencer, 1993).

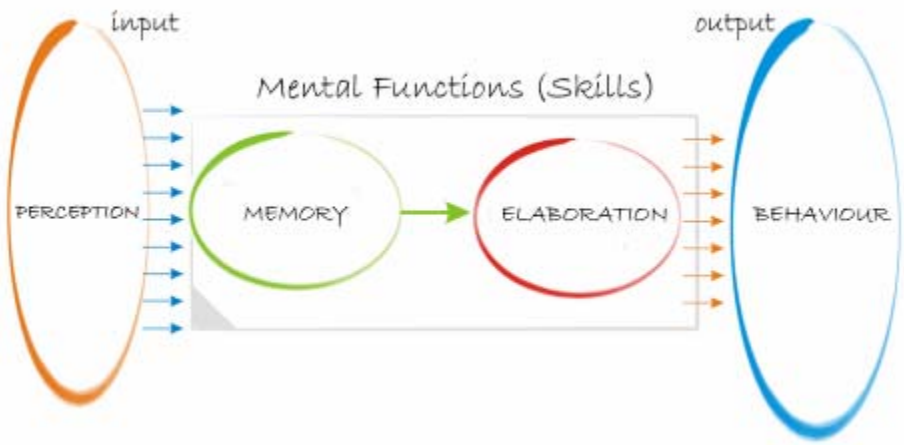
With reference to our example Peter, he must be able to:

- *Interpret and synthesise information*
- *Communicate*
- *Actively listen*
- *Took decisions*
- *Manage a team*
- *Analysis*
- *Manage priorities*
- *Use the software c-map*
- *Design a tree of didactic objective*
- *Calculate the efficacy index*
- *Select the objectives to be evaluated*
- *Realize docimologically correct items*
- *Do a correct item analysis*
- *Interpret results*
- *Write creatively*

5.1. Theory of mental systems and functions (skills)

In the model that we propose, the system of skills is articulated in four different dimensions of ability. They characterize the way in which information is assimilated, interpreted and transformed, up to the generation of behavioural schemes where the subject has an increasing degree of autonomy in the interaction context and in the achievement of objectives.

The output of the system (behaviour) depends from the knowledge categories, the level of perception by which knowledge "enters the system", and the mental functions involved, as represented in the figure below:



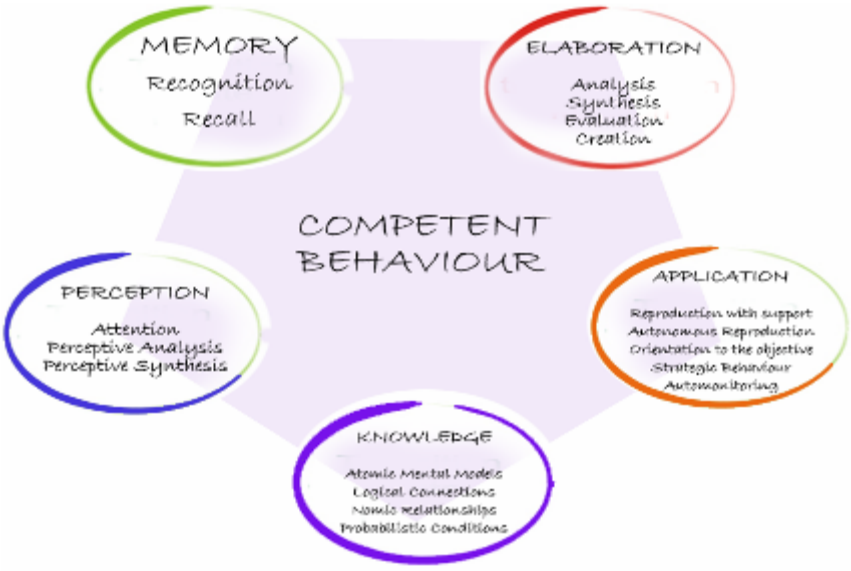
Let us state that ideally, at an abstract level, the phenomenological domain related to the single behaviour or to a sequence of a subject's actions would be broken down in five specific dimensions:

1. Four levels of Knowledge (see paragraph nr 4);
2. Typology of Perception (Attention, Perceptive analysis, Perceptive synthesis);
3. Mnemonic process (Recognition, Recall);
4. Typology of Elaboration (Analysis, Synthesis, Evaluation, Creation); and
5. Typology of Behaviour (Reproduction with support, Autonomous reproduction, Orientation to the objective, Strategic behaviour, Automonitoring).

5.2. The "Pentagon" of mental functions

According to this model, the 4 mental functions (skills) are interconnected in the elaboration process of the first dimension, the subject's knowledge, and impact in a different way (and with different weights) on the observable behaviour, that is the only measurable output of the whole process (Bloom, 1956; Romiszowski, 1999; Anderson & Krathwohl, 2001; Marzano & Kendall, 2007).

The dimensions are graphically represented by the following pentagon.



This pentagon allows the "fragmentation" of all the variables that determine the complexity degree of the competent behaviour. It constitutes the basis to define the observation, measurement, and evaluation techniques of the competence's dimensions.

6. Application, Memory and Elaboration: some definitions and examples

With the aim of illustrating the potentialities of the model in terms of evaluation of competences, we will try to analyze some of the functional areas of the "pentagon".

Let us make particular reference to some sub-functions of Application, Memory, and Elaboration.

For each sub-function we are going to provide a brief definition, an observable behaviours grid, an diagnostic evaluation method, and some examples (referred to the cognitive domain of competences).

6.1. The Application Area

The Application domain (Romiszowski, 1999) is referred to the transformation of mental models into behavioural schemes. It is in relation with the autonomy degree of the competent behaviour according to 5 intensity levels:

LEVELS		BEHAVIOURAL INDICATORS
1	Reproduction with support	Ability to perform a previously learned behaviour, with the support or the input of a supervisor.
2	Autonomous reproduction	Ability to perform a previously learned behaviour in autonomous way.
3	Orientation to objective	Ability to perform a behaviour/action foreseeing the consequences of one's decisions with reference to a specific objective.
4	Strategic behaviour	Ability to plan more adaptive strategies to reach a specific objective.
5	Auto-monitoring	Ability to auto-monitor one's behaviour and one's strategies, even in bad situations, and if necessary to modify them, with reference to a specific objective to achieve.

With reference to our example Peter, the levels will be:

0. Not required: It is not required to design a training programme.
1. Reproduction with support: The subject is able to follow the suggestions of a superior to realize single objectives
2. Autonomous reproduction: The subject is able to complete single tasks without the support of the superior but he needs guidelines to reach his final objective.
3. Orientation to objective: The subject is able to conclude the project autonomously according to the client needs.
4. Strategic behaviour: The subject is able to perform different strategies in a complete autonomous manner to reach the objective according to the client needs.
5. Auto-monitoring: The subject is able to adapt the design to the specific client needs, even though not directly expressed and thus he develops a profound relationship with the clients.

Let us imagine Peter's activities at "auto-monitoring" level related to the Instructional Design process. His macro-objective, according to the "Pentagon functions" will be the following:

1. **Design structure**: to be able to design a learning path according to the client needs [Knowledge = Nomic relationships; Perception = Perceptive synthesis; Memory = Recall; Elaboration = Analysis, Synthesis, Creation]
2. **Content analysis**: to be able to conclude an accurate content analysis [Knowledge = Probabilistic conditions; Perception = Perceptive synthesis; Memory = Recognition; Elaboration = Analysis, Synthesis]
3. **Concept map**: to be able to elaborate concept maps [Knowledge = Logical connections; Perception = Perceptive synthesis; Memory = Recall; Elaboration = Synthesis, Creation]
4. **Tree of objectives**: to be able to elaborate tree of didactic objectives [Knowledge = Logical connections; Perception = Perceptive synthesis; Memory = Recall; Elaboration = Analysis, Synthesis, Creation]
5. **Evaluation system**: to be able to design the macro-structure of the evaluation system [Knowledge = Nomic relationships; Perception = Perceptive synthesis; Memory = Recall; Elaboration = Analysis, Synthesis, Evaluation, Creation]
6. **Storyboard editing**: to be able to elaborate a storyboard [Knowledge = Nomic relationships; Perception = Perceptive synthesis; Memory = Recall; Elaboration = Analysis, Synthesis, Creation.]

6.2. The Memory Area

The Mnemonic area includes two specific functions: Recognition and Recall (Romiszowski, 1999).

6.2.1. Recognition

"Recognition" is the ability to recognize the "object" previously acquired and stored in memory among different "objects". That is the ability to retrieve information from memory through an external stimulus.

Behavioural Indicators	Suggestions for the evaluation
To detect facts, objects, persons, names or events already known among facts, objects, persons, names or events unknown.	Given a list of objects, the subject must recognize the object stored in memory and select it.
To detect procedures already known among sequences unknown.	Given a finite number of sequences, the subject must recognize the order of sequences stored in memory by selecting the correct answer.
To detect concept's characteristics already known, among characteristics unknown.	Given a list of phenomena's characteristics the subject must recognize those connected with the specific phenomenon to which the item referrers to by selecting the correct answer.
To detect known concepts that depends from a principle or a rule among unknown concepts that depends from a principle or a rule.	Given a list of concepts the subject must recognize those depending from a specific rule, by selecting, connecting or gathering them.

Example for the measurement of "Recognition".

Detect, among the following, the "start procedure" to realize a project:

a) needs analysis identification - definition of interventions - planning of activities - planning of interventions - budget estimate
b) budget estimate - needs analysis identification - definition of interventions - planning of activities - planning of interventions
c) needs analysis identification - budget estimate - definition of interventions - planning of activities - planning of interventions
d) planning of activities - planning of interventions - needs analysis identification - budget estimate - definition of interventions

[Knowledge = Logical Connections; Perception = Perceptive Synthesis; Memory = Recognition; Elaboration = n.a.; Application = Orientation to the objective]

6.2.2. Recall

"Recall" is the ability to retrieve the information previously acquired and stored in memory, without having external stimuli.

Behavioural Indicators	Suggestions for the evaluation
To list facts, objects, persons, names or events.	The subject must recall facts, objects, persons, names or events stored in memory and write them as requested.
To order the sequences of a known procedure.	Given a number of activities without order, the subject must recall the procedure stored in memory ordering the sequence of the activities or, at a more complex level, he must write all the steps of the sequence in order.
To describe the characteristics of a concept .	Given a concept, the subject must recall it, describe its characteristics or, given some characteristics, the subject must write the concept to whom they are referred.
To describe the relationships among concepts establishing a principle or a rule.	Given phenomena, the subject must recall the rule to which they depend.

Example for the measurement of "Recall".

Complete the following sentence.

In Alessandro Manzoni's novel "The Betrothed", the two protagonists are a young couple in love and their names are _____ .

[Knowledge = Atomic mental models; Perception = Perceptive Synthesis; Memory = Recall; Elaboration = n.a. ; Application = Autonomous reproduction]

6.3. The Elaboration Area

The "Elaboration area" includes four functions: Analysis, Synthesis, Evaluation and Creation.

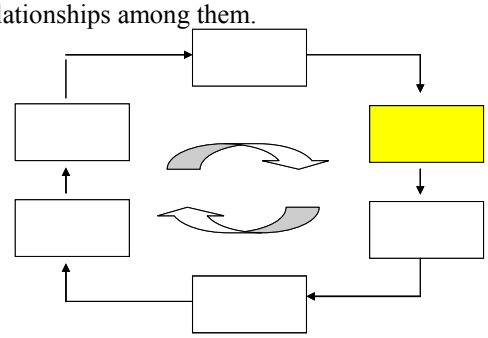
6.3.1. Analysis

"Analysis" is the ability to break down the cognitive field by overcoming established conceptualizations (Bloom, 1956; Romiszowski, 1999; Anderson & Krathwohl, 2001; Marzano & Kendall, 2007).

Behavioural Indicators	Suggestions for the evaluation
To distinguish the characteristics of different facts, objects or events.	Given a fact or a procedure or a concept or a law X, the subject must: detect elements that compose X. define the structure of relationships among these elements.
To identify the different sequences that compose a procedure.	
To specify the characteristics of a concept or a specific phenomenon.	
To look for conceptual relationships among different phenomena (and therefore the rules that govern them).	

Example for the measurement of "Analysis".

Fill in the blank the steps related to the process of "technical variance analysis" of a project.
Detect, in the red boxes, the relationships among them.



[Knowledge = Nomic relationships; Perception = Perceptive Synthesis; Memory = Recall;
Elaboration = Analysis; Application = Autonomous reproduction]

6.3.2. Synthesis

"Synthesis**"** is the ability to detect and sum up the relationships among the different cognitive stimuli (Bloom, 1956; Romiszowski, 1999; Anderson & Krathwohl, 2001; Marzano & Kendall, 2007).

Behavioural Indicators	Suggestions for the evaluation
To put into a scheme the main characteristics of facts, objects, names or events.	Given a fact or a procedure or a concept or a law X, the subject must produce a new element that involves one ore more elements previously analyzed. He must be able to: 1. detect the elements that compose the object X; 2. define the relationships among the elements that compose the object X; 3. define a new object N; 4. detect elements that compose the new object N; 5. define the new relationships. **In case of more mental model X and Y the subject must:** detect the elements that compose the object X define the relationships among the elements that compose the object X detect the elements that compose the object Y define the relationships among the elements that compose the object Y define a new object N detect elements that compose the new object N define the new relationships
To reach the goal of a specific sequence.	
To put into a scheme the characteristics of concepts or phenomena.	
To put into a scheme the conceptual relationships among phenomena.	

Example for the measurement of "Sinthesis".

Write a 20-lines plot of Alessandro Manzoni's novel "The Betrothed" making reference to the following structure:

a) Incipit;

b) presentation of the protagonist/s;

c) presentation of the antagonist/s;

d) Relationships between the protagonist/s and main antagonist/s (explain the reason for the antagonism);

e) Intervention of the protagonist/s' supporter;

f) Intervention antagonist/s' supporter; and

g) End of the story.

[Knowledge = Nomic relationships; Perception = Perceptive Synthesis; Memory = Recall;

Elaboration = Analysis and Synthesis; Application = Autonomous reproduction].

6.3.3. Evaluation

Evaluation" is the ability to critically compare objects and express a judgement with reference to a specific criterion (Bloom, 1956; Romiszowski, 1999; Anderson & Krathwohl, 2001; Marzano & Kendall, 2007).

Behavioural Indicators	Suggestions for the evaluation
To classify facts, objects, people, names, events according to a specific criterion.	Given a fact or a procedure or a concept or a law X, the subject must express a judgment with reference to a pre-defined criterion or with reference to the scale of measurement. He must be able to: detect the elements that compose the object X; define the relationships among these elements; detect the scale of measurement; express the rules of correspondence between values and objects to measure; express a judgment vs 1st element (numerical, qualitative, etc.); express a judgment vs 2nd element (numerical, qualitative, etc.); express a judgment vs Nth element (numerical, qualitative, etc.); express a synthetic judgment (Synthesis among judgments).
To judge the adequacy or inadequacy of sequences of a procedure with reference to the result.	
To judge the characteristics of a concept or a phenomenon with reference to a specific criterion.	
To test an already known rule to evaluate its accuracy/ pertinence.	

Example for the measurement of "Evaluation".

How would you define Alessandro Manzoni's novel "The Betrothed"?
a) historical
b) letter
c) fantastic
d) naturalist
Tell, in 5 lines, the reason why you chose this answer.

[Knowledge = Probabilistic conditions; Perception = Perceptive Synthesis; Memory = Recognition plus Recall; Elaboration = Analysis and Evaluation; Application = Autonomous reproduction]

6.3.4. Creation

"Creation" is the ability to abandon consolidated mental schemes looking for divergent solutions (Anderson & Krathwohl, 2001).

Behavioural Indicators	Suggestions for the evaluation
To combine, in an original way, facts, objects, people, names, and events already known.	The subject is able to join existing elements with new connections with reference to the objective (a new application of an existing "rule", the extension of an existing rule to new fields or creation of a new rule). The subject is therefore able to produce a synthesis. The new object foresees relationships and/or elements not included in the original object.
To order procedures in an original way.	
To set in a catalogue concepts or phenomena in an original way.	
To establish new rules that define relationships between different phenomena or concepts.	

Example for the measurement of "Creation".

Re-write, in 15 lines, the end of the novel "The Betrothed" imagining a negative ending.

[Knowledge = Probabilistic conditions; Perception = Perceptive Synthesis; Memory = Recall; Elaboration = Synthesis and Creation; Application = Autonomous reproduction]

7. A new perspective

The previous paragraphs - the specific evaluation examples - underline three points of strength related to our model for the evaluation of the competences.

7.1. The mirror of behaviours

The first advantage is the great flexibility level of schemes. In fact, the schemes allow to describe a huge range of behaviours that are specific of the human activities in an organizational context.

Even if in this paper we have been dealing only with the cognitive domain, you may have realized the possibility to cross the various dimensions with the functional area "Application". Its five levels - from "Reproduction with support" to "Automonitoring" – are referred to actions typically concerning with the behaviour of people in a Company.

This model has been applied in various service Companies to describe, in a novel way, the observable behaviours. The intensity levels of behaviours was referred to the soft skills of employees (Ronsivalle & De Luca, 2008).

7.2. The building blocks

The second advantage is represented by the potentialities of the 5 dimensions of the pentagon. They allow to reduce most of the currently used competence models in a "painting board of primary colours" in a unique system of building blocks.

Our research is inspired by the idea that we have to deal with scientifically significant evaluation and therefore certification of competences. For these reason it is necessary to translate competences in a "binary code" referred to factors that influence the behaviour in interaction system. The binary code is a synthesis of the Dynamic Systems Theory, of the Mental Models Theory, and of recent models of the cognitive domain evaluation.

Such synthesis is also based on empirical observation related to the analysis of behavioural schemes, that are the expression of a "mental substrate".

The "substrate" – what we called "ghost" - is like a microcosm composed by knowledge and mental functions.

7.3. The competence inside the interaction context

The last point of strength consists in the demystification of the "platonic" paradigm on which many competences models are based. Such demystification guided us to a gradual "aristotelization" of the "competence phenomenon". It is characterized by the following points:

- the direct link of a competence or a set of competences to specific context, an interaction system;
- the measurability of a competence by means of interconnected observable behaviours;
- the direct relationship of a competence with a final objective of the interaction system;
- the time dimension of the behaviours that demonstrate the existence of a competence;
- the evolutionary and adaptive natures of a competence in relation to the environment;
- the reproduction of a competence in contexts with similar characteristics.

7.4. From observation to certification

The latter point of the previous list is one of the essential pillars for the certification of the competences. It reminds us one of the fundamental questions of this paper: the optimal mathematical architecture useful for the measurement of the ghost.

In the case of "certifications" the numerical values assume an official feature and can influence the professional existence of human beings. Observing behaviours of people for love of knowledge, is totally different from making inferences on the potentialities of a collaborator. Translating these considerations in numbers may have the power to direct resources' development plans in a Company[77].

This increases the weight and the importance of the measurement system. That's why it is absolutely necessary to justify in a rigorously way any statement or attribution of value.

Especially in all cases in which the certification is intended as the possibility of an Institutional Subject (the State, a School, an University, a Training Company, etc.) to objectively - and formally -

[77] Unfortunately, the two systems are often confused and the evaluation of competences loses its rigour producing dangerous effects on Human Resources management.

evaluate people in order to transfer their characteristics from an interaction system to another (e.g. from a working context to another).

In this sense, to certify that a subject has got a competence or a set of competences can be considered in different ways depending from the theoretical models and the assessment tools:

- the certification is a formal statement written by the subject. He states to have the examined competence or a set of competences, simply by (qualitatively) declaring it or by selecting a numerical value from a pre-definite measurement scale. The scientific value of this kind of certification is quite evanescent, since it is based (a) on the way, more or less aware, in which the subject perceives his/her own structure of abilities, (b) on the presumption, quite arguable in working contexts, that the affirmations of the subject are totally true.
- The certifier observes a series of behaviours through a structured or semi-structured proof and/or an individual interview. These behaviours are considered as expression of a specific competence, according to previously made analysis. In this case, the observation can be made outside a specific context: it can be based on the premise according to which a competence exists or doesn't exist independently from an interaction system. Quite like a psychological quality of the subject.

In both cases, the fact that a competence can be transferred in future contexts cannot be guaranteed and most mathematical evaluation models aren't able to express the degree of uncertainty related to this possibility.

8. The calculation model: a non deterministic perspective in the measurement of the competences

The problems related to the certification are a specific case of a greater range of questions connected to the evaluation of the competences.

These include the discomfort of the HR managers that have to quantitative define (a) the expected "intensity" of the various competences, according to people's role or the processes dealing with their activities, (b) the gaps between the observed behaviours and the expected levels, (c) the weights to be attributed to the various competence areas, (d) the thresholds which determine the lack of "aptitudes" to carry out a task, etc.

This discomfort can be overcome only with a radical change of perspective against the common linear optics.

8.1. E-learning simulations and Bayes networks

Since 2004 our research team has been developing a theoretical model for the creation of didactic on line simulations directed to the evaluation of behaviours in complex decisional contexts (Ronsivalle, 2005). This model is based on five fundamental principles:

1. If we want to evaluate the ability of a subject to transform his/her mental models into behavioural schemes (and take decisions oriented to Company's goals), we must put him/her to the test in realistic situations that simulate the organizational context in which he acts;
2. The effectiveness of these simulations depends on the likelihood of the effects deriving from the subject's decisions. This brought us to reject any conditional or tree logic common to most e-learning simulations.
3. When there are a big number of variables it's not easy to distinguish between absolutely correct decisions and incorrect ones: there are cases in which a lot of decisions are well-balanced during the time, even if they are imperfect if we consider them isolated;
4. The logic of compensation along a temporal line has been assimilated to the evolution of a dynamic system in a state of equilibrium.
5. With the aim to quantify the effects of a decision related to the maintenance of the state of equilibrium of the system, we adopted the Bayes networks. Its knots are represented by the

variables that influence the evolution of the system. In this sense, after each decision of the user, the system calculates the probability that the final goal of the simulation can be reached. This value of probability is the result of the conditioned probability related to the interconnected variables.

The probabilistic logic of simulating complex situations has produced positive effects in the evolution of evaluation tools connected to learning paths for competences acquisition.

After the first experiments, this model has been applied to create e-learning simulations on the management of sport structures, on the diagnosis of the haemorrhagic ictus, on the sale of bank stock, on the management of a bank robbery, on the maintenance of wiring systems etc. (Ronsivalle & Metus, 2007).

8.2. Extension of the model to competences

Beginning from the Academic Year 2007/2008, we have decided to introduce this model for the evaluation of competences acquired by students of the Master IELM[78] at the end of the Syllabus 3.

This extension of e-learning simulations to the evaluation of competences in a classroom is based on (a) the analysis of the process of Instructional Design, (b) competence mapping in order to detect competences necessary to reach the goal, (c) the creation of a Bayes network for the measurement of the performance of each student during the didactic activity.

At the end of the path, each student has received a detailed report with a probability index related to the attainment of the final goal and an analytical file with the evaluation of competences.

Let us imagine a practical example by using Peter: we want to "test" him through a simulation with the aim to assess his competences as Instructional Designer.

In particular, the specific competence that we want to evaluate is: "the subject is able to efficiently design didactic modules according to client needs, design criteria, deadlines and economic limits".

This is the "macro" control variable, thus it is necessary to monitor the state of equilibrium of the system wit reference to Peter's activities during our observation.

The interconnected knots of the Bayes network that influence the macro-variable's value correspond to the following competences:

- To be able to design to learning path according to the client needs;
- To be able to conclude an accurate item analysis;
- To be able to elaborate concept maps;
- To be able to elaborate tree of didactic objectives;
- To be able to design the macro-structure of the evaluation system; and
- To be able to elaborated a storyboard.

For each of these knots a threshold of local equilibrium is set. The aim is to guarantee the general equilibrium of the system. The thresholds are the result of the probabilistic combination of the five categories of the pentagon: Knowledge, Perception, Memory, Elaboration, Application.

Thus, to evaluate Peter's competences (at a macro and micro level) means to calculate the conditioned probability that certain behaviours can occur in relation to his decisions, his activities and his mistakes during the observation.

[78] The Master took place in the University "La Sapienza" in Rome. The 3rd Syllabus was dedicated to the techniques of Instructional Design.

The effectiveness of the above mentioned experiment[79] persuaded us to extend the model of e-learning simulation on Bayes networks to the evaluation of competences, although in a progressive way and with extreme caution.

9. Conclusions: a probabilistic ghost

In this the paper we have tried to describe a model based on the theory of complex dynamic systems with the aim to make clearer the nature, the form and manifestation of the "ghost".

At first, we have tried to define the concept of competence and to introduce its principal components: the interaction system, the objectives, the observable behaviours, the knowledge, the skills and the time dimension.

Then, we have introduced and analyzed the five categories of skills (knowledge, perception, memory, elaboration and application) underlying the behaviours. In particular, a pentagonal model has been proposed with the aim to (a) divide the behaviour in five mental functions that make it possible and that constitute the deep architecture of each competence, (b) distinguish the various behaviours and the various competences related to the complexity levels of each dimension, (c) detect the optimal way to observe/measure a competence, (d) select the best and suitable tools for the construction of learning paths oriented to empower competences.

We have finally described the general lines of a new conception of diagnostic competence evaluation. It is based on a "complex" interpretation of the human behaviour inside organizations. An interpretation according to which in an interaction system, a competence is the probability index to perform and perform again behaviours oriented to the goal in a specific time interval, with a Probability Range = $0<x<1$, where 0 = absence of competence and 1 = maximum intensity of competence (Ronsivalle, Carta, 2008).

This interpretation of the phenomenon "competences" includes the awareness of the impossibility to deal with the phenomenology of competences in deterministic way or according to a linear logic. But, at the same time, it aims to build models for the analysis of organizational behaviours that produce quantitative results meaningful for the life of the organizations. An interpretation that is not an alternative to the most common models, but only a translation model before the phenomenology itself. We can always translate these values from a probabilistic model to linear scale, for example the common scale to 0 -5 used in many banking competence models.

We can extend the application of probabilistic value to every variable that determines the competence. So, we believe that a competence is like a "probabilistic ghost" and the complexity of its structure can be described by means of a Bayesian network (Ronsivalle & De Luca, 2008).

These are the theoretical bases of our model. And this is the road that we intend to continue to explore in the future with the aim to guarantee a solid epistemological and scientific basis for the diagnostic evaluation and certification of competences.

References

- Aristotles, Metaphysics, 350 b.c.e. (Translated by D. Ross), http://classics.mit.edu/Aristotle/metaphysics.html
- L.W. Anderson & Krathwohl, A taxonomy of learning, teaching and assessment: a revision of Bloom's taxonomy of educational objectives. New York, Longman. 2001
- L. von Bertalanffy: General System Theory . George Braziller, Inc., 1968
- B.S. Bloom, Taxonomy of Educational Objectives: The Cognitive Domain., Giunti e Lisciani, New York: David McKay Co Inc., 1956.
- R. E. Boyatsis, The Competent Manager: A Model for Effective Performance. New York:, John Wiley & Sons, 1982

[79] The application of this method to the didactic activities of Syllabus 3 of Master IELM (Academic Year 2007/2008) is described in Ronsivalle, 2008.

- A. Einstein, Relativity. The Special and The General Theory, Crown, New York, 1961
- J. Elster, Ulysses and the Sirens. Studies in rationality and irrationality, Cambridge: Cambridge University Press, 1984
- E. Goffman, Asylums: Essays on the Social Situation of Mental Patients and Other Inmates. New York, Doubleday, 1961
- E. Goffman, Frame Analysis, Harper & Row, New York, 1974
- P. N. Johnson-Laird, Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness. Cambridge, MA: Harvard University Press, 1983
- R. Mager, Preparing Instructional Objectives, Belmont, CA: Lake Publishing Co., 1975
- R.J. Marzano, & J.S. Kendall, The New Taxonomy of Educational Objectives (2nd Edition). Thousand Oaks, CA: Corwin Press, 2007
- I. Newton, Philosophiae Naturalis Principia Mathematica, 1687 (Translated by A. Motte)
- I. Nonaka, H. Takeuchi, The Knowledge Creating Company, Oxford, University Press, 1995;
- J.D. Novak, Learning, Creating, and Using Knowledge: Concept maps™ as Facilitative Tools in Schools and Corporations. Mahwah, New Jersey: Lawrence Erlbaum Associates, INC., 1998
- A.J. Romiszowski, Designing Instructional Systems. Kogan, Page, London, 1999
- G.B. Ronsivalle & A. De Luca, Complex competences. Toward an integrated model for the evaluation of mental models and behavioural schemes related to the organizational processes, in INTED 2008 Conference, Valencia, 2008
- G.B. Ronsivalle & S. Carta, How to assess complex competences related to the organizational processes?, PowerPoint file in EBTN-ABI Workshop "Strategies, methodologies and good practices in training and certification within the European banks", march 2008
- R.W. Scott., Organizations Rational, Natural and Open Systems, Prentice Hall, Inc. 1992
- M.L.Spencer & S.M. Spencer, Competence at Work: Models for Superior Performance, John Wiley and Sons, Inc. 1993
- L. Wittgenstein, Philosophische Untersuchungen, by E. Anscombe e R. Rhees, Blackwell, Oxford 1953.
- Gill, J. (2002) *Bayesian Methods: A Social & Behavioral Sciences Approach*, Chapman & Hall/CRC
- Press, S.J. (2002) *Subjective & Objective Bayesian Statistics: Principles, Models, & Applications*, Wiley-Interscience
- Ronsivalle, G.B. (2005) Simulare la complessità. Sistemi dinamici e reti decisionali nei percorsi di apprendimento. *E-learning & Knowledge Management.Rivista Italiana di E-Learning,* Anno II n. 7, Marzo-Aprile 2005
- Ronsivalle, G.B., Metus, V. (2007) E-Learning Simulations and Bayes Networks. *Proceedings of the 2nd International Conference on Engineering Education & Training (ICEET-2)*, Kuwait City 2007.
- Ronsivalle, G.B. (2007) The ABI On Line Simulation "Bank Robberies". An Innovative Instrument for the Robbery Risk Management in the Italian Banking System. In Proceedings of EDEN 2007, Naples.
- Ronsivalle, G.B. (2008) Meta-simulating. Designing e-learning simulations for instructional designers. In Proceedings of IADIS e-Learning 2008 (eL 2008), Amsterdam (in press)

Appendix A

Some suggestions for the representation of the system in a computer architecture

With the implementation of IMS RDCEO and HR-XML it is possible to solve the various problems tied to the representation of the Bayes network of competences. All the necessary information during the phase of analysis and evaluation can be conserved, although maintaining unchanged the connection with the standard IMS and the e-learning systems.

To integrate the two models it's sufficient to follow this protocol:

(a) create the list (taxonomy) of competences through RDCEO;

(b) define the structure of map through Competencies 1.1 (as implicitly suggested in IMS document) and recall the various competences through the knots **id** (Identifier) and **idOwner** (absolute or relative address of the XML RDCEO document);
(c) create the direct link be created between the manifest XML and the RDCEO document.

This method of "integrated" description RDCEO/HR-XML allows an analytical representation of all meaningful information related to the Bayes network of competences. Without losing important data for an effective communication among automatic systems of learning management (LMS, LCMS, etc.), applications for Skill-gap Analysis and Skill Rating and traditional models tied to the HR domain.

About the Authors

Gaetano Bruno Ronsivalle (1972) has a degree in Music (1993), a degree in Philosophy (1997), a Post-graduate Specialization in Didactics of Human Sciences (1998), a Ph.D. in Philosophy and Fundaments of Physics (1999), a Master's degree in Digital Design (2000) and a Post-graduate Specialisation in Instructional Design (2001).
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Sara Bianchi (1977) has a degree in Clinical Psychology (2001) and has been working in the e-learning field since 2002. Currently she works as Project Manager at Enapra (Rome, Italy), an Agriculture Research and Training Company. She deals with
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She is working in co-teaching activities and researchers related to the competence model and she moves round the "territory" to organize and manage specific training courses.

(E.40)

Li-juing Wu; Wan-Ting Peng, The stories of homework from Taiwan: Nature vs. Nurture: Abstract Keywords: homework; case study; aboriginal education; teacher's beliefs, assessment of homework, after school club Doing homework is a daily experience for pupils in Taiwan. However, the literature reviewing shows that it has been a relatively under researched area in Taiwan. This study, therefore, presents two homework stories. One is from a Grade One class in a rural aboriginal area. Another case is from a Grade One class in Taipei county. It is an urban area and the majority of the pupil is Han people. The stark contrast between these two cases makes the investigation more interesting and meaningful. A holistic case approach has been employed. Based on the general picture of these two cases, the following six issues have been emerged. These issues also serve to compare these two cases. 1. The quantity of homework 2. The content of homework 3. Instructions for doing homework 4. Teacher's beliefs regarding homework 5. Marking homework 6. The environment for doing homework In addition to the researchers' reflections and learning from these two stories, the suggestions have been made to the relevant authorities in the end of this study.

(F.1)

Kwang Il, Kang; Mi Hee Ban, A teaching strategy using blending module of art and biology for the science gifted students with individual difference: Looking at things in different ways in art education is an important element to facilitate the creative thinking and the expressive power. In order to look at with different perspectives, it is necessary to understand the general visual pathway from sensory inputs to perception in the brain and the evolutionary visual development from light sensing to stereoscopic vision. For the diversity of lectures and practices, we propose that the blending module of art and biology as an instructional method should be applied to an art class in order to extract new creative ideas with the limited materials and to give a new perspective on the matters and problems to the science gifted students. We developed three modules such as the biological lecture module of vision, the theoretical art lecture module, and the practical material module for product. Biological lecture module is comprised of the basic visual pathway from eye to brain, the evolutionary eye development, the different sense systems and the disorder of vision. The theoretical art lecture module consists of realistic, semi-abstract, and abstract artworks. The practical material module is comprised of several material sets which include well known material set (e.g., pencil, paper, crayon, water colors), ready made object set (e.g., fabrics, photos, plastics) and natural material set (e.g. sand, steel wire, wood). We combine these modules in accordance with the needs of the science gifted students with individual difference. For example, we start the class using simple combination of three modules and gradually combine the high level modules in accordance with differential student class. This class, following three modules, is expected to give the gifted students diverse creative ideas and help to educate the differential gifted students as a new teaching method.

(F.2)

Sancho, M.T.; Fernández-Muiño, M.A.; Rovira, J.; Alonso-Torre, S.R.; Cavia, M.M., Adaptation of the Subject "Food and Culture" Lectured at the University of Burgos (Spain) to the European Higher Education Space: The Bologna Declaration in 1999 on the creation of a European Higher Education Space (EHES) is a pledge taken by 29 countries to reform the structures of their higher education systems. The European Credit Transfer and Accumulation System (ECTS) implies to modify the current Spanish credit system. The purpose of this work was to adapt to the ECTS the subject "Food and Culture" at present lectured in our University. Focusing on the student, a questionnaire was designed. Students commented that to pass the exam they needed an average of 1.3 study hours by each lecture's hour received. 100% of the polled considered useful the lectures. 67% students indicated that they learned more when using a combination of transparency films or slides, Power Point presentations and blackboard, considering fundamental to deliver in advance the transparency films or slides. 80% students indicated that seminars would help them to pass the subject and would facilitate lessons' discussion. No student found it useful to make reviews of "Food and Culture" related topics. 57% students negatively value the use of the data processing network. In conclusion, in the new design of the subject "Food and Culture" for the EHES, the current number of lectures and seminars should remain the same. Lectures should combine the use of blackboard, transparency films and power point presentations, teaching the students to learn and to value the educational possibilities of the employment of the data processing network. It will be also necessary to encourage them to carry out reviews.

About the Authors

Teresa Sancho is currently a lecturer of Nutrition and Food Science at the Faculty of Science at University of Burgos (Spain). She earned her Ph.D. in 1990 from the University of Santiago de Compostela. She has published more than 50 scientific articles on Food Science, and has taken part in several Conferences on both Food Science and Education, and quality improvement.

Miguel Fernández-Muiño is currently a lecturer of Nutrition and Food Science at the Faculty of Science of the University of Burgos (Spain). He earned his Ph.D. in 1991 from the University of Santiago de Compostela. He has published more than 40 scientific articles on Food Science, and has taken part in several Conferences, mainly focused on Food Science.

(F.3)

Dora Balic-Zunic, Motivation in the early learning of the foreign language other than English: In the modern world English assumes a specific position among the foreign languages learned in schools. The pupils get an automatic motivation and help in learning it through modern media like computer (internet) and the pop-culture. The other foreign languages do not dispose of such a "natural" motivating aspect and an interest in them is usually developed relatively late, whereas their learning is easier if started at an early stage. This work investigates some practical aspects of motivation in the early learning of a foreign language by gifted children. They are exemplified by an introduction of German as a second foreign language for pupils at the age of 7 to 9 in a Danish school for gifted children. Experience shows that the most important for the motivation is using the in-born creativity of children, their musical, performing and artistic abilities. The process of learning becomes a creative game with the teacher's role being primarily a coordinating one. Another important help was arousal of interest through recognition of the existing foreign influences in the own national culture (like songs and fairy-tales). The presentation illustrates the methodology developed along these lines through selected practical examples.

About the Author

Dora Balić Žunić got her MA in Comparative Literature and German at the University of Zagreb in 1976. In 1982 she studied arts at Ronald Kocher, Berne, Switzerland. In 1998, she got another MA. Her thesis entitled: *Fremdsprachenunterricht aus dem Blickwinkel des Lerners*, Institute of German Philology, University of Copenhagen. She has a number of publications. Her fields of interests includes: Motivation aspects in learning of foreign languages; Role of games and competition in learning, Multilinguality. Dora has a long teaching experience as German and Arts teacher.

(F.4)

Greek teachers' attitudes towards giftedness. The case of Chios

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Abstract

The term "inclusion" oftentimes understood to apply to school's approach to students with special educational needs (SEN), yet it also embraces other groups, whose needs are often not well met in mainstream schools, particularly gifted students. The Greek law, as part of the inclusion policy, recognizes the need for special provision for gifted students within mainstream schools. However, the application of this legislation in practice is highly questionable. Teachers are one of the key players to help gifted students to achieve their true potential. Exploring teacher's attitudes towards gifted students would be one of the essential steps towards more effective gifted education which is an under-researched area in Greece. This poster is part of a work in progress, which is due to be completed by May 2008, on the teachers' attitudes towards giftedness in Chios, Greece. The research targets whole population of secondary school teachers (N00). The survey data is being gathered via questionnaires, which are completed by teachers, aiming to explore: * Teachers' attitudes towards giftedness, * Teachers' preparedness to identify gifted students * Teachers' confidence to teach gifted students The preliminary analysis of the data suggests lack of confidence and preparedness among teachers to identify and teach to gifted students due to lack of training. Although the vast majority of teachers received additional training on supporting students with SEN no training was provided supporting gifted students. More through analysis will be conducted to explore further correlation between the variables.

Greek teachers' attitudes towards giftedness. The case of Chios

The aim of this study is to examine attitudes of high school teachers towards gifted students and to what extent gifted students are identified and included in mainstream education. Teachers' attitudes towards their students can be considered as one of the main factors maximizing pupils' true potential by designing appropriate teaching programmes and interventions to meet the needs of each individual student and this is especially important in the case of gifted students (Tallent-Runnels, Tirri & Adams, 2000). In the past years teachers' attitudes have been examined extensively (Avramidis, Bayliss & Burden, Robert, 2000, Avramidis & Norwich, 2002, Kniveton, 2004). Research has shown that teachers' negative attitudes can result in the creation of conflicts in the classroom such as in terms of teacher-student interactions (Whitmore, 1986). Focusing on teachers' attitudes can be extremely useful as Rao and Lim (1999) suggest teachers' attitudes are one of the decisive factors achieving inclusion. However, the idea of inclusion has basically embraced students with special educational needs whereas gifted students have received minimal attention (Kniveton, 2004). Koshy and Robinson (2006) refer to the gifted students as the group of students that is more frequently ignored and neglected. Also they report that it is frequently the phenomenon of educators who fail to consider these students as students with special needs. Nevertheless, Winner (1996) points out that exploring giftedness can be proved vital for our society and for the systematic comprehension of human kind potential.

The bulk of research that focuses on teachers' attitudes towards gifted students is limited compared to similar studies that investigate attitudes towards students who experience learning difficulties and experience low levels of attainment and achievement (Mönks & Pflüger, 2005; Elhoweris, 2008). However, there are some significant studies that have been undertaken in this area and through these studies is observed that teachers' attitudes vary and cultural and educational context are variables that tends to affect teachers' attitudes (e.g., Mönks & Pflüger, 2005) . Teachers' attitudes towards gifted students vary. In a cross-cultural research Tallent-Runnels and colleagues, (2000) compared American and Finnish teachers' attitudes towards gifted students. The findings revealed significant differences between attitudes of American and Finnish teachers. American teachers were in favor of special services for the education of gifted students whereas Finnish teachers expressed reservations in terms of providing special services for gifted students as they raised concerns around psycho-social adjustment of gifted students and increased drop-out rates. Further findings suggested that American teachers were in favor of acceleration programs whereas this was no the case among

Finnish teachers. Tallent-Runnels and colleagues (2000) concluded that culture plays an important role in establishing teachers attitudes as many of the findings where related with the provisions offered in the countries where the participants came from.

A study conducted by Siegel & Moore (1994) compared teachers' attitudes towards gifted students and students with learning difficulties and the possibility to include them in the mainstream classroom. The difference of this study was in the fact that teachers' were not asked to express their general view towards giftedness but to answer the questionnaire by having in mind specific students' examples. The results indicated that teachers tend to be more hesitant towards the idea of integration of students with special educational needs than gifted students. However, when the authors took previous work experience into account, the findings revealed that those teachers who had previous work experience within inclusive programs were in favor of integration of students with special educational needs. Additional findings showed that teachers training did not affect teachers' attitudes when they have to cope with actual situations. The authors concluded that attitudes in theory do not always reflect attitudes in practice. This implies that even a positive attitude can become negative when it comes in the reality of the classroom, where teachers have to confront and meet the diverse needs of their students.

Kniveton (2004) investigated perceptions of significant others (including teachers) hold of the inclusion of children with difficulties (including those children with range of special educational needs as well as gifted children) in mainstream classes. Results revealed that gifted children are ranked in the middle of the scale for inclusion in mainstream school. That is, children with 'other' difficulties, followed by physical and speech difficulties perceived as priority groups to be included in mainstream schools and this followed by gifted students who were perceived to have priority of inclusion over children with sensory, learning and behavioral difficulties. Interestingly, in his conclusion section, Kniveton connected this finding with perception of children as 'problem to their parents' and concluded that children seen as a problem to parents tend not to be thought suitable for inclusion and vice versa. This suggests that gifted children are not seen as 'problem' children.

In the past, the vast majority of research in the field of gifted education had been conducted in the USA and in Australia whereas the same area used to receive less attention in Europe and more specifically in Greece. Currently a cross-European survey has been conducted aiming to explore how gifted education is been approached among 21 European countries (Mönks, F.J. & Pflüger, R., 2005). The report provides sufficient indicators that the area of gifted education gradually attracts the interest of researchers, policy makers, scientists, teachers and parents. Greece is one of the countries that have gradually started to provide support to gifted students starting with significant changes in terms of legislation. Until now in Greece we have sufficient information on teachers' attitudes towards students with special educational needs (Avramidis & Norwich, 2002). However, we do not have sufficient information on teachers' attitudes towards gifted students. Little is known in the field of gifted education in Greece and this study aims to explore Greek teachers' attitudes towards giftedness in Chios island.

The present study explores giftedness adapting Gagné's Differentiated Model of Giftedness and Talent (Gagné cited in Heller, Mönks, Sternberg & Subotnik, 2000) by reflecting on how this model can be tailored in Greek reality. In addition to Gagné, Gardner's (1999) and Stenberg's (1993) theories of intelligence will comprise the theoretical framework of this study. The choice of the above theoretical frameworks is based on the belief that they are more inclusive compared to out-dated assumptions to define and conceptualize giftedness through IQ tests, which in practice fail to recognize more than one indicator conceptualising giftedness (Lee, 1999, Woodliffe, 1977). For this purpose this introduction is divided in three sections. The first section presents some key issues related with giftedness, theories of intelligence and Gagné's Differentiated Model of Giftedness. The second section discusses all current changes in Greek legislation and policy regarding giftedness and gifted education. The third concluding section of the introduction explains how the Differentiated Model of Giftedness can work as a starting point in addressing gifted students' needs by initially conceptualising

teachers' attitudes towards gifted students and understanding how these attitudes can affect gifted students achievement.

Conceptualising Giftedness

Definitions of gifted and talented

Firstly, in order to conceptualize giftedness it is essential to distinguish the differences between gifted and talented students. For the purposes of this study the definition that is going to be used is the one of Gagné's (1995, cited by Gross, 2006), who describes giftedness as the ability to perform at a level significantly beyond what might be expected for one's age, in any domain of human ability- cognitive, creative, emotional- to a level that would position one in top 10-15% of age-peers. The reason for choosing this definition is that it recognizes the fact that giftedness is described as a potential rather than an outstanding performance that means that it is aware of the existence of an underachieving gifted child (Smith et al., 2003). In terms of defining talented students the definition that is going to be used is that of Gagné's that identifies talent as a set of abilities and knowledge in at least one natural aptitude, placing the individual within the top 10% of their age group who are, or have been, participating in that domain. This excessive ability that talented students have is observed in fields such as sports, music, visual arts or performing arts (DfEE, 1999).

Theories of intelligence

In 1983 Gardner proposed the theory of multiple intelligences. That means the existence of three categories of intelligence (those presented in schools, arts and personal issues) with seven types of intelligence (i.e., logical-mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal and intrapersonal) belonging to the categories mentioned before. In order to assess whether a student is gifted should be evaluated in all areas of intelligence. The interesting part of this theory and at the same time the most useful is the fact that it recognizes different types of intelligence, which usually teachers ignore, and at the same time pays equal significance to all the types of intelligence (Smith et al, 2003).

The other theory that is part of the theoretical framework of this study is Stenberg's triarchic theory of intelligence (1993). Stenberg's (1993) theory makes a significant attempt to synthesise the various theories of intelligence. It presents three types of intelligence (analytical, creative and practical). Analytical intelligence involves abilities related with problem solving and the cognitive procedure. Creative intelligence is basically related with insights, synthesis and ability to react to novel circumstances. Furthermore, practical intelligence involves the ability to seize with practical everyday tasks. According to Stenberg (1993) gifted students demonstrate high ability in one or more dimensions.

The reason for choosing these two theories of intelligence as part of the theoretical framework of this study is based on the fact that they are differentiated from the outdated use of IQ tests and provide flexibility in approaching and conceptualizing intelligence by recognising that intelligence can be seen in a variety of skills and abilities. This is significant as teachers tend to focus to academic performance and achievement and ignore other areas where a student can be highly able. Failure to identify a child as gifted can provoke a set of problems in providing the education and the support that child needs. So through these theories teachers have more options in distinguishing possible abilities and skills that a child may have and then identifying that student as gifted.

Gagné's Differentiated Model of Giftedness and Talent

Gagné's Differentiated Model of Giftedness and Talent (1991) proposes a clear differentiation between giftedness and talent based on the definition that is mentioned above. According to this model natural abilities compose the essential basis for the creation of talents. Gagne believes that the existence of talent sets as prerequisite that a child is gifted however, the reverse is not true (Gagné, 1993). By recognising a specific talent that a student may have teachers can see through these aspects of giftedness that are not necessarily linked with academic abilities. Through this teachers can be

helped in choosing the appropriate pedagogical approach to educate this child by focusing on the specific area where its talent is expressed. Developing a talent happens through systematic learning and practicing which normally takes place in school settings. How this process will be evolved is dependent on two types of catalysts; intrapersonal and environmental. Both catalysts can either facilitate the process or deter it. The intrapersonal catalysts are subdivided into physical and psychological factors. Whereas between the environmental factors are included surroundings, persons, undertakings and events. In this study our main focus is to explore how persons (specifically teachers) can impact on the process of developing gifts and talents. Gagné's differentiated model has influenced significantly Australian studies (Lee, 1999). However, it can be adopted from other educational systems in other countries also as it approaches holistically the issue of giftedness by presenting interactions between a variety of factors related not only with the person each self but with the environment also. Next section will describe current situation in terms of legislation as long a brief description of the educational system of the country that is the focus of this study. One of the countries that this model can be adopted in order to approach giftedness is the country where this study took place. But in order to explore that, it is essential to provide a brief description of the educational system of the country that is the focus of this study and provide current changes that have been made in terms of legislation.

Greek legislation towards gifted and talented students

The first attempts to provide special provision for students with special needs are dated back to the 1970, when special education was introduced as part of teachers training. Since then significant steps have been taken aiming to provide inclusive education. The first steps in favour of special education took place through the law 1143/1981 and followed by the revision of this law (1566/85), which acknowledged the individuality of each student and encouraged schools to meet the needs of individual students within school settings. Another significant part of this law is that incorporates to the purposes of state education the following: 'all students should be able to cultivate and develop harmonically their spirit, their body, their talents, their interests and their skills' (1566/85, article 1, paragraph 1). In practice the above statement recognized the need for additional provision for all children and this should include also talented students. In reality, the focus of the educational policy included provisions only for disabled and students with special educational needs without however recognizing gifted as students with special educational needs. Special schools and special classes within the mainstream settings were established but until then gifted education continued to be an area that received minimal attention.

The milestone for gifted education in Greece happened recently by a change that was voted in 2003, 'Special educational provision may be offered to those students who have special mental abilities and talents' (2817/2000, article 1, paragraph 2). Before this law the only steps that were taking into consideration the needs of talented students were through the existence of sport gymnasia and lyceums for those students who were talented in sports and in 1998 through the creation of music gymnasia and lyceums for talented students in music.

As Mönks & Pflüger (2005) report no specific provisions are made for intellectually gifted students in Greek schools. Despite the lack of special provisions for gifted students recently researchers have acknowledged the need to explore In terms of continued professional development of the participants, more than half of the teachers (52.4 %) has not attended any seminar for gifted or students with special educational needs, almost forty percent of the teachers (39.2%) has attended seminars for children with special educational needs whereas only approximately one in ten teachers (8.5%) of teachers has attended seminars for both gifted and pupils with special educational needs.

The area of gifted education (Gari, Kalantzi-Azizi & Mylonas, 2000). As the law does not mention explicit ways of provision for intellectually gifted students it is understandable why the state schools are not providing essential support for gifted students. However, private schools and institutions use enrichment programs for providing support and challenge to gifted and talented students.

Purpose of this study

As the research findings in terms of teachers' attitudes towards giftedness conclude that there are differences on attitudes among participants from different countries and cultural backgrounds (Tallent-Runnels et al., 2000) the main purpose of this study is to explore how the issue of giftedness is conceptualized in Greece and specifically in the island of Chios. Compared to other countries Greece is now making the first steps towards a more inclusive education for gifted students and this is the reason that it seems challenging to explore how teachers feel about this issue. The main aims of the present research are:

- To investigate conceptualization of giftedness by Greek teachers in island of Chios;
- To explore teacher's perception of giftedness;
- To identify weather teachers feel confident to teach gifted students;
- To identify teachers perception of inclusion of gifted students in mainstream schools; and
- To identify teachers' perception of effective provisions supporting gifted students.

The above aims will be explored across teacher gender, type of school teacher works (the description of schools types presented in the following section), years of experience working as a teacher as well as teacher's educational background/training.

Methodology

Participants

This research study aimed to include the total population of secondary school teachers in island of Chios, in Greece. That is, the number of the high schools is 12 and 330 questionnaires were distributed to the teachers that comprise the teaching population of those schools. From the 330 distributed questionnaires an impressive response rate of 64% was achieved. The teacher sample comprised of 147 female and 65 male with the age range of 22-70 years old. Of the sample 67% taught in mainstream high schools, 10.5% in the School of Special and Vocational Education, 9% in the Music Gymnasium, 7.5% in the Athletic Gymnasium and finally 5.7% in the Night high school.

Measures

The present research study did not aim to 'measure' teachers' attitudes towards giftedness because this area is a developing area in Greece in terms of researchers, policy and practice as a result a standardized attitude scale, such as Gagné and Nadeau's attitude scale "Opinions about the gifted and their education" (Gagné, 1991) that has been constructed in different cultural context and serves the needs of a different educational system with different provisions for gifted and talented students, was not used. The present study rather aimed to describe what the current practice, focusing on teacher's perceptions and construction of giftedness and gifted education, and educational provision for gifted students in Chios, Greece.

As Elhoweris (2008) states one of the most dominant problems that are obvious in the field of gifted education is the need for the development of appropriate identification procedures for gifted and talented students from diverse cultural backgrounds. For this reason the questionnaire that was constructed tried to adapt to the Greek cultural context, focusing on the provisions that are being offered through state mainstream school settings. It was based on a review of the literature on gifted education and theories of intelligence and adapted and modified some statements from the questionnaire that was used in Tallent-Runnels et al. (2000) cross-cultural study.

Taking into account all the above consideration the questionnaire that was used consisted of three sections. The first section was introductory explaining to the teachers' the purpose of the study, providing definitions of gifted and talented as well as definition of what is meant by students with special educational needs. This section also sought some teacher related background information (ie. gender, age, years of work experience, type of school they work at, work experience with gifted students and students with special educational needs and attendance to in-service training). The second section aiming to explore their attitudes towards giftedness consisted of 33 statements some of them factual and the rest focusing on their attitudes in which each respondent could agree or disagree using a five point Likert-type scale. Finally, the third section listed alternative educational provisions for

gifted students and respondents were asked to rank them according to degree of effectiveness of the provision.

Procedure

The data was analyzed via Statistical Package for the Social Sciences version 14 (SPSS). All the returned questionnaires were coded and the data were entered in an SPSS file. T-test was used in order to explore whether there are gender differences. ANOVA analysis was used to explore whether the school type consists of a variable that creates statistically significant differences and also crosstabs between variables were used to explore the existence of any correlations. Also as the main purpose of present study is to explore this developing area in Greece it is assumed that descriptive statistics can provide significant information describing teachers' perceptions and attitudes towards giftedness and gifted education.

Results

Some of the teacher background data (i.e., age, gender and type of school they worked at) was presented in 'participants' section of methodology. Analysis of further background data suggested that, in terms of continued professional development of the participants, more than half of the teachers (52.4 %) has not attended any seminar for gifted or students with special educational needs, almost forty percent of the teachers (39.2%) has attended seminars for children with special educational needs whereas only approximately one in ten teachers (8.5%) of teachers has attended seminars for both gifted and pupils with special educational needs.

Teachers' previous working experience with gifted students reported that 42% of them have taught gifted students whereas a significant percentage of 42.5% were not sure whether they have taught gifted students or not. On the other hand in everything concerns talented students teachers answered with more assurance whether they had taught them (71.7% answered yes and only 17.9% were not sure). This finding is in agreement with the second question on the attitudes section which explores whether it is easier to identify a talented student than a gifted where 53.8% of the sample answered agrees and another 10.4% answered completely agree.

Exploring teachers' confidence in teaching gifted students, approximately a quarter of teachers (25.5%) answered that they agree and a 4.7% of the respondents answered that they strongly agree with the above statement. In order to test whether this confidence in teaching is affected by teachers' continued professional development one-way MANOVA was used. It was tested the hypothesis that attending seminars for both gifted and SEN students has an effect on teachers' confidence in teaching gifted students. The results showed that there was not a significant effect of seminars on teachers' confidence to teach gifted students, $F=0.146$, $p > .05$. The same procedure was followed in order to test whether attending SEN seminars had an effect on teachers' confidence to teach students with special educational needs. The results reported that there was a significant effect of SEN seminars on teachers confidence to teach students with special educational needs, $F=12.108$, $p < .05$. An independent-samples t-test was conducted to compare teachers' confidence scores in teaching gifted students across teacher gender. The results suggested significant difference between male and female teachers where male teachers reported to feel more confident teaching gifted students ($M=3.2769$, $SD=1.053$) compared to female [($M=2.7891$, $SD=0.869$); $t(104.2)=3.27$, $p=.001$]. The same procedure was followed in order to test whether gender affects teachers' confidence in teaching students with special educational needs. It was reported that there is no significant difference in scores for males ($M=2.8769$, $SD=1.053$) and females [($M=2.7823$, $SD=0.94$); $t(210)= .56$, $p=.516$].

In terms of exploring whether teachers consider gifted education as a cause for the creation of social injustice or as a form of elitism, questions 6, 7 and 9 from the attitudes section addressed that issue. The frequencies for these questions are described below: For question 6 (disagree=42.5%, strongly disagree=5.2%, undecided=17.5%, agree=27.8%, strongly agree=6.6%). For question 7 (disagree=49.1%, strongly disagree=11.3%, undecided=20.3%, agree=14.2%, strongly agree=5.2%). And finally for question 9 (disagree=48.1%, strongly disagree=9%, undecided=18.4%, agree=21.7%, strongly agree=2.4%).

Tables 1 and 2 show how teachers conceptualize the distribution of services among gifted students and students with special educational needs. As can be seen in Tables 1 and 2 teachers are generally in favor of the equal distribution of services for both gifted students and students with special educational needs.

Table 1: Special services for SEN students form social injustice for other students.

	Frequency	Percent
Strongly disagree	52	24.5
Disagree	130	61.3
Undecided	17	8.0
Agree	9	4.2
Strongly agree	4	1.9
Total	212	100.0

Table 2: It is fair to provide support equally to students with SEN and gifted students.

	Frequency	Percent
Strongly disagree	3	1.4
Disagree	19	9.0
Undecided	13	6.1
Agree	98	46.2
Strongly agree	79	37.3
Total	212	100.0

Tables 3 and 4 present findings on whether teachers believe that a gifted student has special educational needs and also in accordance with that whether they believe that the only students who need educational support are the students with special educational needs. As it is shown in the tables, teachers consider gifted students as students who have special educational needs and believe that children with SEN are not the only pupils that need special support.

Table 3: A gifted student has special educational needs.

	Frequency	Percent
Strongly disagree	6	2.8
Disagree	24	11.3
Undecided	24	11.3
Agree	115	54.2
Strongly agree	43	20.3
Total	212	100.0

Table 4: Students with special needs are the only ones that need special educational support.

	Frequency	Percent
Strongly disagree	33	15.6
Disagree	136	64.2
Undecided	14	6.6
Agree	25	11.8
Strongly agree	4	1.9
Total	212	100.0

Another set of questions from the attitudes section of the questionnaire explored to which extent teachers' are predisposed to some myths related with gifted students and their academic and psycho-social performance. Table 5 presents the results of one of these questions which expresses teachers' attitudes to some of the myths for gifted education.

Table 5: Gifted students are well-mannered students.

	Frequency	Percent
Strongly disagree	2	.9
Disagree	96	45.3
Undecided	64	30.2
Agree	49	23.1
Strongly agree	1	.5
Total	212	100.0

It is obvious from the percentages of disagreement that almost half of the sample (n=98, 46.2%)) are not affected whereas 64 respondents remained undecided. Table 6 shows, teachers' attitudes to peer-mentoring as a good solution of occupying gifted students when they finish a task ahead of other students. As can be seen in Table 6, more than half of the respondents (agree=45.8, completely agree=7.1) either agreed or strongly agreed with the statement.

Table 6: Gifted students should help their peers when they complete a task ahead of other students.

	Frequency	Percent
Completely disagree	4	1.9
Disagree	49	23.1
Undecided	46	21.7
Agree	97	45.8
Strongly agree	15	7.1
Total	211	99.5
Missing	1	.5
Total	212	100.0

As it can be seen in Table 7 the provision that teachers tend to consider as most effective for the education of gifted is daily enrichment activities by using library and laboratories whereas the least effective is considered the idea of attending special classes for gifted within private schools.

Table 7: Participants' view of the most effective provision for gifted (low score indicates high ranking).

Type of provision	N	Minimum	Maximum	Mean	Std. Deviation
Daily enrichment activities by using library or laboratories.	205	1	7	2,9122	1,78284
Co-operation with other professionals such as psychologists and counsellors of professional orientation in order to meet gifted students' needs.	205	1	7	3,0927	1,85139
Differentiated curriculum in the mainstream classes in order to cover gifted students' needs.	205	1	7	3,4927	1,67338
Creating special state schools for gifted students focusing on their skills.	206	1	7	3,7524	1,85100
Attend special classed within the state mainstream school.	205	1	7	3,8049	1,71240
Acceleration.	206	1	7	5,0194	1,61988
Attending special classes for gifted in private school.	205	1	7	5,9220	1,63412

The fact that acceleration is considered as one of the least effective options according to participants' is found to be in line with their views on potential impact of skipping class on psychosocial adjustment of gifted where almost half of the participants (n= 100, 47.2%) either agreed or strongly agreed with this statement. However, 34.4% of the participants remain undecided on the impact of acceleration on students' psycho-social adjustment.

Discussion

This study explores the attitudes and conceptualizations of teachers in the island of Chios towards giftedness and gifted education. Research on investigating feasibility of inclusion of gifted students' in mainstream schools should take into account of range of variables but especially attitudes of 'significant others' as suggested by Anita (2002), and Rao and Lim (1999), the attitudes of 'significant others' affect how successful any attempt to include children in mainstream school can be. The results of the data analyses demonstrate the attitudes of teachers' towards a variety of issues concerning gifted students and gifted education.

In this study a significant percentage of teachers reported lack of training not only in gifted education but also in continuing professional development related with students with special

educational needs. These data are consistent with a body of prior research suggesting that lack of training in teachers' education creates difficulties in terms of identifying and then providing support to gifted students' needs (Morgan, 2003; Nyland, 2003; Zundans, 2006). Lack of training in gifted education results in lack of confidence to teach gifted students. Similar findings were suggested at Gallagher's study (2007) where teachers were characterized by fear in approaching and teaching gifted students. However, in this study Gallagher reports that appropriate training resulted in increase in teachers' knowledge and awareness of gifted education issues.

The findings of this study reveal that the majority of teachers do not consider the support to gifted students as elitism or as a form of social injustice. This findings are in contrast with findings from other studies (Koshy & Robinson, 2006; Gross, 2006), where teachers appear to consider the provision for gifted students as a form of 'elitism'. However, there is the possibility which needs to be further investigated that teachers answered to this section according to what is the socially acceptable answer. This problem is common in research into teachers' attitudes (Siegel & Moore, 1994). However, it is reasonable to assume that most teachers responded with honesty to the questions provided that anonymity was assured and the option 'undecided' was provided to the Likert-scale.

Surprisingly enough although teachers in Greece do not receive training as part of their professional qualification in serving the needs of students with special needs and gifted students, in the question that was asking them whether they consider gifted students as students with special educational needs the large majority of the respondents answered yes, which is again in contrast with the findings from Koshy & Robinson (2006) research, were teachers failed to recognize that gifted students need special educational support in order to have their needs met. It is possible that the fact that high school teachers professional qualification focuses mainly on the subject of their study instead of emphasizing also on pedagogical approaches makes them aware of their weaknesses and they realize that there are groups of students that need special educational support.

The fact that more than half of the teachers consider peer-mentoring as a good way of interaction of gifted students with their peers it is one of the significant findings of this study. In terms of mentoring there are several controversial issues of whether this can be perceived as an effective provision or not. Greek teachers seem to agree with one of the most famous myths related with gifted education. However, Fiedler et al. (1993, cited by Gross, 2006) analyse the reasons for why this concept cannot work. Firstly, less capable learners will not be able to understand gifted because they have different way of thinking and conceptualising ideas. Secondly, gifted students are not in position to adjust their way of motivation and achievement to their peers. We can add to the above statements the fact that gifted students feel easily bored (Gallagher, 2006) and they need challenge in order to raise their motivation (Woodliffe, 1977). But teaching curriculum topics, which are already known to them, to their classmates, cannot work as a challenge for those students. At the same time it is possible that when gifted students act as mentors to a mainstream class, they will be isolated from the rest of the class, as mentoring overemphasises their difference.

The last section of the questionnaire that was distributed to the teachers of the island of Chios was aiming to explore which provisions consider as most effective for the education of gifted students. In terms of provisions teachers in Chios consider as the most effective provisions enrichment activities and the co-operation with school psychologists and other professionals such as counselors of professional orientation. The reason behind this is basically related with a well-known gap of the Greek educational system where school psychologist do not exist as part of the workforce in every school with the only exception of special schools where social workers and psychologists work within schools. The results show that teachers consider acceleration as one of the least effective provisions for the education of gifted students. This is in accordance with the findings of what Finish teachers support at the study of Tallent-Runnels et al. (2000), where they appear to have considerations about acceleration programs. The fact that both Greek and Finnish teachers are not in favor of acceleration programs is related with the lack of popularity this provision to both educational systems of those countries. Furthermore, acceleration is perceived as an ineffective provision is in contrast with what American teachers believe in the same study. As Van Tassell-Bask (1992) suggests acceleration is the key concept that tests acceptance towards gifted education. However, this is not the case neither for Finnish nor for Greek teachers as acceleration is not part of the support provided, so it is difficult to judge a provision with which they are not familiarized. Through this it is highlighted the need that

Elhoweris (2008) points out for developing appropriate programs and identification procedures for students from different cultural backgrounds.

The present study, conducted in high school teachers in the island of Chios, Greece explored teachers' attitudes towards an under researched area that of giftedness, which gradually attracts the researchers, educators and policy makers interest. In general it is assumed that teachers hold positive attitudes in terms of including gifted students within the mainstream settings. However a set of implications for further research and suggestions can be provided aiming to improve the educational system and how it is delivered for all students.

Firstly, teachers need to receive additional and continuing professional development and training in order to be able to respond to the diverse needs of different groups of students. This continuous professional development can help teachers respond to a variety of teachers with confidence. As a consequence to the above results the following topics should be elaborated: conduction of small-scale projects in different areas of Greece in order to explore and compare the attitudes of teachers and be able to provide generalizations in terms of the whole Greek teacher population, also it is essential to create a standardized scale of measuring teachers attitudes and be able to compare them in a cross-cultural level.

References

Annita, S. D. (2002) Developing membership in the education of deaf and hard-of-hearing students in inclusive settings, *Journal of Deaf Studies and Deaf Education. 7*(3), 214-229.

Avramidis, Elias, Bayliss, Phil and Burden, Robert (2000) 'A Survey into Mainstream Teachers' Attitudes Towards the Inclusion of Children with Special Educational Needs in the Ordinary School in one Local Education Authority', Educational Psychology.*20*(2), 191 -211

Avramidis, E. & Norwich, B. (2002) Teachers' attitudes towards integration/inclusion: a review of the literature, *European Journal of Special Needs Education*.*17*(2), 129–147.

Department for Education and Employment (1999) Excellence in cities report March 1999 to September 2000. Nottingham: DfEE Publications.

Elhoweris, H. (2008) Teacher Judgment in Identifying Gifted/Talented Students.

Multicultural Education. *15*(3), 35-38.

FEK 78/14.03.2000, N 2817/2000 *Education of persons with special educational needs and other laws.* (Title translated from Greek).

FEK 80/81, N1143/81 *Education and professional development of disabled students* (Title translated from Greek).

FEK 167/85, N1566/85 Education of persons with special educational needs (Title translated from Greek).

Gagné, F. (1991). Toward a differentiated model of giftedness and talent. In N. Colangelo and G. A. Davis (Eds.), *Handbook of gifted education* (pp. 65-80). Boston: Allyn and Bacon.

Gallagher, J. J. (2006). *Driving Change in Special Education*. Baltimore: Paul. H. Brookes.

Gallagher, S. (2007). Reflections from the deep end : primary school teachers' experiences of gifted education. Australian Journal of Gifted and Education.*16*(1), pp.20-29.

Gardner, H. (1999). *Intelligence reframed. Multiple Intelligences for the 21st Century*. New York: Basic Books.

Gari, A., Kalantzi-Azizi, A. and Mylonas, K. (2000). 'Adaptation and Motivation of Greek Gifted Pupils: exploring some influences of primary schooling', *High Ability Studies*. *11*(1), pp. 55 – 68.

Gagné, F. (1993). Constructs and models pertaining to exceptional human abilities. In K. A. Heller, F. J. Monks & A. H. Passow (Eds.), *International Handbook of Research and Development of Giftedness and Talent* (pp. 63-85). Oxford: Pergamon Press.

Gross, M. U. M. (2006). 'To group or not to group: is that the question?' in Smith C. M. M (Ed.) *Including Gifted and Talented. Make inclusion work for more gifted and able learners.* London: Routledge.

Heller, K., Mönks, F., Sternberg, R., & Subotnik, R. (2000). *International handbook of giftedness and talent* (2nd ed.). Oxford, United Kingdom: Elsevier Science.

Koshy, V. and Robinson, N. M. (2006). 'Too long neglected: Gifted young children', *European Early Childhood Education Research Journal*.*14*(2), pp. 113 – 126.

Kniveton, B. (2004) 'A study of perceptions that significant others hold of the inclusion of children with difficulties in mainstream classes', Educational Studies. *30*(3), pp. 331-343.
Lee, L. (1999) 'Teachers' Conceptions of Gifted and Talented Young Children', *High Ability Studies, 10*(2), 183-196.
Morgan, M. (2003). Through Another's Eyes: An Interdisciplinary Creative Problem Solving Conference for Both Teachers and Their Students. *Gifted Child Today*. *26*(4), 14-19.
Nyland, B. (2003). Inclusive early childhood education: the university and the theoretical orientation of pre-service teachers. *International Journal of Learning*, *10*, 1635-1647.
Rao, S. M. & Lim, I. (1999). Beliefs and attitudes of pre-service teachers towards children with disabilities, paper presented at the *123rd Annual Conference of the American Association of Mental Retardation*, New Orleans, LA, USA, 27 May.
Siegel, J; Moore, J. N. (1994). Regular Education Teachers' Attitudes toward Their Identified Gifted and Special Education Students. Paper presented at *the Annual Convention of the Council for Exceptional Children* (72nd, Denver, CO, April 6-10, 1994).
Smith, T. E. C., Polloway, E., Patton, R. J. and Dowdy, C. A. (2003). *Teaching students with special needs in inclusive settings*. Allyn and Bacon Publications, 4th edition.
Strenberg, R. J. (1993). Procedures for identifying intellectual potential in the gifted: a
perspective on alternative "Metaphors of Mind". In K. A. Heller, F. J. Monks & A. H.
Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 185-206). Oxford, UK: Pergamon Press.
Tallent-Runnels, M., Tirri, K., & Adams, A. (2000). A Cross-cultural study of teachers' attitudes toward gifted children and programs for gifted children. Gifted and Talented International. *15*(2), 103 - 115.
Winner. E. (1996). *Gifted Children Myths and Realities*. New York: Basic Books
Whitmore, J. (1986). Understanding a lack of motivation to excel. *Gifted Child Quarterly*. *30*, pp.66-69.
Woodliffe, H. (1977). *Teaching Gifted Learners. A Handbook for Teachers*. Canada: The Ontario Institute for Studies in Education
Van-Tassel-Baska, J. (1992). Education decision making on acceleration and grouping. Gifted Child Quarterly. *36*(2), pp. 68-72.
Zundans, L. (2006). Teacher attitudes towards gifted education in a metropolitan boys' school: what work needs to be done? *Talented*. *24*(1&2), pp. 72-78.

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(F.5)

Eva Vondrakova, GC Education: Experience, Policy, Plans, and Cooperation: Association for Talent and Giftedness – STaN (Spolecnost pro Talent a Nadani) started its work 1989 in the previous Czechoslovakia as ECHA branch. It was founded (as well as Mensa Czechoslovakia) by Dr. Hana Drabkova, psychologist, specialized on the heritability of giftedness. Poster presents a brief history and main activities of the STaN-ECHA (newly STaN): STaN work-days (seminars for psychologists, teachers and parents), Club for Clever and Curious Children, Club for Parents (newly also for teachers). We offer consultations to parents, teachers and students; help to solve problems in education of extremely gifted children; publish and popularize the GC education topic; collaborate with some schools really interested in GC education. Actually it is namely the 1st private primary school for the gifted children "Path towards success in Prague" and the class for gifted children in the Rozmarynek kindergarten. We cooperate with institutions such as the Ministry of Education of the CR.

(F.6)

Brasseur Sophie; Gregoire Jacques, The development of the emotional intelligence of gifted adolescents: The development of the emotional intelligence of gifted adolescents The study reflects the development of emotional intelligence (EI) of gifted adolescents. The EI is evaluated with the Trait Emotional Intelligence Questionnaire (French version). The sample is composed by approximately 100 adolescents in the age of 11 to 18 years. The results are analysed with reference to different profiles of the adolescents (with or without school of social difficulties, sex, age, etc.) and compared to a control group composed by approximately 150 adolescents. The study pays equal attention to the different dimensions of EI, such as emotionality, self control, well being, sociability, etc. The study puts in perspective the results obtained with the latest literature in the socio-affective development of gifted adolescents.

(F.7.1)

Sara Ibérico Nogueira; Leonor Almeida, Qualités psychométriques du Test for Creative Thinking – Drawing Production: études avec des enfants Portugais du premier et du deuxième cycles d'études: On présente les résultats concernant les caractéristiques psychométriques (fidélité interne basée sur la méthode Alpha de Cronbach) et validité (validité de construit, basée sur une analyse factorielle exploratoire) du TCT-DP (Test for Creative Thinking- Drawing Production by Urban & Jellen, 1996) pour un échantillon Portugais de 500 élèves, 250 élèves de la sixième année (à la fin du deuxième cycle d'études) et 250 élèves de la sixième année (à la fin du troisième cycle d'études). On discutera les implications des résultats dans l'évaluation de la pensée créative dans la population portugaise. Mots-clé: Évaluation de la Créativité, Test for Creative Thinking-Drawing Production(TCT-DP), Psychometrics, Études de Validation.

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(F.7.2)

Sara Ibérico Nogueira; Leonor Almeida, Evaluation de la Créativité: le Test for Creative Thinking- Drawing Production(TCT-DP). Concept, application et études portugaises: On présente des études avec le Test for Creative Thinking - Drawing Production (TCT-DP), un nouveau instrument d'évaluation de la créativité dont la version originale a été développée par Urban e Jellen (1986) selon une conception plus holistique de la créativité, différente de celle des traditionnels tests de pensée divergente. Après une brève révision de littérature concernant la créativité, sont présentées les études portugaises de caractérization des niveaux de créativité dans l' échantillon de 500 élèves (250 élèves de la sixième année, à la fin du deuxième cycle d'études, et 250 élèves de la neuvième année, soit disant, à la fin du troisième cycle d'études). On présente aussi les études de differences entre groupes tenant compte les variables age, genre, année d'études et niveau socio-economique. On discutera les implications des résultats dans l'évaluation de la pensée créative dans la population portugaise, en comparaison avec les résultats obtenus par les études interculturels. Mots-clé: Évaluation de la Créativité, Test for Creative Thinking-Drawing Production (TCT-DP), Psychometrics, Études de Validation.

(F.8)

Alonso-Torre, S.R.; Cavia, M.M.; Fernández Muiño, M.A.; Sancho, M.T., Adaptation of the Subject "Human Nutrition" Lectured at the University of Burgos (Spain) to the European Higher Education Space: In 2002 the European Higher Education Space (EHES) was assumed in Europe. The adoption on the part of the Spanish Universities of the European Credit Transfer and Accumulation System (ECTS) implies the modification of the current Spanish credits, based on the time that students are attending lectures. The aim of this work was to adapt to the ECTS the subject Human Nutrition at present lectured at our University. With a focus centred in the student, a questionnaire was designed. Students commented that for the preparation of the exam they needed 1-2.5 hours of study by each lecture's hour received. 91.7% of those polled considered useful both lectures and practical seminars. 75% of the students indicated that they learned more when using a combination of transparency films or slides, Power Point presentations and blackboard. 66.7% considered strongly positive to deliver in advance the transparency films or slides. At the beginning of the academic year several revi ews on Human Nutrition related topics were proposed. 75% of the students considered that these works didn't contribute to learn. 75% of students valued as highly positive to use the data processing network. In conclusion, in the new design of the subject Human Nutrition for the EHES, the current number of theoretical lectures and seminars should remain the same. Theoretical lectures must combine the use of blackboard, transparency films and power point presentations promoting the wide possibilities of the use of the data processing network. Finally it will be necessary to encourage students to make reviews.

(F.9)

Min Soo Jung; Miran Chun; Hee K. Chae, Questioning Styles in Korean gifted education programs for the scientifically gifted: Focus on Chemistry: This study is conducted to analyze the questioning styles in the gifted education programs for the scientifically gifted students based on Chemistry in terms of frequency and type of questions. It is also to analysis the kind of scientific processes elicited by the questions. The programs used in Science-gifted Education Center in five Universities and Seoul Metropolitan Office of Education as well as the programs released from Korea Educational Development Institute are listed and weighed. The instrument was the Textbook Questioning Strategies Assessment Instrument (TQSAI) developed the Cooperative Teacher Preparation Project, University of California. The average number of questions per topic was only 10.7 and the total number of questioning was 1216. Most of type of questions were the information questions (45.8%). The reasoning question was the highest in all characteristics of questions.

(F.10)

Creativity and Effectiveness of Functioning in Polish School: The role of the Level and Style of Creativity

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Abstract

Poster presents results of the research conducted on large sample (N=1316) of youths of both sexes (50% men and 50% women) from two categories of schools – public (68%) and non-public (32%). Participants' creative abilities as well as their style of creative functioning were assessed using Urban & Jellen TCT-DP (to assess level) and Kirton Adaption Innovation Inventory (to assess style). GPA was used as an indicator of effectiveness of school functioning. Results show that effectiveness of school functioning is weakly but significantly and positively correlated with the level of creative abilities but not with innovativeness-adaptativeness (but positive correlations between GPA and originality and efficiency of KAI subscales were found). However interesting differences were found between two types of schools. In public schools school grades were significantly influenced by creative thinking and original style of functioning, whereas in non-public schools efficiency of functioning was more important to school successes. It was also shown that in public schools creative innovators are most efficient, whereas non-creative innovators are least effective. In non-public schools adaptors tend to be slightly more efficient, especially creative adaptors. The results are discussed in terms of assumed independence of level and style of creativity formulated by M. Kirton (1976, 2003) and different sources of school successes in different types of schools in Poland.

Keywords: school success, creativity

Introduction

Both among specialists who analyze the conditions for the development of creative potential and among laymen, a "Romantic stereotype" of an eminent creator is strong (see Sawyer, 2004). According to it, creative people are those who break the set standards, boldly question the *status quo*; they are revolutionists who make such far-ranging changes in the area they deal with, that they change its nature. And though there is quite a lot of truth in this view (especially with reference to the most eminent creators), it omits all those who, while working systematically, contribute to the culture in a way that is far less spectacular when it comes to the form of creation, which most frequently does not mean that the significance of such creators is lower.

The discussion, sketched in such a way is important, because it attracts attention to a different than the dominating dimension of the analysis of creativity, namely aside from creativity level which means strengthening creative abilities, proper attention is paid also to the style of creating, meaning *how* people create. After all, getting to know how people create shows not only the level of creative abilities, but also how specifically their creativity may be expressed.

The key assumption of the Kirton (1976, 2003) adaption-innovation theory can be brought down to the statement that each person could be placed in a specific continuum whose one pole is defined as adaptativeness and the second one – innovativeness. In his seminal work , Kirton (1976) basing on the views of Peter Drucker, convinces that adaption is connected with the tendency to "do something better," whereas innovation means preference to "do something differently." What results from this is that those people who prefer the adaptive functioning style operate skillfully within the frame of the existing paradigm, and when they attempt to change that they do it systematically, step-by-step and evolutionarily. In case of innovators, dominating is the tendency for revolutionary changes – not so much improvement of a paradigm, but its complete rejection and replacement with a new one that has a character which clearly destroys the *status quo*. Deepened characteristics of adaptors and innovationists can be found in the works of Kirton (1976, 1987, and 2003) as well as in numerous discussions (Isaksen, Dorval, 1993, Tokarz, 2005).

In order to conduct research into cognitive styles connected with creativity, Kirton proposed a short questionnaire- KAI. The inventory of adaption-innovation by Kirton (KAI – *Kirton Adaption Innovation Inventory*) is composed to 32 statements, with 5 point Likert scale– from very hard to very easily. Usually, the numerous studies with the use of KAI indicate its three-factor structure, though

research also appears whereby the existence of four-factor solution is postulated (Taylor, 1989a, 1989b). The three singled-out factors were described as sufficiency of originality, (SO), efficiency (E) as well as rule conformity (RC). Kirton is convinced that innovators are characterized by high level of the sufficiency of originality and low level of efficiency as well as rule conformity. On the other hand, adaptors are characterized by high level of efficiency and rule conformity, but low level of the sufficiency of originality. The special way of calculating raw results in KAI scales also makes it possible to use the total result whereby high results prove innovativeness and low ones – adaptativeness.

Kirton's questionnaire is characterized by acceptable reliability that ordinarily oscillates around Cronbach's α = .8-.9 (Kirton, 2003), though detailed scales are slightly less reliable. Most publications with the use of KAI contain one indicator (total result in KAI) – the fact that within the factor analysis, usually the first non-rotated factor, loaded by all positions in the scale with the force of no less than .3, may become an argument in favor of such treatment of the results.

The range of theoretical results at KAI range between 32 and 160 points with the theoretical mean of 96 and almost the same empirical mean (M=95.5, Kirton, 2003). In most analyzed research, the KAI scale (total result) is characterized by normal distribution, which makes it useful even for the very demanding statistical analyses.

The research with the use of KAI shows that men usually achieve higher indicators of innovativeness than women, yet aside from that, as Kirton (2003) states, there is a lack of explicit and unambiguous interrelations between innovation-adaption and age, education or profession. This remark does not mean that these types of differences are not observed, but that they are of different character in the various research.

The fact of the functioning of a valid and reliable method makes it possible to verify to what extent the hypotheses about the independence of level and style, formulated by Kirton, find their confirmation. Kirton consequently treats these two dimensions as orthogonal. Significant body of research, conducted both by Kirton and other researchers as of Torrance (Torrance, 1982, Torrance, yun Horng, 1980), usually confirms this ascertainment. Exhaustive discussion of the research into the problem of level-style can be found both in the works of Kirton himself (2003) and the followers of his concept (Isaksen, Dorval, 1993, Mudd, 1996). And so Mudd (1996), while analyzing the issue of the relations between creativity level and style, calls on much research based on factor analyses which ordinarily indicate that the level (e.g. results in such creativity tests as TTCT) and style (KAI, or the MBTI creativity index) usually load different factors. This type of results is provided by Kirton's (1987) re-analysis of the data provided by Torrance and yun Horng (1980), where (despite small, 33-people sample) independence of level and style was confirmed. Similar research was conducted on a larger sample (Tefft, 1990), and it also showed that KAI creates a mutual factor along with MBTI (described as "style"); while the measurements of fluency, flexibility and originality of thinking prove to be connected with a different factor.

Results of factor analyses conducted by Isaksen and Dorval (1993) confirm the postulated independence of level and style. One may therefore assume that most of the conducted studies support the view of the creator of KAI on the independence of the analyzed dimensions of creativity. The most spectacular confirmation of the theses of Kirton was found by Mudd (1980) who in his research divided the 27 measurements ordinarily used in research into five groups (1-creativity level; 2-creativity style; 3-mixed style; 3-creativity level/style; 5-other measurements) as well as proved that six out of seven level measurements did not correlate with KAI at all. Slightly different results and usually stronger relations are noticed when KAI results are correlated with the questionnaire measures of creativity measurements. And so in the research of Goldsmith (1984, 1985, Goldsmith and Matterly, 1985), significant and moderately strong connections between KAI and the scale of creative motivation were revealed (r=.46) along with other self-descriptive measurements of creativity.

CONDITIONS OF SCHOOL SUCCESSES

In educational debate, the subject of the conditions of educational successes and failures is constantly present. It is worth to ponder what the effectiveness of functioning in a school of individual people is dependent on, what influences good grades of some students and failing grades of others. These are very important issues, because school achievements are some of the most important predictors of professional career and success in life (Lebuda, Karwowski, 2006; Skarzynska, Chmielewski, 1998). Provision of an answer to the question of what conditions the success of pupils

and students in studying also formulates a basis for elaborating profiles of good students, methods of correctional, and appropriate educational programs that support the process of learning-studying (Kossowska, 2004).

School achievements should reflect the level of intellectual development. In educational practice, school achievements are frequently understood as high grade point average, won contests and subject-related Olympics (Karwowski, 2005). School success may be described as a state of balance between school requirements and achievements as well as behavior of a child. The results hence achieved provide insight into a student's adaption to his or her environment where he or she functions, into his or her frame of mind while at school. They also influence acceptance on the side of teachers and peers.

A series of various factors influence school success. These are, among others: intellectual, personality, motivation-emotional, and environmental conditions, as well as creative abilities. Kupisiewicz (1988) indicates three groups of factors that determine school success. These are: social-economic, biological-mental and educational factors. Generally, the above factors may be divided into internal, connected with mental and physical development of a child as well as his or her individual characteristics, as well as external factors composed of the child's living conditions, nearer and more distant environment or the educational care and work family and school ensure. It is worth to remember, however, that these remain in tight relations (Tyszkowa, 1964).

The phenomenon of school achievements seems to be significant for the issue of giftedness. Very frequently giftedness is defined as eminent school achievements (Borzym, 1979; Marland 1972), and the students who get good grades are sometimes called gifted ones. Creation of a general profile of a gifted person causes many problems, which fact is connected with the diversity of definitions of giftedness. On the one hand, it is understood as a high level of intelligence and on the other, as a broadly understood creativity, and yet on another as a series of directed abilities (Marland, 1972; Sternberg, 1997 Gardner, 1983). And so in the report of Marland from 1972, we can read that everyone who possesses at least one of the seven listed abilities is a gifted person. Among these abilities are: high intellectual level, creative abilities, fine arts / musical abilities, school achievements, leadership abilities as well as psychomotor abilities.

The dimensions that are at the heart of interest and research which refers to the conditions of the achievements of gifted students can be divided into two spheres: dispositional and emotional-motivational. The following belong to the dispositional sphere: intelligence level, special abilities, level of creative abilities, as well as preferences within the frame of cognitive styles. On the other hand, the emotional-motivational sphere encompasses such factors as: self-image, self-assessment, aspirations, values system or structure of aims (Sekowski, 2001).

In accordance with the definition of Sternberg (1985), intelligence is understood as a mental ability to adjust and change one's behaviors depending on context. It therefore encompasses dealing with new situations. It seems to be obvious that intelligence is decisive of the level of school achievements, yet, as it proves, not always is this relation significant and strong. Intelligence *is* a necessary factor, but it does not explain the overall phenomenon of school successes (Firkowska-Mankiewicz, 1997, 1999, 2002; Gardner, 1983; Necka, 2002; Seligmann, 1995; Strelau, 1997). Many results indicate dependence between the level of intelligence and school successes (Terman, 1959), however, some researchers claim that the relation between intelligence and school successes is positive – but weak and significant mainly in the initial years of education (Kossowska, 2004).

Personality is also one of the predictors of school successes. It may exert a modifying influence on all levels of the process of processing information, and what follows that on the result of studying. For example conscientiousness may influence the way of analyzing information (Kossowska, 2004).

Research into learning styles is a source of interesting data about factors that influence school achievement of students (Kossowska, 2004). This data refers to acquiring knowledge as well as organizing and monitoring the strategy of learning itself. Learning styles encompass a series of cognitive strategies that support gaining knowledge. These are: strategies of receiving, processing, assessing and remembering information that is included in the material for studying, metacognitive strategies that are indispensable in setting goals, controlling and regulating one's own school activity, as well as strategies of time-management, "effort investment" and obtaining help from others (Kossowska, 2004). Research of Kossowska and Shouwenburg (2000) showed how certain personality traits influence the learning styles that are directly connected with school achievements. For example, the chosen learning style and school achievements are both dependent on whether the given students

are characterized by conscientiousness, openness to experience, neurotism, perseverance, or strong fright.

A whole body of research also highlights the influence of metacognition on school and academic achievements of gifted people. Metacognition is understood as knowledge of one's own cognitive processes, the way they function and how they can be steered. It proves that gifted students differ with respect to metacognitive functioning from average students (Jausovec, 1994). This mainly refers to metamemory – gifted students use more diversified strategies of memorization, as well as they separate significant from insignificant information more deftly and effectively (Sekowski, 2001). Aside from that, they have greater stock of knowledge, more effectively find indispensable information, more spontaneously and with greater ease solve complex problems, as well as are characterized by better metacognitive understanding, which may strongly influence achieving better results while studying.

The issue of the relation between creative abilities and school achievements of students in different areas of their operation also seems significant (Sekowski, 2001). However, the results of research conducted in this area, provide contradictory data. Creative ability is in fact one of the elements of the aspect of giftedness, but some connect it rather with extra-school activity (Tyszkowa, 1990). Borzym (1984) in her research stated a lack of any relation between the level of creative abilities and learning results. This fact may indicate that the contemporary school which prefers uncreative acquisition of knowledge by means of gathering and automatically "replaying" it, does not encompass enough creative abilities of students, and so creative students are not able to make use of their potential capabilities in such conditions (Turska, 2006). Research conducted by Kuspit and Tychmanowicz (2005) proved that there is a connection between school achievements and creative attitudes. It shows that the students who are characterized by high level of a creative attitude may boast of higher achievements at school. Students who are characterized by a creative attitude score higher grades, as well as use and present their abilities better because of such features as cognitive curiosity, originality of thinking, or openness on problems (Kuspit, Tychmanowicz, 2005).

According to Sternberg (1997), abilities explain only a small part of individual differences within the frame of school achievements, and many researchers claim that ability tests are a highly imperfect predictor of successes in life. The author signalizes a necessity to concentrate not only on abilities, but also on thinking styles preferred by people, that enable one to differently manage one's own cognitive stock. However, these appear as an intermediary between abilities and their implementation via particular actions. A peculiar synergy effect may be created as a result of the "cooperation" between abilities and thinking styles. Sternberg claims that consideration of this specificity of human functioning in school practice is especially important and may be fecund with new educational solutions (Sternberg, 1997; Sternberg, Zhang, 2001), especially in the education of gifted children (Sternberg, Grigorenko 1993).

Methodology

1,316 students from 32 Polish schools took part in the research. The sample was composed of 49% men and 51% women. 68.4% of researched students attend public schools and 31.6% attend non-public schools. Students recruited from middle schools (13-16 years of age – 61%) and high schools (17-19 years of age – 39%).

Instruments

1. To evaluate the level of creativity – *Test for Creative Thinking-Drawing Production* TCT-DP Urban, Jellen in its Polish adaptation by Matczak, Jaworowska, Stanczak (1996, 2000). It is a drawing test that aims at diagnosing creative abilities. It is based on a component model of creativity by Urban (1996) that encompasses 6 groups of components: divergent thinking, general competences, specific knowledge and abilities, task-oriented engagement, motives and tolerance of ambiguity. The task for a research respondent is to complete a drawing whose beginning is a frame and six graphic elements.

2. To evaluate the style of creativity – *KAI Adaption-Innovation Questionnaire* by Kirton in its Polish, non-authorized translation of Kossowska (2005). The questionnaire is composed of 32 statements of self-descriptive character. Its aim is to measure cognitive styles of adaption-innovation treated as opposite poles that describe a single dimension. The following three sub-scales compose KAI: sufficiency of originality, efficiency, and rule governance.
3. To evaluate the school effectiveness – GPA – Grade Points Average.

Hypotheses and Research Options

The following hypotheses underwent verification during the course of the research:

H1. There is a positive relation between the effectiveness of functioning at school and the adaptive style of creativity as well as creative abilities. At the same time the correlations between school successes and creative abilities (level of creativity) are stronger than in case of adaptativeness-innovativeness (style of creativity) and GPA.

H2. In non-public schools, high achievements are connected with creative abilities and the innovative style of creativity. The effectiveness of functioning in public schools is connected with low level of creative abilities and adaptativeness.

H3. Students of non-public schools are characterized by greater school achievements, higher innovativeness and higher level of creative abilities, than the students from public schools.

Results

A correlation analysis was conducted in order to verify the hypothesis which states that there is a connection between the effectiveness of functioning at school and the styles of adaption-innovation, and creative abilities. The results, presented in Table 1, show that the effectiveness of functioning at school, measured by means of GPA positively statistically significantly, though weakly correlates with creative abilities. However, a lack of relation was observed between GPA results and styles of adaption-innovation. The KAI scale of the sufficiency of originality significantly correlates with the effectiveness of functioning at school, and the efficiency scale correlates very weakly, positively. The hypothesis about the relations between results and style was rejected. However, that relations do exist between school results and the sufficiency of originality (characteristic for the innovation style), and efficiency (characteristic for the style of adaption).

Table 1: Results of the analysis of GPA correlation with creative abilities and adaption-innovation styles.

	M	SD	2	3	4	5	6
GPA	3.80	.76	.17***	.04	.10***	-.07**	.01
TCT-DP	21.28	10.27	1	.11***	.05*	.05^	.08**
KAI	95.55	6.72			.33***	.60***	.79***
O (KAI)	46.61	6.25				-.35***	-.22***
E (KAI)	17.40	4.21					.58***
RC (KAI)	31.54	6.72					

Note: ^p< 0.1, * p<.05, **p < .01, ***p<.0001, In E and RC scales of KAI scoring is inverted.

In order to examine whether differences exist between the results of students from public and non-public schools, comparison was conducted between group means (ONEWAY ANOVA). Membership in individual types of schools (public, non-public) was a dependent variable and functioning at school, creative abilities, and the adaption-innovation scales were factors. The results were concordant with the hypothesis. Non-public school students achieve higher results within the frame of functioning at school, creative abilities and cognitive styles of adaption-innovation than the students of public schools. The hypothesis (3) has been confirmed.

Table 2: Comparison if mean results within the frame of functioning at school, creative abilities, and adaption-innovation styles in groups of students from public and non-public schools.

Type of school	M & SD	GPA	TCT-DP	KAI	O (KAI)	E (KAI)	RC (KAI)
Public	M (SD)	3.67 (.7)	20.48 (9.8)	93.99 (8.3)	46.27 (6.0)	17.06 (3.9)	30.66 (6.1)
Non-public	M (SD)	4.07 (.7)	23.01 (11.0)	98.92 (12.0)	47.35 (6.7)	18.13 (4.9)	33.44 (7.5)
Total	M (SD)	3.80 (.8)	21.28 (10.3)	95.55 (9.9)	46.61 (6.3)	17.40 (4.2)	31.54 (6.7)
Significance of differences		F(1.1243)=8**; η2=.06	F(1.1305)=17**; η2=.01	F(1.1310)=74**; η2=.05	F(1.1310)=8.5**; η2=.01	F(1.1310)=18**; η2=.01	F(1.1310)=51**; η2=.04

Note: ^p< 0.1, * p<.05, **p < .01, ***p<.0001, In E and RC scales of KAI scoring is inverted.

Interesting results have been obtained on the basis of analyses of correlations conducted in both types of schools. In case of public schools, creative abilities as well as the KAI – sufficiency of originality scale both correlate with the success of functioning at school. On the other hand, in case of non-public schools positive relation has been observed between the effectiveness of functioning at school and the efficiency that forms the KAI dimension. GPA results also correlate positively with creative abilities.

Table 3: Results of the analysis of the correlation between functioning at school, creative abilities and adaption-innovation styles in the division into public and non-public schools.

	GPA	TCT-DP	KAI	O (KAI)	E (KAI)	RC (KAI)
GPA	1.00	0.15***	0.00	0.10**	-0.08**	-0.04
TCT-DP	0.13**	1.00	0.10**	0.04	0.06^	0.05
KAI	-0.06	0.07	1.00	0.28***	0.55***	0.74***
O (KAI)	0.05	0.05	0.39***	1.00	-0.43***	-0.33***
E (KAI)	-0.15***	0.00	0.64***	-0.28***	1.00	0.53***
RC (KAI)	-0.04	0.07	0.83***	-0.09^	0.62***	1.00

Note: ^p< 0.1, * p<.05, **p < .01, ***p<.0001, In E and RC scales of KAI scoring is inverted Above diagonal – public schools, below – non-public schools

Interaction "level x style" is significant in public schools only (F[1.838]=6.58; p=.01) and it is visible that the effectiveness of functioning in public schools, diversifies the level of creative abilities along with the adaption-innovation style. In public schools, those who characterized by creative abilities and innovation style (creative innovators) are most effective at school. At the same time, non-creative innovators (with lower level of creative abilities) least frequently achieve success at school. In

non-public schools, adaptors seem to be more effective, especially the creatively gifted ones. Analysis of 3-way interaction "school x level x style" show it is close to be significant (F [1.1233] =2.6; p=.11), but school mean effect as significant - F [1.1233] =77.52; p=.0001.

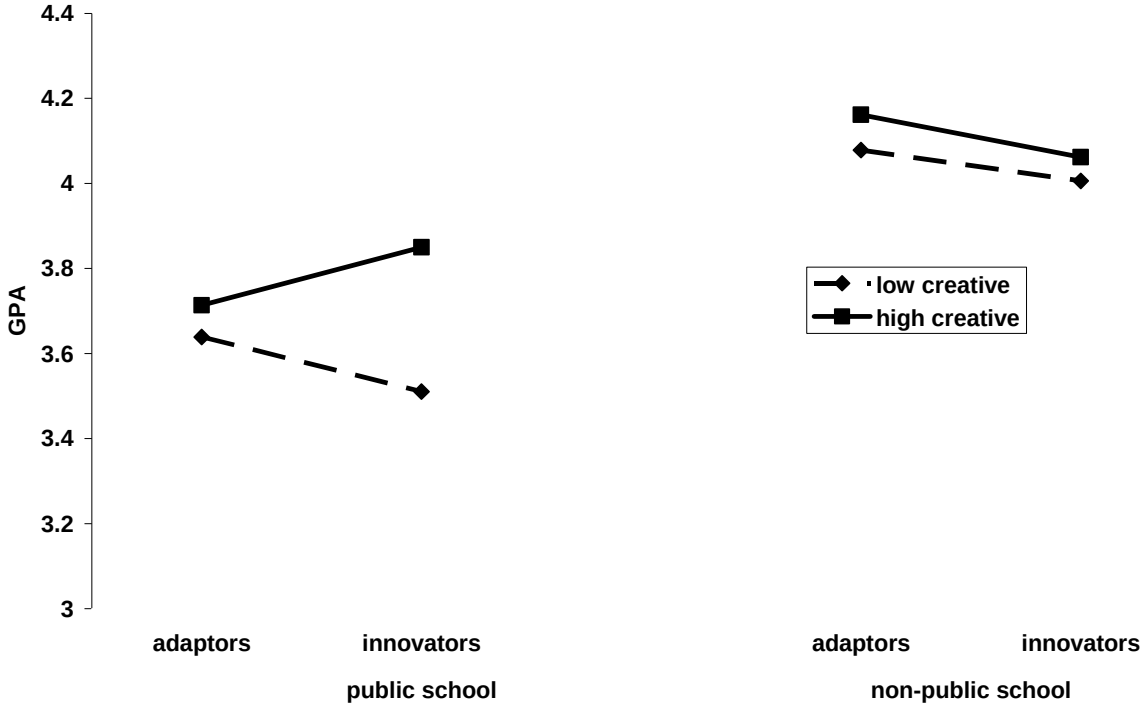

Figure 1: Comparison of mean results of the effectiveness of functioning at school (GPA), depending on the level of creative abilities (TCT-DP) and functioning styles of adaption, innovation (KAI).

Discussion

The results have shown that there is a positive relation between learning abilities and school achievements, measured by GPA. However, there is a lack of relation between school results and adaption-innovation styles overall. There is a weak positive relation between the effectiveness of functioning at school and individual KAI scales – sufficiency of originality and efficiency. One may therefore conclude that creative abilities are related with the effectiveness of solving tasks the school sets for its students, and this has a reflection in school grades. It is possible that in order to achieve school successes, the way, style of solving problems is less important than the effect itself – getting results.

Analyses have indicated that students of non-public schools achieve better results, and are characterized by higher level of creative abilities and innovative creativity styles. One may suppose that such finding has its source in the specificity of Polish non-public schools. These are institutions that, in comparison with public ones, have greater chances for multilateral stimulation of students, for providing them with more diverse experiences, and thanks to working in less numerous groups they give a chance to teachers to notice, appreciate and stimulate special abilities of individual students.

In public schools, students characterized by high level of creative abilities and high sufficiency of originality (KAI scale), are better students. In non-public schools a positive relation exists between the effectiveness of functioning at school and creative abilities (weaker than in case of public schools) and efficiency (KAI scale). It is therefore possible to conclude that high level of creative abilities facilitates dealing with school situations independently from school types, whereas at a public school in order to achieve good results one must also stand out in the style of working. In public schools, creative innovators achieve the highest results, whereas less creative ones obtain the lowest results. This means that the ability to introduce, create newness, and solve problems in a non-typical way is appreciated in these schools, but only when these are accompanied by creative abilities. Despite the

lack of statistical significance in case of the results in non-public schools, it is worth to pay attention to the fact that creative adaptors are more effective, and non-creative adaptors obtain the lowest results. In non-public schools, educational successes are achieved by people who are able to introduce the previously invented solutions.

Reference

Atkinson, J. W. & Feather, N. T. (1966). *A Theory of Achievement Motivation*. New York: J. Wiley.

Borzym, I. (1984). Wybrane cechy funkcjonowania intelektualnego osob zdolnych w roznym wieku a ich postepy w nauce. *Psychologia Wychowawcza*, 4.

Firkowska-Mankiewicz, A. (1997). *Spor o inteligencje czlowieka: dziedzicznosc, czy srodowisko?* Warszawa: IFiS.

Firkowska-Mankiewicz, A. (1999). *Zdolnym byc... Kariery i sukces zyciowy warszawskich trzydziestolatkow.* Warszawa: IFiS PAN.

Firkowska-Mankiewicz, A. (2002). *Intelligence and success in life.* Warsaw: IFiS Publishers.

Gardner, H. (1993) *Multiple Intelligences. The theory in Practice*. New York: Basic Books.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Goldsmith, R. E. (1984). Personality characteristics associated with adaption-innovation. *Journal of Psychology, 117*, 159-165.

Goldsmith, R. E. & Matherly, T. A. (1985). Seeking simpler solutions: Assimilators and explorers, adaptors and innovators. *Journal of Psychology, 120*, 2, 149-155.

Isaksen, S. G. & Dorval, K. B. (1993). Toward a improved understanding of creativity within people: The level-style distinction. [W:] S. G. Isaksen, M. C. Murdock, R. L. Firestein & D. J.

Treffinger (red.). *Understanding and recognizing creativity: The emergence of a discipline*. Norwood, NJ: Ablex.

Jausovec, M. (1994). Metacognition in creative problem solving. In: M.A. Runco (Ed.), *Problem finding, problem solving & creativity* (pp. 77- 95). New Jersey: Ablex Publishing Corporation.

Karwowski, M. (2005). *Konstelacje zdolnosci.* Krakow: Oficyna Wydawnicza "Impuls".

Kirton, M. J. (1976). Adaptors and innovators. A description and measure. *Journal of Applied Psychology, 61*, 622-629.

Kirton, M. J. (1987). *Kirton Adaption-Innovation Inventory (KAI) manual (2. edition)*. Hatfield, England: Occupational Research Centre.

Kirton, M. J. (2003). *Adaption-Innovation: In the Context of Diversity and Change,* London: Routeledge.

Konopnicki, J. (1966). *Powodzenia i niepowodzenia szkolne*. Warszawa: PZWS.

Kossowska, M. (2004). Psychologiczne uwarunkowania wybitnych osiągnięć szkolnych. [W:] A. Sękowski (red.), *Psychologia zdolności. Współczesne kierunki i badania*. Warszaw: PWN.

Kossowska, M.& Schouwenburg, H. (2000). Osobowość a kompetencje szkolne. *Przegląd Psychologiczny, 43,* 81-100.

Kulisiewicz, C. (1988). Podstawy dydaktyki ogolnej. Warszawa: PWN.

Kuspit M. & Tychmanowicz A. (2005) Poziom postawy tworczej uczniow o zroznicowanym poziomie osiagniec szkolnych. *Annales*, XVIII, 59-71.

Lebuda, I.& Karwowski, M. (2006). Sukces. Czym jest? Od czego zalezy? Nauczycielskie poglady na zrodla sukcesu. *Ruch Pedagogiczny,* 5-6, 45- 63.

Marland, S. P., Jr. (1972). *Education of the gifted and talented, Volume I: Report to the Congress of the United States by the Commissioner of Education.* Washington, DC: United States Government Printing Office.

Matczak, A., Jaworowska, A. & Stańczak, J. (2000). *Rysunkowy Test Twórczego Myślenia (TCT-DP) K. K. Urbana i H. G. Jellena. Podręcznik*. Warszawa: Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego.

Mudd, S. (1996). Kirton's A-I theory: Evidence bearing on the style-level and factor composition issues. *British Journal of Psychology, 87,* 241-254.

Necka E. (2002). *Inteligencja. Geneza- Struktura- Funkcja*. Gdansk: GWP.

Sawyer, R. K. (2004). *Explaining creativity. The science of human innovation*. Oxford: Cambridge Univ Press.
Seligman, D. (1995). *O inteligencji prawie wszystko. Kontrowersje wokol ilorazu inteligencji*. Warszawa: Wydawnictwo Naukowe PWN.
Sekowski, A. (2004) , *Psychologia zdolnosci. Wspolczesne kierunki badan* (pp. 47 – 64). Warszawa: PWN.
Skarzynska, K. & Chmielewski, K.(1998). Motywacja osiagnieciowa i uwarunkowania sukcesu w Polsce. *Studia Psychologiczne,* 2, 95 - 117.
Sternberg, R. J. & Grigorenko, E. L. (1993). Thinking styles and the gifted. *Roeper Review,*16, 122-129.
Sternberg, R. J. (1997a). *Successful intelligence: how practical and creative intelligence determine success in life,* New York: Plume.
Sternberg, R. J. (1997b). *Thinking Styles.* New York: Cambridge University Press.
Sternberg, R. J. (1985). *Beyond IQ*. New York: Cambridge University Press.
Sternberg, R. J & Zhang, L. F. (ed.) (2001). *Perspectives on Thinking, Learning and Cognitive Styles*. London: Lawrence Erlbaum Associates.
Strealu, J. (1997). *Inteligencja czlowieka*. Warszawa: Wydawnictwo "Zak".
Taylor, W. G. K. (1989a). The KAI: A re-examination of the factor structure. *Journal of Organisation Behaviour, 10,* 297-307.
Taylor, W. G. K. (1989b). The Kirton Adaption-Innovation Inventory: Should the sub-scales be orthogonal? *Personality & Individual Differences, 10*, (9), 921-929
Tefft, M. (1990). Creativity through the lenses of the TTCT, MBTI & KAI: the level-style issue examined once again. *Teorie vedy (theory of science), 1*, (2), 39-46.
Terman, L. M. & Oden, M. (1959). *The Gifted Group at Mid-Life*. Stanford, CA: Stanford University Press.
Tokarz, A. (2005). *Dynamika procesu twórczego*. Krakow: Wydawnictwo UJ.
Torrance, E. P. & Horng, R. Y. (1980). Creativity and style of learning and thinking characteristics of adaptors and innovators. *The Creative Child Adult Quarterly, 2,* 8085.
Torrance, E. P. (1982). Hemisphericity and creative functioning. *Journal of Research and Development in Education, 15,* 29-37.
Turska, D. (2006) *Skutecznosc ucznia. Od czego zalezy udana realizacja wymogow edukacyjnych?* Lublin: UMCS
Tyszkowa, M. (1964). *Czynniki determinujace prace szkolna dziecka*. Warszawa: PWN.

(F.11)

Chin-hsieh Lu, Embodiment: The way of creative problem-finding: The purpose of this study was to investigate the changing processes of gifted children's thinking in the curriculum of problem-based learning (PBL). There were 52 fifth-graders from three pull-out gifted programs participated in this study since 2003. The focus of the PBL curriculum was to integrating science and humanities into the current social issues to engage gifted children's learning in social reconstruction and to emphasize their learning on the live science making rather than upon the accomplished science (Bruner, 1996; Stepien & Pyke, 1997; VanTassel-Baska, 2006). Based on the qualitative analyses of the results of the first three years, it was found that gifted children's creativities were revealed through the intensification of their basic experiences of the problem scenarios. Through direct experiencing the problem scenarios, their way of thinking becomes changed and more creative on redefining the problems. Children's interpretation of the problems changed while their personal feelings were immersed into the problem situations. Those children used lots of metaphors in their journal narrative to bridge their imagination and the affective feeling about the problem and transformed the problems into the possibilities. The challenges teachers faced were how to keep the problems alive for children instead of killing it with too much teaching. Based on the results, it was suggested that the primary education component of creativity and gifted children would be to emphasize on children's direct experience of the problem rather than on cognitive analysis or intellectual reasoning about the problem. Embodied gifted children in the problem situation is the way of facilitating creative problem-finding. Key Words: Creative Problem-Finding, Embodiment, Problem-based Learning, Gifted Children.

(F.12)

Some features of Creativity fostering program among middle and upper school age students (12-17 y.o.)

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Abstract

Among middle and upper school age students (12-17 y.o.). The pilot research was done in Educational Centre for Gifted among Lower School Age Children (7-11 y.o) and among middle and upper school age students (12-17 y.o.). The program was used seeking to develop the creative abilities of the Lithuanina children who took part in the Educational Centre for Gifted Youth in Lithuania which was established in 2002 in Vilnius. Creativity training is a part of gifted education programs of the Centre. The program of creativity training among middle and upper school age students will be represented more detailed. As our research has showed the special creativity training programs could be effective for fostering university students creativity also (Karkockiene, 2007). The effective programs are those that try to influence different aspects of creativity – cognitive, personality, attitudes, behaviour, interpersonal, affect, and environmental. Sizable effects can be observed using four major criteria applied in evaluating training – divergent thinking, problem – solving, performance, and attitudes-behaviour (Scott, et al., 2004; Parnes, 1999).

Keywords: Creativity training program for the school age children, excercises and tasks fostering creativity.

Introduction

Developing educational programs help to enhance students' creativity is among the most important goals of our educational system.

Creativity means one's ability to perceive a problem and to generate new ideas, or to think independently and deal quickly and easily with a problem situation, or to find an original way of solving a problem, or to create novel things (Guilford, 1968; Torrance, 1974; Sternberg, O'Hara, 1999; Sternberg et al., 2005). Ability to think creatively depends not only on one's knowledge and skills. Rather, it is determined by one's special ability to distinguish a problem, and to utilise, speedily and in multiple ways, information contained in tasks one has been set (Guilford, 1968).

The belief that creativity can be enhanced is discussed. Many authors agree that creativity can be fostered. Efforts to enhance creativity will not expand one's inborn potentialities but they can insure that potentialities are maximized (Plucker, Runco, 1999). Different components of creativity such as *cognitive, attitudinal, interpersonal components can be enhanced* through a stimulating environment that induces ideas and creates solutions to problems (Grakauskaitė Karkockienė, 2003, 2006 a, 2006 b, Grenstad, 1996).

The goals and the features of the of the program

- The main goals of creativity training programs are to foster human potential and elaborate inborn abilities.
- Both goals may be achieved by adequate training conditions and using special training programs.

Figure 1: Participants of The Creativity Training Program among middle and upper school age students.

The program's purpose are to:

- Develop students' cognitive creative abilities.
- Reveal their own creative powers by cognitive and personality techniques for the fostering of their own creativity.

Figure 2: Participants of The Creativity Training Program during the summer camp.

Using this program we expected that:

- Creative thinking abilities will be strengthened.
- Program participants will realize their cognitive and personality qualities related to creativity; moreover, their confidence in their own creative power increases.
- Program participants will realize to a greater degree their creative potential applicable subsequently to their daily activities.

Figure 3: Participants of The Creativity Training Program among middle and upper school age students during the summer camp.

The example of some Activities/Exercises/Tasks for Fostering Creativity among middle and upper school age students (12-17 y.o.) Teachers/Group Leaders participate in and do the activity/exercise/task sitting comfortably in a circle. Needed is colored paper, a CD, quiet music, balloons (for task 9), felt-tip pens The time specified for each exercise is an estimate, dependent on the size of the group

1. **Getting acquainted exercise**

   The children write their name with colored felt-tip markers in capital letters on a piece of paper. After each letter they think of a positive thing/trait/attribute about themselves for each letter of their name and write it down. Then each person says their name and reads their positive attributes.

   For example:
   PATTI – P-Pleasant, A-Amazing, T –Talkative, T –Teacher, I- Inspiring.
   If there are letters in the name for which it is hard to think of a positive attribute, consider changing the letter to something similar.
   You can only write or say positive attributes.

2. **Expressing your mood.** Can do different variations such as A, B, C below:
   - **A.** Each person is asked to say "what color is your mood" right now? (blue, red, gray …);
   - **B.** Draw how you are feeling today;
   - **C.** Hand-out pictures, from which they could pick a little person or face which might fit their mood.

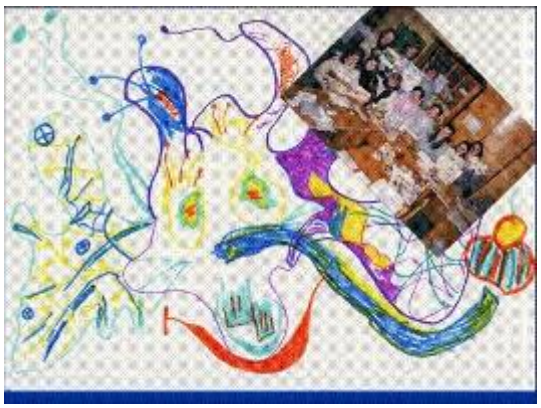

Figure 4: Drawing a fantastic animal and expressive your mood doing collage.

3. **Warm-up exercise (icebreaker).** Ahead of time, hang various nature scenes (could use pictures from a calendar). Then ask everyone to gather around the picture that they like or attracted them the most. Once gathered, each group should talk among themselves about why they chose that picture, and explore some of the things that are different about what led them to this picture, and some of the things that are different. Then the whole group meets and each group briefly talks about their reasons for selecting the picture.

4. **Drawing a fantastic castle**.The group separates into pairs and on one piece of paper with one pencil, without talking, draw a fantastic castle. You could also make-up a name and history for the castle. When done, the pair discuss how the process went, who led, who followed, if they like what they drew, etc.

Note: The exercise is done to calm music. Instead of drawing, you could build out of other materials such as clay but still without talking, or draw or build a scene instead of a castle. You could also do it in larger groups, maybe of four, where the paper is passed around, with each participant adding to/fulfilling the picture, etc.

Figure 5: Drawing a fantastic castle and excercize "Positive trait fair".

5. **Exploring empathy exercise Children are in pairs.** They read out loud 10 -15 pairs of words. The children on their papers write the word of the two they like better. Then the word pairs are read again and the children guess and write down the word they think their partner picked.

Word Pairs (which can be different from below)

	I chose	**I guess my partner chose**
1. Sun /Moon	Sun	Moon
2. Boy / Girl	Boy	Boy
3. Happiness / Sadness	Sadness	Happiness, etc. etc.
4. Rain / Wind		
5. Ice/Candy		
6. Trip / Television		
7. City / Nature		
8. Car / Plane		
9. Book / Film		
10. Truth / Lie		

How many of my partner's words I guessed correctly: 8 words
How many of my words my partner guessed correctly: 9 words

Then you count how many points each child collected guessing about their partner (One point per correct guess). Discuss who collected the most points (the most empathetic/understanding) and others who cam close to the most. Do not ask who got the least, talk about how it is also a chance to guess correctly, etc.

6. **Passing on motion.** The first member of the group makes a motion or movement and "sends it" to the person on his/her right, who "sends it" further, until the movement returns to the original/first member of the group. The original/first member of the group repeats the movement and then the second member of the group thinks of another/new movement and sends it on, and so on, and so on.
7. **Training/Expanding the imagination.** The children are asked to think of and say a word for a person or thing. Then the question is asked of one of the children "what is it like?" That child might say, for example, "it is soft." Then the leader of the group asks "and what else is (for example) soft?" The children again say things that are soft. And then another name of a thing is chosen and again the question is asked "what is it like?" So for example, the children say their words and one word such as "friend" is chosen. And the question is asked by the group leader "what is a friend/what is a friend like?" and the children might answer "trustworthy," "good," "helpful," "brave," …. Then the question can be asked "who else is brave?" The children might answer: a soldier, a brother, a father … And what are fathers like? "caring," "loving," "strong," "angry," "friendly," …
8. **Sharing positive thoughts about each other with the group**. A very fun exercise to end the group session, which is done in the following way: each person on his/her paper draws the palm of their hand/their hand, writes their name and one positive trait about themselves that maybe others

wouldn't know. Then the papers are passed around the circle and each person writes in for their friend one positive trait they have noticed about their friend. At the end, each person can read out loud what others wrote about him/her. Small children can draw a picture or something similar instead of writing a word.

Figure 6: After the sharing the experience.

9. **Positive trait fair** (suitable for childrens' celebrations, end of the school year events, together with parents and family friends, it can be done with participants of different ages. It's fun to do this outside in nature where there is space):

Step 1. Each member of the group has three different colored balloons (not dark colors, so that you can write on them with a felt-tip pen).

Step 2. Each member of the group blows up their balloon. And on each one writes a positive trait about themselves. It is suggested that they pick something interesting, less commonly known/used traits.

Step 3. Then everyone in the group is asked to go around and try to trade their balloon (and trait) with any one in the group. The group members can trade as many times as they want with as many people as they want.

Step 4. Everyone returns to the circle and shares which traits they had/started with, which they got, how they went about getting/trading for other traits, if they now have more or less then the original three, how/why they got them, i.e. was it hard to give up the balloons, why, ...

Step 5. When everyone has shared, each person is invited to say what they didn't get, but would like to have. Everyone is invited to share freely and not regret that everyone could get what they want, because the traits that you got or wrote and gave away you already have … The balloons should fly freely, and each person who wants the trait should be able to hold the balloon and then pass it on to others. Everyone can hold what they want…

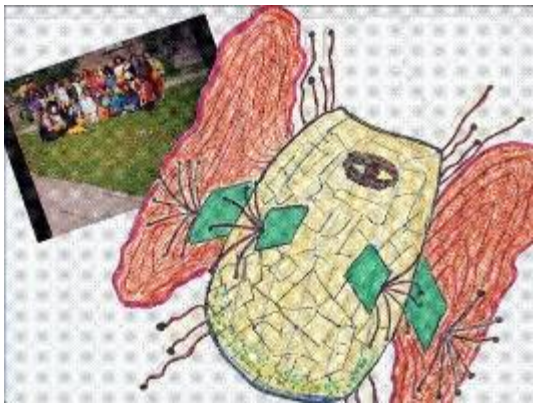

Figure 7. Drawing a fantastic animal and excercize "Positive trait fair".

10. **Reflection.** Explore the mood of the group after doing these exercises together. A potentially practical way to discuss would be to have snacks (maybe Lithuanian candies). You could also have mandarin oranges/clementines to illustrate, that nature itself was made such that it is easy to share and be friendly with everyone, taking a piece and sharing with one and other.

Figure 8: The end of the program.

Conclusions

1. The model of *creative competencies (abilities) which were develop*:
    - *Knowledge* (theories of creativity, creativity training, research);
    - *Cognitive abilities of creativity* (divergentive thinking, metacognition, solving of creative problems);
    - *Practical abilities* **(**ability to apply different methods of creativity training)
    - *Ability to coolaborate with groups members* **(**sharing ideas, ability to reflect the experience in the group); and
    - *Attitudes toward their own creativity* (positive self evaluation of their own creativity, self-motivation to reveal their own creativity in learning process as well as in different social situations).

2. *The methods* used teaching according the program: reflection and discussion, role playing,individual work, work in the pairs, working in small groups, different creativity techniques.

3. The effective programs influence *different aspects of creativity* – cognitive, personality, attitudes, behavior, interpersonal, etc. Sizable effects can be observed using four major criteria applied in evaluating training – divergent thinking, problem-solving, and attitudes-behavior.

4. The special programs could be created and effective *for the different age groups*.

References

Grakauskaitė Karkockienė D. (2003). *Kūrybos psichologija* (Psychology of Creativity). Vilnius: Logotipas, p.256.

Grakauskaitė Karkockienė D. (2006a) *Kūrybos psichologijos* pagrindai (Basics of Psychology of Creativity). Vilnius: Logotipas, p.101.

Grakauskaitė Karkockienė D. (2006b). *Kur dingsta Kodelčiukai?* (Where do the "why askers" go?, Handbook for teachers, parents, students). Vilnius: Logotipas, p.74.

Grakauskaitė Karkockienė D. (2007). Creativity training programme – a part of gifted education programmes in Lithuania. In: *Science education: Models and Network of Students Research Training under 21* (Ed. by P. Csermely, K. Karlovec, K. Suyok). IOS Press, Vol. *16*. pp. 240-248. ISSN 1574- 5597. ISBN 978-1-58603-721-5. http://nyex.info/58-10257.html

Grendstad N. M. (1968). *Mokytis – tai atrasti* (To learn – is to discover). Vilnius: Margi raštai, 1996.

Guilford J. P. Intelligence, Creativity and Their Educational Implications. San Diego, CA: Knapp.

Karkockienė D. (2007). Peculiarities of Developing Creativity of the Future Pedagogues when Learning According to a Special Program. In: *Development of Educational Paradigms: Theory and Practice* (Entwicklung erziehungswissenschaftlicher Paradigmen: Theorie und Praxis), Frankfurt am Main, Vol. *14*. pp. 325-334. ISBN 978-3-631-56029-7 / US-ISBN 978-0-8204-8767-0.

Karkockienė D., Butkienė O.G . (2007). Educational Center of Gifted: The Problems and perspectives. Gifted Children: Challenges and possibilities (Abstracts). *International scientific conference. Lithuania Kaunas University of Technology*. October 2-5, 2007. pp.55-56. ISBN 978-9955-25-352-5

Parnes S. J. (1999). Programs and Courses in Creativity. In M. A. Runco, S. R. Pritzker. *Encyclopedia of Creativity*. San Diego, Ca: Academic Press. pp. 465-477.

Plucker J. A., Runco M. A. (1999). Enhancement of Creativity. In: M. A. Runco, S. R. Pritzker. *Encyclopedia of Creativity*. San Diego, Ca: Academic Press. pp. 669-675.

Scott G. , Leritz L. E., Mumford M. D. (2004). The effectiveness of Creativity Training: a quantitave review. *Creativity Research Journal*. *16*(4). pp. 327-361.

Sternberg R. J., O'Hara L. A. (1999). Creativity and Intelligence. In: R. J. Sternberg (Ed.). *Handbook of Creativity*. Cambridge: Cambridge University Press. pp. 251- 272.

Sternberg R. J., Lubart T. I., Kaufman J. C., Pretz J. E. (2005). Creativity. In: Holyoak K. J., Morrison G. (Eds.). *The Cambridge handbook of thinking and reasoning*. New York: Cambridge University Press.

Torrance E. P. (1974). *Norms - technical manual, Torrance Tests of Creative Thinking*. Bensenville, IL: Scholastic Testing Service.

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(F.13)

Sing Lau; Toby Tong, What Makes Creative Teaching Possible among Primary and Secondary School Teachers in Hong Kong: The purpose of the present study was on examining the effect of different personal and social factors on the creative teaching style of school teachers. A total of 498 primary and secondary school teachers in Hong Kong were included. In addition to the measure of creative teaching style, the teachers were asked to provide their perception of some immediate factors that might be related to students' creativity orientation (such as students' creative family environment, creative learning environment in the classroom), some distal factors that might be related to their own creative teaching orientation (such as the creative work environment in school), and some global and personal factors that might be facilitative to their creative teaching practice (such as hindrance to creativity education, practice of creative education in general, personal involvement in creative activities). Results showed that the factors measured accounted for 29% of teachers' creative teaching style, with the most significant ones being the creative learning environment in the classroom, creative work environment in school, hindrance to creativity education, and personal involvement in creative activities. Further analysis revealed significant differences between the two groups of teachers, with the factors accounted for greater variance among the primary than secondary school teachers (i.e., 34% vs 23%). Moreover, among the primary school teachers, a wider scope of significant factors related to their creative teaching style was found that included creative work environment in school, creative learning environment in the classroom, hindrance to creativity education and personal involvement in creative activities, whereas among the secondary school teachers, the most significant factors included only creative learning environment in the classroom and hindrance to creativity education. The implication based on these differences in the significance of these sorts of factors in relating to the promotion of creative teaching in general and creative teaching in primary and secondary school levels was discussed.

(F.14)

The Effect of Using Dimensions of Thinking Model in Developing Map Reading Skills and Creative Thinking Abilities of Elementary students

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Abstract

The purpose of this study was to determine the effect of using the Dimensions of Thinking Model on developing map reading skills and creative thinking abilities of 86 eight six elementary school students at Assiut City, Egypt. The tools of this study consisted of a booklet for the students and a teacher's guide developed according to the Dimensions of the Thinking Model. Also, a test of map reading skill and a test of creative thinking skills were developed. The results indicated that students in the experimental group who were taught using the two units according to Dimensions of Thinking's Model outperformed those in the control group (P = 0.01). Results also showed that the Dimensions of Thinking's Model had a significant effect on the development of the creative thinking abilities test (fluency, originality, and flexibilities) for the experimental group (P = 0.01).

Introduction

Researchers provided evidence that young children possess mapping abilities (Blaut et al., 1970; Stea and Blaut, 1973; Mathews, 1985). Blades and Spencer (1990) concluded that an interesting aspect of the spatial development and geographic learning is the ability of children to make sense of macro-spatial environments and their representation in the form of maps. Stea et al., (1996) proposed a theory of universal mapping in which children possess a natural ability to represent the world in a symbolic manner at a reduced scale. Stea (in press) concluded that teaching geography at the elementary school entails the understanding of pictographic information and learning the spatial locations, boundaries of continents, and geo-political regions such as countries and states. Research has shown that icons and imagery facilitate the recall of map contents (Webb et al., 1994).

Durbin (2003) contended that creativity in geography is related to the opportunity to express, in different various, our understandings, and perspectives for the world around us. She believes that "maps can be criticized, imagined, debated, and/or assessed for purpose and audience" (p. 65). She also believes that good creativity entails, (a) an enthusiastic start to establish purpose and direction, (b) an audience, away from the teacher, known from the beginning to stress the quality of production, (c) an openness to ideas and paths of representation, while remaining within standards or parameters; and (d) meaningful criteria for good geography and for good creative response.

This study involves an investigation of the effect of the Dimensions of Learning Model (Marzano et al., 1988 a and b) on developing map reading skills and creative thinking abilities (fluency, flexibility, and originality) of elementary school children.

Dimensions of Learning Model

Marzano et al. (1988a paper) developed a model for teaching thinking. The authors listed five types of thinking referred to as dimensions. Marzano et al. (1988b) concluded that dimensions of thinking are "major themes commonly found in discussions of human cognition that can be used in planning for curriculum" (p. 143). These dimensions or major themes are thinking that launches and maintain and sustain the content of learning, thinking that helps understand and organize content, thinking that helps in storing of content in long-term memory, thinking that characterizes and sharpen content, and dispositional thinking that permits reflection of the learning process and transform it to be critical and creative. Marzano et al., (1988b) stated that 'dispositions are inclination to get involved in some kinds of behavior not in some others. Some of these dispositions are related to creative and critical thinking and self-regulatory thinking. Marzano et al. (1988a) stated that the dispositions for creative thinking involve (a) profound or deep engagement in tasks when answers or solutions are not directly explicit; (b) maximizing the boundaries of the individual's knowledge and abilities to promote knowledge and skills; (c) producing, trusting, and keeping the individual's own standards of evaluation; and (d) producing new ways of looking at a situation away from the limits of the

conventionality. Marzano (1992), in the Dimensions of Learning Model, proposed five dimensions of thinking after modification. These dimensions are: positive attitudes and perceptions about learning, thinking involved, thinking related to the acquisition and integration of knowledge, thinking related to the extension and refinement of knowledge, thinking related to the use of knowledge in a meaningful way, and productive habits of mind. Productive habits of mind consisted of critical, creative, and self-regulatory thinking. Marzano (1992) concluded that the Dimensions of Learning Model is designed to concentrate on authentic student learning by changing the current instructional practices in order to reflect on the way children learn. He states that the five types of thinking in the model are necessary to the process of learning.

The first dimension is positive attitudes and perceptions about learning. In this dimension, attitudes and perceptions have an essential role in the learning process. Authors described attitudes and perceptions as a part of the learner's 'self system' that affects other systems (Markus & Ruvulo, 1990; McCombs & Marzano, 1990). Marzano (1992) stated that this dimension consists of attitudes and perceptions that represent "the filter through which learning occurs" (p. 3). The cognitive and mental climate is controlled by acceptance, ease, and orderliness in the classroom.

The second dimension consists of thinking related to the acquisition and integration of knowledge. Marzano (Marzano et al., 1988a; Marzano, 1993, Marzano et al., 1993) concluded that learning involves a subjective process of interaction between the current information we know and the information we long to learn. The integration of this new knowledge is not enough. What is needed is two more processes. The first is related to the analysis of new information order to get it organized and shaped in such ways that show its significance. The second process consists of the integration of the new knowledge in such ways so it can be readily utilized.

The third dimension is related to thinking involved in the extension and refinement of knowledge. This dimension entails the knowledge on a deep and analytical level. Students should get involved in such activities that include the comparison, classification, induction, inference, deduction, analysis, and abstraction. Marzano (1992) mentioned that "…once information is required and stored in long-term memory, it can be changed-and in the most effective learning situations, it is changed" (p. 67).

The fourth dimension involves the thinking in the use of knowledge in a meaningful way. This dimension entails using thinking in authentic learning and complex activities. Also, it allows self-learning as the learner is entitled to control his or her own learning in order to maximize one's abilities.

The fifth dimension is the habits of mind. Marzano et al., (1992) concluded that habits of minds could be of high importance as they "permeate all the others" (p. 211). Logically, insufficient habits of mind end into undesirable learning outcomes. Marzano (1992) concluded that the use of mental habits could make the learning successful and resourceful. Marzano (1992) mentioned a list of habits of mind into three different categories: dispositions of critical thinking, dispositions for creative thinking, and dispositions for self-regulatory thinking. Examples of dispositions for creative thinking are getting involved in activities which answers are not straightforward, generating the learner's own standards of evaluation, producing new ways of looking at a situation away from the conventionl standards.

Some studies proved the effectiveness of the Dimensions of Learning Model in enhancing the thinking skills. For example, Fisher and Epperson (1991) concluded that the habits of mind contributed to changes in teaching habits especially in changes in teaching philosophy. Teachers showed more interest in listening to the students and they reported improvement in students' social behavior.

Marzano et al., (1988a) contended that the five aspects of creativity in his model are (a) creativity takes place in relation with craving and preparation; (b) creativity entails working at the edge rather than the center of one's capability; (c) creativity entails an internal rather than an external locus of evaluation, (d) creativity entails restructuring ideas, and (e) creativity could be facilitated through freeing one's self from engagement to permit free thinking. The Dimensions of Learning Model involves eight thinking processes that are interrelated into knowledge acquisition and knowledge production or application. The processes that are essential to knowledge acquisition are comprehension, concept formation, and principle formation. On the other hand, composing, problem solving, decision making, and research are essentially related to knowledge application. Oral discourse is shared in both knowledge acquisition and application.

There are eight core thinking skills that are deemed central to the performance of the other dimensions. These skills are focusing, remembering, analyzing, information gathering, organizing, generating, integrating, and evaluating skills (Marzano et al., 1988a). Marzano (1992) stated that the Dimensions of Learning Model can be used with all grade levels and content areas. He mentioned that "The belief underlying the Dimensions of Learning Model is that both content knowledge and thinking and reasoning processes tend to be taught if we want students to become proficient learners" (p. 32). Tarleton (in Scanlon, 1997) reported effective results when using the Dimensions of Learning Model in mathematical problem solving performance. Other researchers investigated the Dimensions of Learning Model to improve the science achievement African-American college students (Dujari, 1995) and explore the effect of the model on teacher attitudes and student achievement in fourth graders (Scanlon, 1997), and use of habits of mind in the acquisition of language arts (Guenther, 1997).

Creativity

Numerous definitions of creativity exist, however none of these definitions is universally accepted. Even though different theorists, researchers, and educators may use the term creativity, they might refer to completely different constructs (Treffinger, Young, Selby, & Shepardson, 2002). Delineating similarities or differences among the different definitions of creativity is not easy. However, almost all of the definitions can be classified according to Rhodes (1961) who proposed a classification of creativity definitions based on four dimensions: person, process, product, and press or environment. Determining whether various definitions of creativity are good or bad is not easy.

Divergent Thinking

The current study involves three components of the divergent thinking: fluency, flexibility, and originality. Fluency refers to the numerous ideas when responding to a certain stimulus. Flexibility refers to the different categories of the response or the ability to change one's mental views about things. Originality refers to the statistical rarity of a response. Mednick (1962) contended that divergent thinking is an essential feature of creativity for the generation of various responses to a single stimulus would increase the probability that the individual will produce an original or unique idea.

Map Reading Skills

Hollister et al., (2001) stated that previous studies of children's ability to use maps can be classified into academic and navigational categories. Academic map use entails the maps that are taught in early grade such as map deciphering skills. Navigational map use is the realistic or every-day or using maps to locate things or places. Efficient performance in map reading, map interpretation, and navigation need various kinds of skills. In the light of the academic domain, map reading involves the understanding of traditional symbols and the ability to make sense of the symbol system that is limited to the map being considered. Several studies asserted the importance of developing the map reading skills (Bruno, 1999).

Although the importance of map reading skills and divergent thinking skills, the researchers in this study observed, when attending some class periods for social studies of fourth graders that teachers use traditional ways in the presentation of lessons. This leads to some difficulties faced by the children in understanding the content delivered by teachers. The researchers also conducted a pilot test regarding the possession of creative thinking skills by these children.

The purpose of this study was to investigate the effect of the Dimensions of Learning Model on developing map reading skills and creative thinking skills. The study questions are:

1. What is the effect of using the Dimensions of Learning Model (DLM) on developing some map reading skills for fourth graders?
2. What is the effect of using the Dimensions of Learning Model (DLM) on developing some creative thinking skills for fourth graders?

Methodology

The participants of this study were 84 fourth graders from an elementary school located in Assiut City, Egypt. The students came from a similar socioeconomic status. 42 students constituted the experimental group and 42 constituted the control group.

Instruments

Teaching Materials

Students' Booklet

The student's booklet included an introduction about the booklet that dealt with the way the student can handle the tasks in the booklet. Some of these tasks are individual and some others are group-based. The booklet also included some guidelines that show students the way they can handle creative thinking tasks in addition to the most important behaviors in the groups and the duties of each student towards his peers in the group. The booklet also contained two teaching units of the social studies book in the fourth grade: 'Where is My City Located?' and 'Natural Phenomenon'. The unit 'Where is My City Located?' included two lessons: the first is 'My City is Part of My Country' and 'How I Can Read a Map'. In the 'Natural Phenomenon" unit, five lessons were introduced: landscape, weather, natural plants, and wild animals. Each of these six lessons consisted of a title of the lesson, behavioral objectives, in addition to the main components of the lesson topic and instructional media used in the lesson and classroom tasks. These tasks were designed according to the Dimensions of Learning Model. For example, in the dimension 'acquiring and integrating knowledge', procedural and declarative knowledge were used according to the model. Pictures were used as advance organizers. Also, some other teaching strategies were used such as classification and induction. This focus of this part was on creative thinking that included brainstorming, decision-making tasks, and problem solving tasks. In addition, some other activities were conducted by students by the end of the lesson. The evaluation included essay and objective questions that measure the objectives of the lesson.

Teacher's Manual

This manual included an introduction that contained helping the teacher know the Dimensions of Learning Model and the importance of developing map reading skills and creative thinking skills. The purpose of the manual was also to provide a recent teaching model for the teacher. Also, the manual helped the teacher in teaching the two units of 'Where is My City Located?' and 'Natural Phenomenon'. The manual helped the teacher plan the lessons of the two units according to the Dimensions of Learning Model. The manual also helped the teacher make use of the student's booklet according to the Dimensions of Learning Model.

The teaching method used in the manual can be divided according to five dimensions: the positive attitudes and perceptions toward learning, acquiring and integrating knowledge, extending and refining knowledge, using knowledge meaningfully, and productive habits of the mind. The first phase of teaching in this manual included the positive attitudes and perceptions toward learning. There are two kinds of positive attitudes and perceptions that teachers should develop. The first is the positive attitudes and perceptions toward the classroom atmosphere. The second is positive attitudes and perceptions toward the classroom tasks.

Marzano et al., (1992) stated some teaching performances that the teacher can use in developing positive attitudes and perceptions toward the classroom atmosphere. Examples of these performances are helping students feel accepted by the teacher and their peers, monitoring students' attitudes, positive response for incorrect responses, letting students work in groups, and setting clear rules and policies for the classroom. As for the positive attitudes and perceptions towards classroom tasks, Marzano et al. (1992) stated some teaching performances with which the teacher can develop the positive attitudes towards the classroom atmosphere. Examples of these performances include observing students' attention and reformulating questions.

The second phase in the manual included acquiring and integrating knowledge. In this phase, the K-W-L (What I Know, What I Wanted to Learn, and What I Learned) instructional technique was

used (Ogle, 1986). Brainstorming rules was also used in the generation of creative ideas around the topic. The third phase included extending and refining knowledge. Some teaching strategies such as comparison, classification, and induction were used in this phase. The fourth phase included using knowledge in a meaningful way. This phase include some teaching strategies such a decision making, inquiry, and problem solving. The last phase included productive habits of the mind. This phase is closely related to the purpose of this study. What is meant by habits is those which help students think and attain self-learning. Some creative thinking abilities were used: fluency, flexibility, and originality.

Creative Thinking Abilities Test

The test included 8 items. Each item measures fluency, flexibility, and originality. The items included problem solving of some geographical problems and imagination of geographical environments. The test time is 45 minutes. Reliability of the test, according to Guttman split-half reliability coefficient, was .78. As for validity, the test had content validity and face validity according to the views of the experts in educational psychology and social studies.

Map Reading Skills Test

This test included 10 objectives items such as multiple choice, right or wrong and fill-in-gaps questions. The purpose of the test was to measure map reading skills including determining a title of the map, locating directions, using the scale, using the scale in locating. Reliability of the test, according to Guttman split-half reliability coefficient, was .80. Content validity and face validity of that test was determined by experts in educational psychology and social studies.

Procedure

The researchers conducted a content analysis of the social studies course of fourth graders to reach to the list of map reading skills. The preliminary list of map reading skills (related to the two units 'Where is My City Located?' and 'Natural Phenomenon' was introduced to some referees or experts in social studies teaching to revise and modify the list. Students in both the experimental and control group took the map reading skills test and creative thinking abilities test. The experimental group studied the two teaching units 'Where is My City Located?' and 'Natural Phenomena'. Then, the map reading skills test was conducted to the two groups.

Data Analysis

SPSS 16 for Windows was used in analyzing the scores of this study. For the two research questions, an independent-samples *t*-test was used to determine the difference between the experimental and control groups.

Results

The first question: What is the effect of using the Dimensions of Learning Model (DLM) on developing some map reading skills for fourth graders?

The purpose of this question was to investigate the effect of using the Dimensions of Learning Model (when taught with student's booklet) on developing some map reading skills for fourth graders. An independent-samples t-test was conducted to examine the differences between pre-test and post-test. Means, standard deviations, and t-test values for the pre-test are illustrated in Tables (1) and (2). As shown in Table (2), there is a significant difference between the pre- and post-test (p = .01). Inspection of the two group means indicates that the average map reading test score for the experimental group (8.28) is significantly higher than the control group (4.28), (t = 24.18, p = .01). The effect size is approximately .93 which is a large effect.

The second question: What is the effect of using the Dimensions of Learning Model (DLM) on developing some creative thinking skills for fourth graders? The purpose of this question was to investigate the effect of using the Dimensions of Learning Model (when taught with student's booklet) on developing some creative thinking abilities (fluency, flexibility, and originality) for fourth graders.

Table 1: Means, standards deviations, and independent-samples t-test for the pre-test of the Map reading test and creative thinking skills test (n = 84)

Variable	**Experimental Group (n = 42)**		**Control Group (n = 42)**		***t***	***df***	***P***
	M	*SD*	*M*	*SD*			
Map reading test	1.4	.24	1.38	.27	.17	82	NS*
Creative thinking abilities test							
	Experimental Group (n = 42)		Control Group (n = 42)		*t*	*df*	*P*
	M	*SD*	*M*	*SD*			
Fluency	4	2.4	3.7	8.2	.36	82	NS*
Flexibility	4	2.4	3	1.9	1.2	82	NS*
Originality	16	3.5	12	2.1	1.2	82	NS*
Whole test	24	6.8	19	8.8	1.1	82	NS*

NS = Non significant.

Table 2: Means, standards deviations, and independent-samples t-test for the post-test of the Map reading test and creative thinking skills test (n = 84).

Variable	**Experimental Group (n = 42)**		**Control Group (n = 42)**		***t***	***df***	***P***
	M	*SD*	*M*	*SD*			
Map reading test	8.28	.33	4.28	1.02	24.18	82	.01
Creative thinking abilities test							
	Experimental Group (n = 42)		Control Group (n = 42)		*t*	*df*	*P*
	M	*SD*	*M*	*SD*			
Fluency	46	7.49	17	6	25.07	82	.01
Flexibility	71	5.6	14	6	47.06	82	.01
Originality	139	8.94	52	2.8	60.18	82	.01
Whole test	256	14.2	83	3	31.02	82	.01

As shown in Table (2), there is a significant difference between the pre- and post- test (p = .01). Inspection of the means of the experimental and control groups indicates that the average of the whole creative thinking abilities test is significantly higher than the control group (t = 31.03, p = .01). The effect size for the whole test is .95 which is a large effect. The independent-samples t-tests for the three individual tests namely fluency, flexibility and originality are also significant. Effect sizes for the three subtests are .90, .97 and .90 respectively. These effect sizes are large.

Discussion

The purpose of this study was to investigate the effect of using the Dimensions of Learning Model on developing map reading skills and creative thinking abilities of fourth graders. Two teaching units (Where is My City Located? and Natural Phenomena) were integrated using the Dimensions of Learning Model in teaching the students. The first question dealt with the effect of the teaching units on developing map reading skills. The experimental group had a significant increase (p= .01) in the scores of the map reading skills test. This study is probably the first to investigate map reading skills in geography for fourth graders using the Dimensions of Learning Model. This model was effective in developing an essential skill for elementary school students. Looking at the effect size (d = .93) denotes that the effect is large. Thorough analysis of this result may be attributed to the close relationship of some of the elements in the Dimensions of Learning Model and map reading skills.

Although this might be the first research article that deals with the Dimensions of Learning Model with map reading skills, it could be consistent with the results of authors who used the same model on different domains or subjects. For example, Scanlon (1977), concluded that the model improved mathematical problem solving performance. While Dujari (1995) concluded no differences

were found in the science achievement of university students. Scanlon (1997) concluded that the model was effective in changing the teacher attitudes while no significant gains were found in student achievement. For future research, attitudes of students toward the domains or subjects could be an important research endeavors.

The Dimensions of Learning Model supports the results of this study. The dimension 'acquiring and integrating knowledge' is closely related to map reading skills. Marzano et al., (1997) stated that many proponents of cognitive psychology view knowledge as organized into process knowledge, also known as procedural knowledge, and factual knowledge, known as declarative knowledge. Procedural knowledge requires executing a process such as reading a mp, setting up an experiment, and editing a composition. Procedural knowledge consists of three stages: constructing meaning, organizing, and storing. Marzano (1992) contends that constructing meaning is applying what students already know about a subject or a topic to a new learning experience. Organizing entails use of information in a subjective manner and includes what is important and not important.

More research is needed to investigate the first dimension of this model: positive attitudes and perceptions about learning. Marzano et al., (1997) mentioned some techniques that could be used in the class and that can establish a relationship with each student in the class. Examples of these strategies include monitoring personal attitudes, engaging in equal and positive classroom behaviors, and providing numerous opportunities to get involved in cooperative learning.

Generalization of the results of this research should be taken with caution given the cultural differences of the study sample.

References

Blades M, Spencer C. (1990). The development of 3- to 6-year-olds'map using ability: the relative importance of landmarks and map alignment. Journal of Genetic Psychology 151: 181–94.

Blaut, J., McCleary, G., & Blaut, A. (1970). Environmental mapping in young children. *Environment and Behavior, 2*, 335-49.

Bruno, E. M. (1999). Map literacy: Designing an instructional videotape to teach map reading skills to high school students. *Dissertations Abstracts International, 50, 8, 62.*

creativity: A guide fir educators. Research Monograph Series. CT: National

Durbin, C. (2003). Creativity-criticism and challenge in geography. *Teaching Geography,* 64-69.

Fisher, C., & Epperson, K. (1991). ASCD/McREL *Dimensions of Learning Consortium: Report on year 1 assessment*. Aurora, CO: Aurora Public Schools.

Markus, H., & Ruvulo, A. (1990). Possible selves personalized representations of goals. In L. Pervin (Ed.), *Goal concepts in psychology (*pp. 860-878*)*. Hillsdale, NJ: Lawrence Erlbaum.

Marzano, R. J. (1992). *A different kind of classroom: Teaching with dimensions of learning.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R. J. (1993). How classroom teachers approach the teaching of thinking. Theory into Practice, 32(3), 154-159.

Marzano, R. J., Arredondo, D., Blackburn, G., Brooks, D., Ewy, R., & Pickering, D. (1988a). *Creating a learner-centered paradigm of instruction.* Aurora, CO: Mid-continent Regional Educational Laboratory. Unpublished manuscript.

Marzano, R. J., Brandt, R. S., Hughes, C. S., Jones, B. F., Presseisen, B. Z., Rankin, S. C., & Suhor, C. (1988b). *Dimensions of thinking.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R. J., Pickering, D. J., Arredondo, D. E., Blackburn, G. J., Brandt, R. S., & Moffett, C. A. (1992). *Teacher's manual: Dimensions of learning.* Alexandria, VA: Association for Supervision and Development.

Marzano, R. J., Pickering, D., & McTighe, J. (1993). *Assessing student outcomes: Performance assessment using the Dimensions of Learning Model.* Alexandria, VA: Association for Supervision and Curriculum Development.

Mathews, M. (1985). Young children's representation of the environment: A comparison of techniques. *Journal of Environmental Psychology, 5*, 261-278.

McCombs, B. L. & Marzano, R. J. (1990). Putting the self in self-regulated learning: The self as agent in integrating will and skill. *Educational Psychologist, 25*(1), 51-69.

Mednick, S. A. (1962). The associative basis of the creative process. Psychological Review, 69, 220-232.
Ogle, D. S. (1986). K-W-L group instructional strategy. In A. S. Palincsar, D. S. Ogle, B. F. Jones, & E. G. Carr (Eds.), *Teaching reading as thinking (Teleconference Resource Guide*, (pp. 11-17). Alexandria, VA: Association for Supervision and Curriculum Development.
Research Center on the Gifted and Talented, Stores
Stea (in press). Geographic learning in children. I*nternational Encyclopedia of the Social & Behavioral Sciences*, 6185-6188.
Stea D., Blaut J. M., & Stephens, J. (1996). Mapping as a cultural universal. In J. Portugali (Ed.), *The Construction of Cognitive Maps,* (pp. 345–60). The Netherlands Kluwer Academic Publishers, Dordrecht, ,
Stea, D. & Blaut, J. (1993). Some preliminary observations on spatial learning in school children. In R. Downs & D. Stea (Eds.), Iamge and environment, (pp. 226-234). Aldine: Chicago.
Treffinger, D. J., Young, G. D., Selby, E. C., & Shepardon, C. (2002). *Assessing*
Webb, J. M., Saltz E. D., McCarthy M. T., Kealy W. A. (1994). Conjoint influence of maps and auded prose on children's retrieval of instruction. *Journal of Experimental Education 62*: 195–208

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(F.15)

Problem-based learning facing globalized education. Can PBL deliver global excellence?

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Abstract

In recent Danish higher education history, a remarkable turning-points was the establishment of two innovative universities (Roskilde University in 1972 and Aalborg University in 1974), based on "project work". Project work implied group-organized inquiry into socially relevant problems and simultaneous studies of scholarly theory. Today, the value of social relevance and cooperation in educational settings is contested, from side of the government (having issued a decree banning the group exam) and from a seemingly individualistic youth culture. Ironically, employer representatives from Danish companies defend PBL and group exam, acknowledging the value of university candidates who can combine scholarly knowledge, interdisciplinary thinking and a feel for practice. The contestation of core values of project work should encourage self-reflection among PBL-practitioners and researchers. Furthermore, project work and PBL is facing the challenge of the global educational market. PBL must be capable of ensuring students' development of knowledge depth and breadth to the same degree as traditionally organized university studies. Students must be able to obtain excellence by engaging in a set of teaching and learning practices which emphasize collaborative knowledge building, interdisciplinarity, and practice-orientation. The paper will address the following question: Can team-organized, problem-oriented studies, once oriented towards the establishment of an alternative to traditional elitist educational practices and the formation of a basis for societal change meet the challenges, posed by a competitive globalized education market, seeking to foster educational excellence and to cultivate the talents of gifted and well-achieving students?

Introduction

Aalborg University was established as a PBL university in 1974. Problem-based learning is the dominating learning methods at all faculties at the university. The specific version of problem-based learning practiced at Aalborg University is called 'problem-oriented project-based learning' (POPBL). This specific PBL method implies that learning activities are centred around a problem, normally chosen by the students (within a broad interdisciplinary framework), and that the work of the students results in a written report, resembling a scholarly research report encompassing presentation of theory, methodological reflection, and presentation of empirical research findings. As documented by Savin-Baden and Howell Major 2004, the history of problem-based learning shows that the term PBL covers a wide variety of learning and teaching methods. PBL literature locates the actual 'birthplace' of problem-based learning to be McMaster Medical School, Ontario, Canada ((Savin-Baden and Howell Major 2004)(de Graff and Kolmos 2007, 1-1-9)). After the implementation of the PBL method at McMaster in 1969, other medical schools (in Europe and Australia) adapted the model of problem-based learning, and soon several professional schools followed the path, pointed out by McMaster. However, most institutions combined the PBL principles from McMaster with existing practices and educational cultures. What stands out as remarkable concerning the establishment of the Danish PBL tradition, is the fact that two new universities (in Roskilde and Aalborg) were given the opportunity to found all learning and teaching activities on PBL principles. This entailed that not only professional education such as engineering studies, but also arts, humanities and social science programmes were designed as problem-oriented and project-organized activities at these universities.

Problem-based learning as a learning method and the history of its dissemination to a wide range of different school systems, disciplines, national and institutional cultures is no doubt influenced by a complicated interplay of educational and political factors and PBL draws on a wide range of different philosophical and theoretical sources ((Savin-Baden and Howell Major 2004)). But despite the fact that the philosophical and pedagogical inspirations stem from numerous and divergent sources, two major approaches to educational thinking have been involved in the development of problem-oriented project work:

- a professional qualification approach.
- a general education or 'Bildung' approach.

No doubt, in the case of Aalborg University the professional approach has proven to be the far most successful one. It is generally acknowledged that the philosophical and educational notion of Bildung designates a combination of personal, social, and cultural learning processes which – ideally – pave the way for the full unfolding of the individual's potential as human being and as a political and social subject ((Biesta 2002, 377-390; Biesta 2006, 149; Gur-ze'ev 2002, 391-408)). In the pedagogical theory, laying the more general theoretical foundation for problem-oriented project work, the 'Bildung' dimension was linked to the project of 'counter qualification', an approach which sees education as playing an active part in bringing about social change (this will be further elaborated below). However, exactly the intention of influencing society in a more direct and politically conscious way is deemed unsuccessful by UNESCO chair holder AAU professor , Anette Kolmos:

> At the Universities of Roskilde and Aalborg, these principles were implemented and fully institutionalized. The principles permeated the entire construction phase, organizationally, culturally, as well as physically, for instance, in the sense that group rooms were built for the students. Both schools proved to be viable models and each has known its own history of development and adaption of the project model. Project-organized learning has not lived up to the expectation of bringing about changes in society. However, project work turned out to be an excellent method for developing new types of competencies" ((de Graff and Kolmos 2007, 1-1-9))

On the other hand, the qualification project – the production of highly skilled and knowledgeable university candidates for the professions has proven to be extraordinarily successful, in fact even 'excellent' as Kolmos and de Graff put it. Thus, problem-oriented project work seems to represent a way of learning which apparently overcomes the contradiction between the need for mass education and the focus on fostering professional and academic elite candidates for business, management and research. According to Kolmos and de Graff, PBL is conducive to the development of innovation skills and high level competences.

The intention of this paper, however, is to investigate the apparently lost *Bildung* project, inherent in the specific version of PBL, called problem-oriented project work. It intends to present key concepts and principles concerning the connection between problem-oriented project-based learning and the idea of individual political and social 'Bildung' for social change. Given the possibility of applying POPBL as an instrument for meeting the challenge of simultaneously educating 'the masses' and catering for the elite, one might tend to criticize this intention as futile and somewhat untimely, as problem-oriented project work has apparently not 'lived up to the expectation of bringing about changes in the society'. What makes it worthwhile to undertake such an endeavour today, is the challenge of globalized education in the era of postmodernism mentioned in the title. A number of contemporary educational studies scholars seem to be trying to reconstruct the connection to the line of Bildung oriented education which apparently faded away with postmodern criticism of the Enlightenment project[80]. This paper should be seen as a modest contribution to this reconstruction process from the perspective of problem-based learning.

Background – the history of PBL as counter qualification

> "Following the student revolts in the late 1960s, a strong moment arose in social sciences during the 70s regarding project work as a possible factor contributing to change in society. In particular, this was true in North European countries like Denmark, Germany, and the Netherlands (Negt and Kluge, 1972, Negt 1968, Jansen and van Kammen, 1976), however, the advantages turned out to be learning and achievement of new skills." (de Graff and Kolmos 2007, 1-1-9)

Although this historical account presented in the quotation above does not offer a thorough explanation, Kolmos and de Graff point to important landmarks in Danish PBL history:

1) The birth of the Danish project work model in a turbulent political and cultural climate in the aftermath of the 1968 youth revolt, leading to perhaps *the* most liberal university law in the world;

[80] (Biesta 2006, 149; Gur-ze'ev 2002, 391-408; Lovlie 2002, 467-486; Nordenbo 2002, 341-352)

2) The subsequent disappearance of political and social involvement, originally inherent in the PBL principles upon which the project work model originally was built; and
3) The present recognition of the capacity of the project work model to support students' competence building, especially in professional education.

Illeris gives in his book "The pedagogy of counter qualification" from 1985 an account of the ideological background which lead to the foundation of Danish PBL practice in Marxist theory, namely the *"re-discovery of Marxist critique of political economy, following the student revolt in 1968, starting in West Germany and appearing shortly thereafter in Denmark"*.(Illeris 1985, 225) This line of pedagogical thinking was at first concerned with a critique of bourgeois didactics and educational economy, but soon the interest in presenting a positive vision of "counter qualification", a pedagogical theory based on a Marxist analysis of existing educational practice as part of the oppressive power of capitalist society arose. The purpose was to establish a foundation for pedagogical thinking which clearly would take sides with the working man (or perhaps rather 'the proletarian' to do justice to the Marxist inspired jargon of Illeris' work).

Main contributors to the Marxist turn in Western European pedagogical thinking were the German Frankfurter School scholars and Habermas-students Alexander Kluge and Oskar Negt, and in Denmark Illeris mentions himself as being one of the most important contributors.

Illeris links the establishment of the university centres in Aalborg and Roskilde to the booming economy of the late 60es. This period of relative prosperity had quantitative as well as qualitative consequences for Danish education. As part of the effort to expand and secure the development of the welfare state, social democratic governments felt the need to increase the capacity of the educational system at all levels, e.g. by increasing the number of students in higher education institutions. The need for mass education challenged existing curricula and teaching principles oriented towards educating the societal elite.

But not only did the prosperous 60es lead to a pressure on the educational system because of the sheer quantity of students. For the first time the need for well educated, creative, and independently thinking employees primarily for positions in middle and top management became manifest(Illeris 1985, 225): 47. The existing educational culture based on systematic disciplining of the learner and oppression of critique of authority would clearly be unable to meet the demands of educating the future creative and cooperative employee who, at the same time as he exercises his ability to independent and innovative thinking, embraces the 'system' and identifies with the organisational values of the company or institution in which he finds himself. Thus, the university centres in Aalborg and Roskilde were born in a political and economic climate which on one hand was defined by the social democratic welfare state project, on the other by emerging business interests in education which differed from the previous demand for knowledgeable, but well disciplined candidates.

As a hindsight observation, it is surprising that Illeris simultaneously recognizes the strong economic and political interests invested in institutionalization of project work and problem based learning and advocates the introduction of project work as an instrument of the counter qualification endeavour (which, if realized to its full extent, would ultimately lead to a subversion of the power of the capitalist and governmental interests which were at that time for the reasons indicated above promoting alternative pedagogical models such as PBL). What makes Illeris' concept of counter qualification controversial, at least compared to present day pedagogical thinking, is not so much his explicit positioning of his work as an instrument for social change as his doing so in a position as educator and leading PBL scholar. The vision he depicts, is one of the educational system as a kind of 'incubator' for university candidates and professionals who will leave universities and colleges with the double agenda of using their competences in the service of state and industry, *and* at the same time – as they have gained a deeper insight into the functioning of capitalist society – will represent a highly critical and potentially revolutionary element/ segment of society. However, Illeris sees the educational system as offering its affiliates – students, teachers, and researcher some degree of freedom from the disciplining forces of state and business interests. These forces find themselves in a

dilemma regarding education. On one hand the qualification of the workforce is a prerequisite for production and creation of surplus value, on the other hand there seems to exist an awareness of the risk of destroying human resources through coercion and discipline. Independent and innovative thinking cannot be induced in human beings by force which is the reason why a certain, to some degree unregulated, 'room for action' has to exist within the wall of schools and universities (Illeris 1985, 225): 60. Negt and Kluge present a similar analysis of the role of educational institutions in their 'The public sphere and experience' (Kluge and Negt 1974, 310)but see the relatively privileged position of these institutions as an effect of the need of capitalist society for research results which of course are as pivotal to creation of profitable production as a well educated workforce.

Counter qualification, resistance and problem orientation

As mentioned above, influential educational scholars in Denmark and Western Germany saw the structural necessity of 'free space' or 'room for action' within the educational system itself. This 'room' encompasses potentials for qualification as well as counter qualification. As indicated above, Illeris saw that the system had to exercise some precaution regarding the level of control and coercion to which it would subject the future workforce. However, Illeris analyses the youth of the 70es as being everything else than well functioning. Young people were generally perceived as unhappy, suffering from alienation, fragmentation, a lacking understanding of society and their own life situation. Symptoms such as lacking involvement, general negativity as well as mental illness were the observable symptoms, according to Illeris. In line with the prevailing discourse on youth and education in this historical period, this is explained as being caused by society as such which on one hand subjects young people to intolerable conditions, on the other hand – because of a dysfunctional educational system and fragmented teaching practice - prevents them from realizing the mechanisms causing these conditions. In order to restore the mental health of young people, the educational system can offer learners the chance of re-creating a deeper and more coherent understanding of society and their own life conditions. Here Illeris refers to accommodative learning processes as a way of cognitively 'putting knowledge and experience in place'. Ideally this will result in mentally healthier individuals equipped with a thorough understanding of society and adequate methods of uttering resistance against societal oppression. This process is to some degree, argues Illeris, beneficial both in a qualification and counter qualification perspective - as he puts it: even an oppressive system needs well functioning individuals.

Problem oriented project work is seen as the learning and teaching method which is especially well suited for supporting accommodative learning processes. Key principles are, according to Illeris, problem orientation, participant direction, and the principle of the Example. The learning process should take the problem as its point of departure and organize learning activities such as reading, researching, writing, presenting, teaching and supervision around the problem. This means that the choice of a good problem becomes crucial. The good problem is characterized by:

- its perceived relevance for the participants (participants should accept that the problem is in fact a problem). A problem should be seen as the driving force behind the learning process.
- its potential in terms of leading to the discovery of the structure and functioning of society (thus playing an important role in the counter qualification process).

Selection of suitable problems becomes a delicate matter as learners are not involved in this choice as knowledgeable, well disciplined 'pupils' or future scholars – but as *human beings* who are primarily, according to Illeris, characterized by their 'sufferings' related to their societal position and lacking insight in their own situation. Illeris realizes that the teacher must be involved in the problem choice, as he/she is also a participant in the project process. Through his/her participation in problem selection and subsequent supervision and evaluation, he/she is able to contribute to qualification as well as counter qualification of the learners.

Learner-centredness has often been criticized for leading to neglect of the learner and for allowing the teacher to reject his/her responsibility for the learning process. Thus it should be noticed that the principle of participant control presented by Illeris illustrates a very strong concern for the

student. The teacher recognizes his/her responsibility for the learning process (constituted by the double process of qualification and counter qualification) but seeks to handle this responsibility in a self-reflective and democratic way by putting him/herself on an equal footing with the other participants – the learners. The 'troublesome' participant position as supervisor of a project group stems from the insight that the teacher is also, in a structural sense, a representative of the oppressive system which, in the first place, has caused the painful condition in which the student finds him/herself.

What we find in the early writings of Danish PBL theorists, is a position which solidarizes itself with the students because they are seen as victims of class oppression, unconscious of the consequences this has meant to their lives and learning trajectories. Learning difficulties are primarily seen as caused by the learner's lacking ability to overcome learning blocks and barriers. This lacking ability is primarily caused by disbelief in one's own capacity as a learner, an individualization of structurally conditioned barriers to learning and thus indirectly by the system itself. Furthermore, inequality regarding access to higher education is seen as reinforced by differences between working class cultural values and practices and a primarily bourgeois educational culture and thus analyzed as a social justice issue rather than a question of different (innate) abilities and prerequisites for schooling (Illeris 1985, 225; Kluge and Negt 1974, 310)Consequently, learning difficulties and poor academic performance are explained as cognitive and emotional 'resistance', manifesting itself as "escape, isolation, withdrawal and a diffuse protest against societal conditions and authorities". (Illeris 1985, 225)

Problem oriented project work in a 'Bildung' perspective

I will argue that the pedagogical thinking behind the Danish problem-oriented project work represents a contribution to a theory of 'Bildung', perhaps one of the most recent on Danish ground. The combination of concern for the individual student as a human being and the political project of counter qualification clearly places problem oriented project work much closer to the concept of Bildung than to concepts of education as professional training. This argument is supported by Biesta's definition of the Bildung concept:

> Bildung refers, rather, to the cultivation of the inner life, that is, of the human soul, the human mind and the human person; or, to be more precise, the person's humanity. ((Biesta 2002, 377-390): 62)

In fact, the concept of counter qualification comes very close to Kantian definition of Bildung as "man's release from his self-incurred tutelage [Unmündigkeit] through the exercise of his own understanding" ((Biesta 2002, 377-390): 62), only is the 'Unmündigkeit' not understood as self-incurred, but as structurally imposed on the individual by the social order itself. But the idea that the learner is capable of freeing him/herself and fellow human beings through the use of his/her own intellectual power is paramount to the counter qualification concept. Counter qualification could be understood as the idea of collective or solidaric Bildung for a future socialist society, similar to the Kantian notion of Bildung as the development of "the subject in the emerging civil society".

In fact, the Bildung perspective of problem oriented project work could be identified as an example of educational thinking in continuation of what Gur Ze'ev terms 'the first stage of the development of critical theory', which according to Gur Ze'ev is characterized by optimistic utopianism (Gur Ze'ev 2003:78). In this period, an explicit Marxist orientation characterized leading Frankfurter School theorists (Adorno, Horkheimer) and while being sceptical to the idealistic bourgeois *Bildung* concept, they connect the *Bildung* concept to the transformation of the "exterior totality", i.e. the social and material world. By linking *Bildung* and education to realization of concrete social change, the emancipation of the individual is seen as made possible through changing external/social circumstances. The optimism is especially connected to two assumptions present in the work of Horkheimer in this period: the meaningfulness of the strive for radical social change and the belief that once given improved social conditions, humanity and the individual human being would be able to unfold its essence and fully realise its potentials. The idea that *Bildung* - the unfolding of human potential - is made impossible by coercive social conditions and power structures, represents an un-broken continuation of the Enlightenment project. The second period of the development of

Frankfurter School critical theory was characterized by deep pessimism. Because of the pervasiveness of modern capitalism, its influence on all aspects of human life, all human relations are seen as distorted, even the human being's relation to him/herself which would ultimately destroy every possibility of *Bildung* through reflective transcendence of existing life conditions. The change from optimism to pessimism is characterized by Gur-Ze'ev in the following way:

> All the conditions and assumptions of Bildung seemed to be fading away, according to their [Adorno, Horkheimer] reconstruction. In the second stage of the development of critical theory they emphasized the deconstruction of the individual as autonomous subject much more than the suffering and emancipatory potential of the proletariat, which they had underlined in the first stage ((Gur-ze'ev 2002, 391-408): 80)

Renouncing positive utopianism and recognizing the only form of solidarity in the acknowledgement of suffering as a shared life condition, hope, for Horkheimer, can only be phrased as negative or pessimistic utopianism, the transcendence of factual conditions by pointed to absence and negation, for example could "justice…be present in this world only in the form of resisting injustice"(Gur-ze'ev 2002, 391-408) (87).

In his contribution to POPBL theory, Illeris takes an interesting position regarding the 'negative turn' in critical theory as presented above. Clearly, the notion of counter qualification is only meaningful as an optimistic Bildung project aiming at real social change. However, the recognition of 'suffering' caused by alienation, fragmented understandings and distorted social relations is also present in his writing, and concern for a youth facing these conditions motivates his pedagogical project. But optimism seems to prevail as Illeris believes in the possibility of bringing 'relief' by offering meaningful learning possibilities qua the 'processing' of paradoxical experience in the form of problem-oriented project work. Furthermore, the optimism is confirmed by his analysis of the interest of the forces in power (government, industry, capital) in supporting problem-oriented learning ((Illeris 1976, 255): 254). To some degree, shared interests between 'the system' (as Illeris puts it) and critical educators can be identified – there is apparently no conflict between educating "for the people" and educating "for profit"[81]. The insight, that problem-oriented project work carries the potential to overcome the apparent contradiction between mass education and education of the elite, is present in Illeris' analysis of the dialectics between capital interests and progressive learning forms. However, the awareness that the dissolution of the 'people vs. profit' conflict in educational theory and practice only applies when focussing on the professional qualification perspective and ignoring the Bildung perspective, is relatively vaguely phrased as an invitation to a general consciousness of the quality of the problems chosen as point of departure for project work. If a problem truly constitutes an example of vital social importance, it will include the possibility of emancipative learning.

POPBL and a postmodern Bildung approach

In many ways, anticipations of the victories and defeats that POPBL was to meet in the years to follow are present in Illeris' early work. He realizes the potential in POPBL as an extremely flexible learning model which allows for the elite student's development of highly specialized research qualifications as well as education of the average student whose primary needs consist in solid preparation for a professional practice. He is probably aware of the fragility of the counter qualification project, too, as he points to the strong interests invested in alternative learning methods such as PBL, not for the sake of Bildung, but because of the effectiveness regarding professional qualification. But are the principles of the POPBL Bildung project per se viable today? Is the 'failure' of counter qualification reported by Kolmos and de Graff solely due to external factors, or does the idea of Bildung as counter qualification which draws heavily on critical theory contain elements which appear as untenable facing the challenges of education in a globalized world?

That the political and social analysis underlying the presentation of the counter qualification concept reflects the historical period in which the concept was conceived, is of course too evident to

[81] The headline of the concluding chapter of Illeris "Problem orientation and participant direction" (Illeris 1976, 255) is "For the people or for profit?"

count as substantial criticism. It is more constructive to focus on parts of the PBL ideology which still seems to have some relevance for our present day PBL practice.

One issue which is briefly mentioned by Gur Ze'ev is the belief in the 'essence' of the human being which is part of the Enlightenment thinking and clearly present in the optimistic utopianism of the first stage of critical theory. Gur –Ze'ev points to the risk that this idea could become manifest as a 'constitution of a desirable subjectivity', a normative ideal. The belief in a shared human nature is also present in POPBL theory. Learners are believed to react in similar ways to their (unsatisfying) life conditions and to the learning environment constituted by problem-oriented project work.

My intention is not so much to question the possibility of reaching shared understanding under conditions of similarity or conditions of difference as to question the absence of any serious attempt to address difference in POPBL theory. One of the more bizarre manifestations of the omission of an explicit treatment of the problem of difference, are the endless discussions of individual evaluation and grading of problem-oriented project work. Until the ban on group exam issued by the conservative-liberal government, different practices regarding evaluation and grading were found at Aalborg University. In the humanities, the performance of the students was graded on an individual bases while projects in the natural and technical sciences were evaluated as collective products. In a Bildung perspective, the issue is not so much difference in terms of competence and academic performance, but difference as a fundamental condition for human existence.

In the face of globalized education the possibility of reaching shared understandings while acknowledging and embracing difference is of major importance. Biesta (Biesta 2006, 149)distinguishes between the concepts 'diversity' and 'difference'. According to Biesta, 'diversity' encompasses the idea of a basic human essence combined with cultural variability. 'Difference', on the other hand implies the notion of fundamentally different ways of enacting human-ness, which represents the true challenge to intercultural understanding, e.g. in educational settings. Biesta, who draws heavily on Arendt's thinking regarding the foundations of human co-existence, defines Bildung today as the central responsibility of education to protect and nurture each individual's 'entering the world' as a truly unique subject ((Biesta 2006, 149): 99). Thus difference is not ignored (nor 'tolerated'), but placed at the centre of the Bildung project. For Biesta, learning to live in the community of "those with whom we have nothing in common" is a key challenge in a globalized world[82].

Concluding remarks

The intention of this paper has been to trace the origins of the Bildung perspective of problem-oriented project-based learning through a discussion of texts which once played a key role in defining this learning form. No doubt, the professional qualification perspective appears to be more influential and successful as candidates from the PBL universities in Denmark are perceived as possessing highly useful competences such as cooperative skills, independent thinking abilities, and an ability to combine theoretical knowledge and practical understanding. It is, however, a worthwhile undertaking to draw attention to the Bildung perspective which once played a major role in POPBL theory and practice. POPBL represents an example of educational theory building in which theoretical and practical preparation for a future professional life and the project of educating politically conscious, critical and socially engaged citizens are combined. Illeris' invitation to consider not only effective teaching and learning methods, but also to discuss and evaluate the purposes for which the acquired

[82] Biesta refers to Bauman's notion of the stranger to explain the character of community in a postmodern world. In a certain sense, says Biesta, we are all strangers and thus belonging to a community of strangers ((Bauman 2002, 255; Biesta 2006, 149)

skills and competences are applied is as relevant today as it was in the 70es. A reconstruction of the Bildung perspective of POPBL must, however, take attempts to formulate new understandings of the Bildung in the era of postmodernism and globalization as its point of departure if it is to contribute to new forms of social engagement in a world understood as a community of 'strangers'.

References

Bauman, Zygmunt. *Postmodern ethics.* Oxford: Blackwell Publishing, 2002.

Biesta, Gert. 2006. *Bortom lärandet. demokratisk utbildning för en mänsklig framtid* [Beyond Learning. Democratic Education for a Human Future.]. Trans. Gunnar Sandin, ed. Gert Biesta. 1st ed. Vol. 1. Denmark: Studentlitteratur.

———. 2002. How general can bildung be? reflections on the future of a modern educational ideal. *Journal of Philosophy of Education* 36, (3) (08/21): 377-90.

de Graff, Erik, and Anette Kolmos. 2007. History of problem-based and project-based learning. In *Management of change. implementation of problem-based and project-based learning in engineering.*, eds. Erik de Graff, Anette Kolmos. 1.th ed., 1-1-9. Rotterdam: Sense Publishers.

Gur-ze'ev, Ilan. 2002. Bildung and critical theory in the face of postmodern education. *Journal of Philosophy of Education* 36, (3) (08/21): 391-408.

Illeris, Knud. *Modkvalificeringens pædagogik. problemorientering, deltagerstyring og eksemplarisk indlæring.* København: Unge pædagoger, 1985.

———. *Problemorientering og deltagerstyring. oplæg til en alternativ didaktik.* Copenhagen: Munksgaard, 1976.

Kluge, Alexander, and Negt, Oskar. *Offentlighet og erfaring. til organisasjonsanalysen av brogerlig og proletarisk offentlighet.* Frankfurt am Main: Suhrlkamp Verlag, 1974.

Lovlie, Lars. 2002. The promise of bildung. *Journal of Philosophy of Education* 36, (3) (08/21): 467-86.

Nordenbo, Sven Erik. 2002. Bildung and the thinking of bildung. *Journal of Philosophy of Education* 36, (3) (08/21): 341-52.

Savin-Baden, Maggi, and Howell Major, Claire. *Foundations of problem based learning.* Maidenhead Berkshire: Open University Press McGrawHill Education, 2004.

(F.18)

Creativity and Competitiveness: Analysis of the Factors Facilitators or Inhibitors from a Case Study with and Artist

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Abstract

In a world of constant change we are faced with the challenge of creativity, and, parallel to this, the growing necessity of adaptability of the individuals. In the present time, where the rule in the organizations started to be the change, the creativity passes not only to be desired as looked for, pledging the companies in incorporate in its culture. So, with this work, we intend to contribute for the debate on the creativity in the organizations, that in recent years has tax, wants of the point of view of psychology, wants of the point of view of other sciences, as sociology, the management or the economy. The present discussion is about the identification of factors facilitators or inhibitors to the expression of the creativity, significant for the enterprise sustainability. The data come from interview conducted with an entrepreneur, internationally recognized for his art, in order to do a qualitative analysis in a life story. The thematic central of this poster is to call the attention for the creative process in its relation with the competitiveness. Key-word: creativity, factors facilitators, factors inhibitors.

Keywords: Creativity, facilitators, inhibitors.

Creativity and Entrepreneurship

In a society in constant change it is necessary to meet the various demands, through innovations and adaptations of organizations and resource management.

Thus, the use and interpretation of information changes and requires an increasing creativity that seeks to adapt and/or modificate family, school and work environments.

Creativity is a complex matter and the first references to the theme occur in the Bible and with the philosophers of ancient times, as a way of trying to explain the originality of great creative works (Kneller, 1978).

The major impetus in the study of creativity takes place in 1950, when Guilford at a conference entitled Creativity emphasized the absence of studies on the subject, stating that only 186 of 121000 articles in psychology addressed creativity. From then on research rose, mainly in the United States, attracting the attention not only of psychologists, but also philosophers, mathematicians, engineers and sociologists (Isaksen, 1995).

This movement goes from a minimalist view of creativity as an exclusive attribute of artists and geniuses, to a comprehensive approach, which also admits creativity in ordinary people in their daily lives. Different authors wrote on the subject, emphasising:

- Amabile suggests that the creative production is a result of the interaction of variables that arise from the social, cognitive and personality aspects (*apud* Morais, 2001).
- Sternberg e Lubart (1996) with the Theory of Investment, include environment and personal variables in creativity manifestation. The creative behaviour is taken as a result of the convergence of six factors identified as resources for creative expression: intellectual abilities, knowledge, cognitive styles, personality, motivation and environment.
- Csikszentmihalyi (2004) with the model of systems based on interactions of a system composed by three main parts: the field (social system), the scope (culture) and the individual (genetic patrimony and personal experiences).

In the present days, the concept of creativity reflects the different theoretical perspectives of the issue, from the focus in the person, to the most comprehensive approaches, representative of a systematic vision of the creative process. Awareness of a complex and multifaceted phenomenon, (Isaken, 1995) that can not be explained only by a component or aspect and that always involves novelty, gaines space.

This conceptual issue refers to the basic elements of the creative process - person, process, product and social context (Morais, 2001) - and therefore, a parallel can be drawn between entrepreneurship and creativity. From our point of view there is a parallel structure in the entrepreneur, considering that his action is based on three elements: the individual, the task and organizational context.

Several authors have helped to clarify the concept of entrepreneurship (Max Weber, in the decade of 1930, McClelland, in the 70's or Schumpeter, in the 80's) looking for a consistent description of those that reach efficiency and efficacy balance in a creative and innovative way: the entrepreneur.

Going beyond the economic issue, Filion (1999) argues that the entrepreneur is the creative person, marked by the ability to set and achieve goals, conscious of the environment in which he/she lives and interacts, enabling him/her to identify business opportunities.

Methodology

For the study of a single case, we used the autobiographical narrative to collect the data. We considered the characteristics of the individual, recognized nationally and internationally for his work - photography - and who works as an entrepreneur. We asked him to produce a written document, free in form and style, and subject to a goal: narrate his own development as adult, considering the personal and professional aspects. The data were collected in 2005.

The content analysis was the technique used for understanding the autobiographical document. We used simple quantification and registration of events and for this purpose built a system of categories, by a process of *a priori* definition (Vala, 1989). We used the model of Sternberg and Lubart (1996), offering a range of factors seen as necessary resources to the expression of creativity as facilitators or inhibitors. We created 6 categories, 44 units, with a total of 109 occurrences.

Table 1: Classes in content analysis.

CATEGORIES	**DESCRIPTION**
Intelligence	Theoretical and practical skills, to: redefine problems, analyze and recognize good ideas and persuade about the value of own ideas.
Intellectual Styles	Form as the person operates and uses its intelligence.
Knowledge	Formal and informal; acquired by books and the like and through dedication.
Personality	Set of features such as: readiness to take risks, self-confidence, tolerance to ambiguity, courage to express new ideas, perseverance and self-esteem.
Motivation	Driving forces for the creative performance; focus on the task.
Background	Environment interaction with the individual facilitates creative expression.

The Results

This communication is limited to comment on the results concerning the characteristics of individual and environmental context that act as facilitators or inhibitors of creativity. For this we frame the case and the narrative and then present the data relating to the facilitating or inhibiting factors for the expression of creativity of the person concerned.

Table 2 : The person.

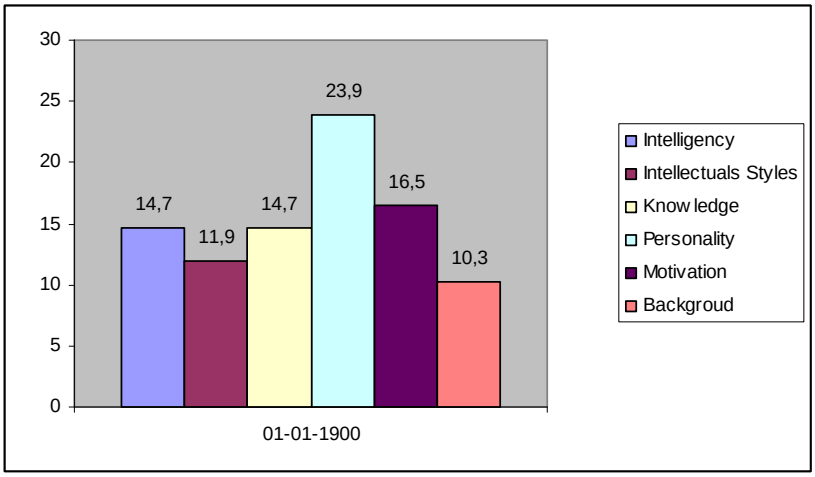
- He is 56 years old and he is a photographer.
- He has huge eyes and a slow way of speaking.
- Originally from Lisbon, lived in Evora from 4 to 17 years, having decided to leave, and cross the border to Paris as a clandestine. Here discovers a taste for cinema and for six months saw an average of three films a day. It was an important moment in his training as a photographer.
- He lived and studied in Holland, where he first got public recognition of his work. In 1993 returned to Portugal and installed in Alentejo, where he grew up. Evora for him is a reunion and thus photographs the Alentejo landscape; also concerns with the sociocultural reality that surrounds him.
- He doesn't capture moments and each photo requires a commitment, before and during the time of registration.
- The following is the darkroom, where he (re)photographs.
- Rich in speaking as in writing; writes as he photographs.

(Note prepared by the authors, from the oral and written contact with the individual)

The autobiographical narrative was in a dense text, rich in form and style, wich in itself presents aesthetic value. Thoughts associated with images, concepts and metaphors focused on central and decisive moments that revolve around a spirit of initiative based on a statement of aesthetic, cultural and rational reality, where the person occupies central place.

The analysis of the data came from reassembly of the narrative. There is a story told in the course of life based on the definition and implementation of goals and projects, a constant in the way of being of the subject. The more emphasized elements are related to personality, followed by those related to the context and motivation; intelligence and knowledge are in an equal position and slightly above the cognitive style. Consider:

Chart 1: Facilitators or inhibitors of creativity.



The individual personality is a predominant factor and facilitator in the expression of creativity. While the social and cultural context has been favourable, it appears that it was intentionally sought; geographic mobility and therefore the social, cultural and historical changes relate to an intention and an individual motivation. The family context and outwards – Portugal in the decade of 1970 - was not particularly stimulating, which underlines the self-determination. Evident personality traits are initiative, dedication and persistence. These are characteristics that support and lead to initiate and manage a creative and enterprising process that is his.

His intelligence, translated, among others, in a theoretical and practical ability to analyze problems, set goals and recognize opportunities and solutions will have stimulated his search based on a urge for creative performance. Focus on the task is a mobilizer, wich gets him to take risks and have confidence in himself, together with perseverance, ruling personal and professional growth.

Trough work and interaction he acquires, explores and uses knowledge in a dynamic process of doing, accomplishment and entrepreneurship. He perceives less favourable environments as challenges and opportunities and even the more adverse won't defeat him. Revealing serenity and wisdom, typical of whom who has chosen a path full of positive and negative experiences, but clearly stimulating the expression of his creativity.

In his life story he emphasizes elements related to these aspects. Consider:

> I spoke to many people, from the very beginning photograghy has been my great concern; when I have nothing to do I invent; in this I find that; always worked very hard; there are shadows because there is light.

Conclusions

There are different ways of people gaining ownership over things, knowledge, practices and rules. These different forms of ownership also promote ways of perceiving and change what surrounds us. The development of the person thus depends on time, space and the symbiosis he establishes with the environment. Therefore it appears that the development of creativity and its expression depends, beyond the individual talent, on access to existing resources.

Shown by the analysis, it also suggests his individuality and self-determination. This artist and entrepreneur combines crossed features, subjacent to the creative process in its relationship with entrepreneurship. Indeed, in recent investigations businessmen are seen as subjects with specific characteristics (Gonçalves, 2000), such as creativity, persistence and ability to lead and control.

These characteristics are part of the individual presently studied; they sustain him and prompt him to action, to choose and make decisions. They link to his availability facing requests, to opportunities demand and to motivations, behaviour attributes and character required by creativity (Sternberg &Lubart, 1996).

References

Csikszentmihalyi, M. (2004). *Creatividad: El fluir y la psicología del descubrimiento y la invención*. Barcelona: Ediciones Paidós.

De La Torre, S. (1993). Creatividad *plural: Sendas para indagar sus múltiples perspectivas*. Barcelona: PPU

Filion, L. (1999). Empreendedorismo: empreendedores e proprietários-gerentes de pequenos negócios. *Revista de Administração, 2 vol.* 34. S. Paulo: FEA/USP.

Guilford, J. (1995). Creativity. In M. Joyce, S., Isaksen, G. Puccio, F. Davison & C. Coppage (Eds.), *An Introduction to Creativity*. Acton, MA: Copley Publishing Group.

Isaksen, S.G. (1995). Conceptions and misconceptions of creativity. In M. Joyce, S., Isaksen, G. Puccio, F. Davison & C. Coppage (Eds.), *An Introduction to Creativity*. Acton, MA: Copley Publishing Group.

Filion, L. (1999). Empreendedorismo: empreendedores e proprietários-gerentes de pequenos negócios. *Revista de Administração, 2 vol.* 34. S. Paulo: FEA/USP.

Kneller, G.F. (1978). *Arte e ciência da criatividade* (5a.ed.). São Paulo: Ibrasa.

Martinez, A. M. (1997). *Criatividade, personalidade e educação*. Campinas: Papirus.

Morais, M.F. (2001). *Definição e Avaliação de Criatividade*. Braga: IEP Universidade do Minho.

Sternberg, R. J. (2000). *Inteligência para o sucesso pessoal: como a inteligência prática e criativa determina o sucesso*. Rio de Janeiro: Campus. (Obra original publicada em 1996).
Sternberg, R.J. & Lubart, T. (1996). Investing in Creativity. *American Psychologist*, 5 (7), 677 – 688.
Vala, J. (1989). A análise de conteúdo. In A. S. Silva & J. M. Pinto. *Metodologia das ciências sociais*, (2ª edição), 101-127. Porto: Edições Afrontamento.

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(F.19)

Obstacles Against Creativity in Family and School Environments: A case study about Kuwaiti primary students

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A large number of scientists such as Guilford and Torrance and others paid a lot of attention to creativity. Their studies showed that we cannot neglect creativity because it is the back bone for the nation in order to achieve its need and conflicts in both the recent age and the coming ones. The two researchers have presented the obstacles of creation, which are related to family environment. This is because there is a type of parents who used to accustom their children to receive ready-mode solutions for all problems or they do not encourage them to have new experiences and overwhelm them. Then, they have presented the obstacles of creation, which are related to school environment namely: school administration teacher, school and curriculum. After that, they have presented the obstacles of creation, which are related to society; finally both of them presented the obstacles of creation, which are related to mass media. The role they play is as great as the other organizations of education concerning developing or hindering creation for children.

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(F.20)

Sayed Mahdi Golestan Hashemi, Educational Creatology: TRIZ and Creative Learning: Creatology, refer to the consolidated , comprehensive, multi-disciplinary independent science of Creativity and Innovation, that included many sub-disciplines for extensive integrated considering of all studies and researches of various aspects of Creativity, Creative & Generative thinking , Creative & Inventive Problem Solving, Creative Design, Invention and Innovation by different scientific approaches and methodologies in all of the fields. Creatology included many sub-disciplines, such as Psychological Creatology, Sociological Creatology TRIZical Creatology, Bionical Creatology, Bioiscical Creatology, Managerial Creatology and Educational Creatology. Educational Creatology, included all aspects and issues of creative education and learning, creative instruction, creative curriculum, creative classroom, creativity and creative problem solving education, and so on. Development of creative learning is an important aim of educational activities in schools and universities. Creative learning refer to a creativity-based learning and development of creativity, creative problem solving and innovative skills and capabilities of learners. TRIZ (Russian acronym for the theory of inventive problem solving that was developed by great creatologist Genrisch Altschuller) is an extensive and rich source for designing of an effective and excellent curriculums and instructional programs for creative learning development. The approach of "TRIZ-based Creative Learning" is based on the TRIZ concepts and methodologies, such as 40 principles of invention, and ARIZ (Russian acronym for algorithm of inventive problem solving). This approach consider cognitive, perceptual, motivational and other psychological and educational characteristics of learners. The approach is expansive to high school, college and university.

(F.21)

Enhancing Creative Productivity by Using 4E-C Learning Model for Scientifically Gifted and Talented Students

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Abstract

This study was aimed at enhancing creative productivity for scientifically gifted and talented (G/T) students by using the 4E-C learning model. This new learning model was based on the three-ring conception of giftedness, enrichment triad model, and modeling method. It consists of 4 phases: encouraging issues, experiments for modeling, creation of new model, and exhibition. Students worked in small groups doing projects to create new physics models out of the students' own interest and reading of contemporary physics journals. Students also have opportunities to present their creative products to improve their communication skills. The 4E-C learning model was used as an elective physics course for 22 scientifically G/T students in grade 10 for 40 periods at Mahidol Wittayanusorn School, the science school for G/T students in science and mathematics in Thailand. The results indicated that after G/T students had learned through the 4E-C learning model, their creative productivity and attitudes toward physics were significantly higher at the .01 level. G/T students thought that learning activities were very interesting and challenging. Moreover, the teachers participating in this study had opinions of this learning model that students could fulfill their high potential in science by using this model, especially their creative productivity.

Introduction

Thailand's National Education Act of 1999 has the rights of high ability students to develop these students to their fullest potential. Schools are required to provide an equal educational opportunity for all gifted and talented (G/T) students. G/T students are entitled to the right of educational experiences appropriate to their level of development. For truly equal opportunity, a variety of learning experiences must be made available at all levels, so that all children can develop their special skills and abilities to the utmost. All students have individual learning styles, interests, motivations, career goals, development levels, and socio-cultural conditions so a school needs to have many types of programs to meet the students' needs. However, the serious problem is that teachers do not have a sound understanding towards the design of teaching and learning strategies for nurturing G/T students, especially in science.

The interesting issue in science education presented at the annual meeting of National Association for Research in Science Teaching (NARST), Philadelphia, PA (NARST. 2003: Abstract), mentioned that physics was the least enrolled course in United states high school science. Similarly, in Thailand physics enrollment is still a problem. Physics is thus a very important field which faces various problems. For example, Physics teachers still teach physics through rote-memory and lecturing while laboratory and students' products which are highly critical to enhance thinking skills of students are the least emphasized.

Today there are some programs and strategies for the nurturing of giftedness and talents in science. Renzulli (Renzulli. 1994: 147–151) is the one who developed the enrichment triad model. This model is probably the best known and most widely used model for guiding what to do for gifted students. This model consists of three interrelated types of enrichment: Type I: general exploratory activities (enrichment), Type II: group training activities (process), and Type III: individual and small-group investigations of real problems (product). These three types of enrichment in nature are always unnecessary to be sequential, but they can flow freely from one to the other. The students may move from a type I activity to type III, and from there back to type II. Patricia and Miller (Patricia; & Miller. 2000: Abstract) surveyed the practices of teachers of G/T students. The survey showed that Bloom's Taxonomy of Educational Objectives was used by most teachers; the second most used was Renzulli's Enrichment Triad; the third was Parnes' Creative Problem Solving; and the fourth was Taylor's Multiple Talents. For innovative programs, Nina Buchanan and Bill Woerner (Buchanan; & Woerner. 2002: Abstract) indicated that in the past the comprehensive high school model worked well for many G/T and other students. They examined 5 high schools that successfully met the needs of G/T students

through innovative curricular programs featured with small learning communities and supportive structures such as small advisory groups, real world connections, authentic assessment, and teachers who facilitate learning. Schools and teachers should understand about what feature programs are available and develop program models or strategies that depend on the context of their school and students. The center for Gifted Education at the College of William and Mary (Van-Tassel-Baska. 1998:6) has, over the past six years, spent considerable time addressing issues of appropriate science curriculum and instruction for high ability students. They found that one of the important components is the emphasis on inquiry. The more students can construct their own understanding about science, the better they will be able to encounter new situations and apply the appropriate scientific processes to them. There are instructional models based on inquiry method or learning cycle. One of those important instructional models that are useful for physics instruction is modeling method or modeling cycle. Malcolm Wells and David Hestenes (Wells, M.; Hestenes, D.; & Swackhamer, G. 1995: 606-619) showed that this model helped students to construct and use scientific models to describe, explain, predict, and control physical phenomena. Also, the modeling method can yield better student's understanding than alternative methods of instruction. The modeling method has two stages, involving the two general classes of modeling activities: Model development and model deployment. *Stage I* is designed to lead students systematically through the four main phases of model development: *description, formulation, ramification, and validation*. *Stage II* is devoted to deployment of the model developed in stage I to a variety of new physical situations in a variety of different ways. This helps free the students' understanding of the model from the specific context in which it was developed.

In addition to develop learning and teaching method for scientifically G/T students should be the integration of those processes. In this study was to develop new learning model following those methods to enhance creative productivity for scientifically G/T students. For this new learning model was based on the three-ring conception of giftedness, enrichment triad model, and modeling method. This learning model was the 4E-C learning model. There were 4 phases. All phases motivate G/T students, enhance them how to create new models through doing their own projects in content of Energy in daily life. It also gave G/T students an opportunity to present their products in a real exhibition. This learning model also guided the teachers as well as the schools or organizations that involved in gifted education to help G/T students to improve not only their creative productivity, but also preparing them to become a scientist or a specialist in the future.

This study attempted to answer the following questions:

1. Was students' creative productivity higher after they learned by using the 4E-C learning model?
2. Was students' attitude toward physics higher after they learned by using the 4E-C learning model?
3. What were students' learning reflections after they learned through activities in the 4E-C learning model?
4. What were students' opinions toward using the 4E-C learning model?
5. What were teachers' opinions and roles toward using the 4E-C learning model?

Methodology

This study employed both quantitative and qualitative methods. The design was one-group pre- and post-tests design. The researcher studied related literature that involved in developing teaching and learning science, program development for scientifically G/T students, program to enhance creative productivity, definition of giftedness, definition of scientifically G/T students, identification of G/T students, and assessment strategies. There were a survey of 144 scientifically G/T students' opinions of physics content and journals by using questionnaire developed by the researcher. Five experts in gifted education were interviewed on what characteristics should be developed in scientifically G/T students. After that, the researcher conducted a survey of 10 teachers' understanding about G/T services by using Sherry's G/T service questionnaire. She then developed the new learning model: the 4E-C learning model, based on the three-ring conception of giftedness, enrichment triad model, and modeling method. The 4E-C learning model developed by the researcher was administered to 16 scientifically G/T students in grade 10 as an elective physics course, Energy in Daily Life course, at Mahidol Wittayanusorn School , the first science school in Thailand, for 40

periods in the second semester of 2006 as a pilot study. As for the main study, it was administered to 22 scientifically G/T students in grade 10 for 40 periods in the first semester of 2007. The 4E-C learning model is shown in Figure 1.

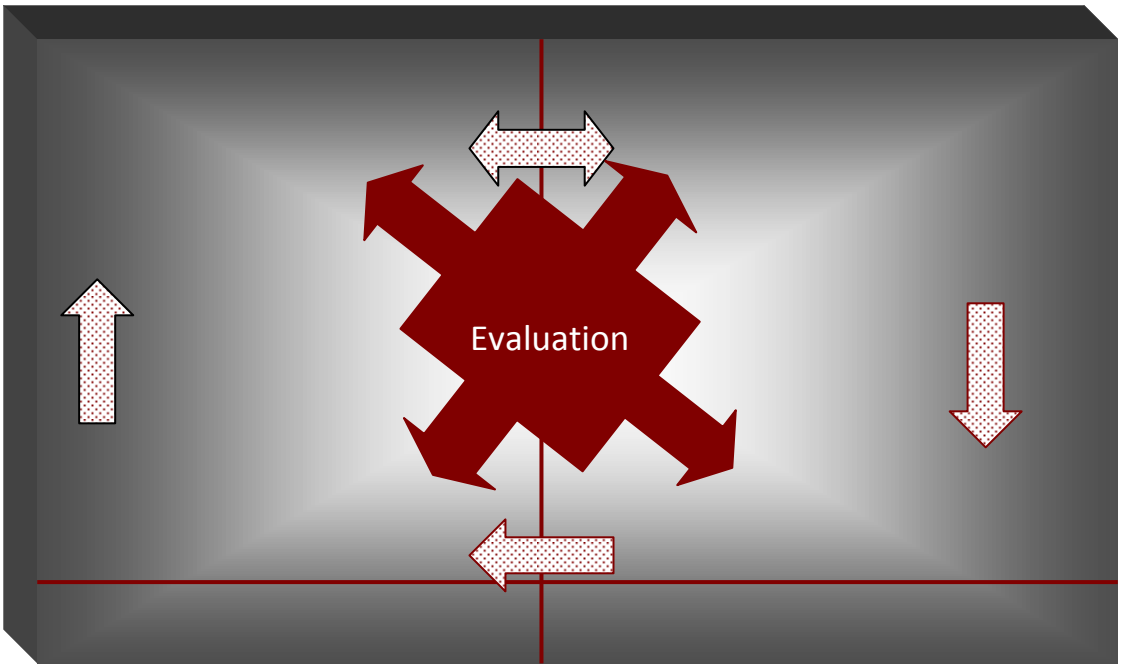

Figure1: The 4E-C learning model.

Phase 1: Encouraging Issues, it is the beginning phase of this model. First of all, a teacher divides students into small groups and, after that, assigns them an interesting topic to study. The teacher allows students to study and search any issues or information of that topic by themselves. Then, each group presents their issues of their interest and discusses about that topic in the classroom. In the final part of this phase the teacher and students together conclude topics presented by student with summaries. In this phase the teacher acts as a moderator of discussion. The teacher also observes students' presentations and discussion in the classroom.

Phase 2: Experiments for modeling, this is the second phase of the model. It is a guided inquiry phase. There are two teachers in this phase. The first teacher is physics teacher while the other is physics laboratory assistant teacher. Teachers are facilitator. First, the teacher divides students into small groups and explains how to create models in physics by following the modeling method. This phase consists of creative experiments designed to enhance modeling. Students can practice designing the experiments and modeling both physical and mathematical models on their own. After that they present their experimental designs and models to the class. The teachers give them suggestion to improve their experimental design. In this phase the teachers assess students' product and presentation by using Student Product Assessment Form.

> ***Note*:** these two phases can be alternately switched back and forth until the teacher are convinced that students are ready to create their own real physics models by checking student's creative productivity scores. These scores are assessed by Student Product Assessment Form. If students' scores in the last activity are higher than the first one, then students can proceed to do project in phase 3. Also, the teachers consider from students' learning reflection form that shows students' learning reflection whether or not they are ready to do project in phase 3. Then, students are allowed to go to the next phase. These two phases should consume 1/3 time of all phases. Before going to the third phase students should come up with questions involving problems in phase 1 and 2. Teacher should help student by asking questions that can guide students to think about variables in their projects in phase 3.

Phase 3: Creation of new model, this is the third phase of the model. It is an independent inquiry phase. Teacher divides students into small groups. Each group finds out which topic they want to

create a new model for. Students are to do science projects. They design experiment to create new model or adapt experiments in phase 3 to create model in the new situation. Teacher should give them advice on doing experiment and creating physics model. This phase should allow students to have enough time to do their products. Teacher should find many resources for students to study and search for any information on their products. Teachers assess their products by using Student Products Assessment Form.

***Note*:** there should be at least three teachers for assessing students' creative productivity by using Student Product Assessment Form.

Phase 4: Exhibition, this is the last phase. Teacher should arrange the exhibition for presentation of students' products. This phase gives students an opportunity to present and share their own products to the class. This phase makes students feel more confident with their ability and gives them practice in communication skills. Teachers assess this phase by checking the presentation item in Student Product Assessment Form.

The learning units were developed according to the 4 phases of the 4E-C learning model. There were totally 6 learning units in this model. There were 5 units in the first and second phase of the 4E-C learning model and the last unit in the third and the last phase. For assessment forms, the researcher developed student product assessment form based on Renzulli's Student Product Assessment Form and performance assessment form of Thailand's Institute of Promoting Teaching Science and Technology (IPST). It was used for assessing students' creative productivity. The researcher also developed a questionnaire to survey students' attitude toward physics ; it was adapted from the questionnaire of Jayne and Kenneth's an evaluation form for evaluating G/T students' attitude toward science for summer enrichment program, and students' learning reflection form. Moreover, the researcher developed student interview protocol and teacher interview protocol to interview their opinions toward the 4E-C learning model.

Teacher's Guide Book and Student's Guide Book were also developed. These books and assessment forms were considered content validity and construct validity by using index of correspond (IC).

For identification of scientifically G/T students this study followed the identifying process of Mahidol Wittayanosorn School. Identifying process of this school can be accepted as on par with identification process of international level. The identifications were as follows:

1. Students' GPA: Students must have GPA of science and mathematics not less than 3.00, and GPAX of every subject not less than 3.00.
2. Paper-pencil tests: 480 students who pass paper-pencil mathematics and science tests are accepted to the academic camp.
3. Academic camp: 480 students join academic camp for 4 days and 3 nights. While in the camp students do many science activities and also take three tests. There are unseen mathematics, creative science, and problem solving tests. Moreover, students take SAT, IQ, SDQ, and YSR test.

The criteria for identification as gifted students

1. T-score from SAT is not less than 60.
2. IQ score is not less than 110.
3. SDQ and YSR are not negative.
4. Top 240 students are selected by experts.

Implementing the 4E-C learning model, this study conducted a preliminary study by using 4E-C learning model with 16 scientifically G/T students in grade 10 for 4 weeks in the second semester of 2006 at Mahidol Wittayanusorn School. After that the researcher revised activities and calculated reliability of assessment forms. Then, it was conducted as the main study with 22 scientifically G/T

students in grade 10 at Mahidol Wittayanusorn School in the first semester of 2007 for 40 periods by using the 4E-C learning model as elective physics course, Energy in Daily Life course.

For assessment phase, scientifically G/T students filled students' attitudes toward physics before and after they learned through the 4E-C learning model. Students' creative productivity scores were compared between students' creative productivity average scores in the second phase and their scores in the third phase. Students in each group reflected their learning in each activity. After they were done in this course, students and teachers were interviewed their opinions toward 4E-C learning model.

Data was collected from two major sources: scientifically G/T students and participants. Quantitative data was collected from scientifically G/T students' creative productivity scores and students' attitudes toward physics. These data were then analyzed by using SPSS program to calculate reliability of assessment forms and t-test for testing hypothesizes. Qualitative data was collected from scientifically G/T students' learning reflection from each activity, student interview protocol, and teacher interview protocol after participation.

The Results

As for the results of this study after scientifically G/T students had learned through the 4E-C learning model, it was found that their creative productivity and attitudes toward physics scores were significantly different at the .01 level.

Table 1: The t-test results of students' creative productivity.

Test	M	SD	df	t	*P*
Pre-test	35.35	3.09	21	6.144**	.000
Post-test	39.47	0.37	21		

To see how different pre-test and post-test score of each student is, a graph of comparison of those scores is shown in Figure 2.

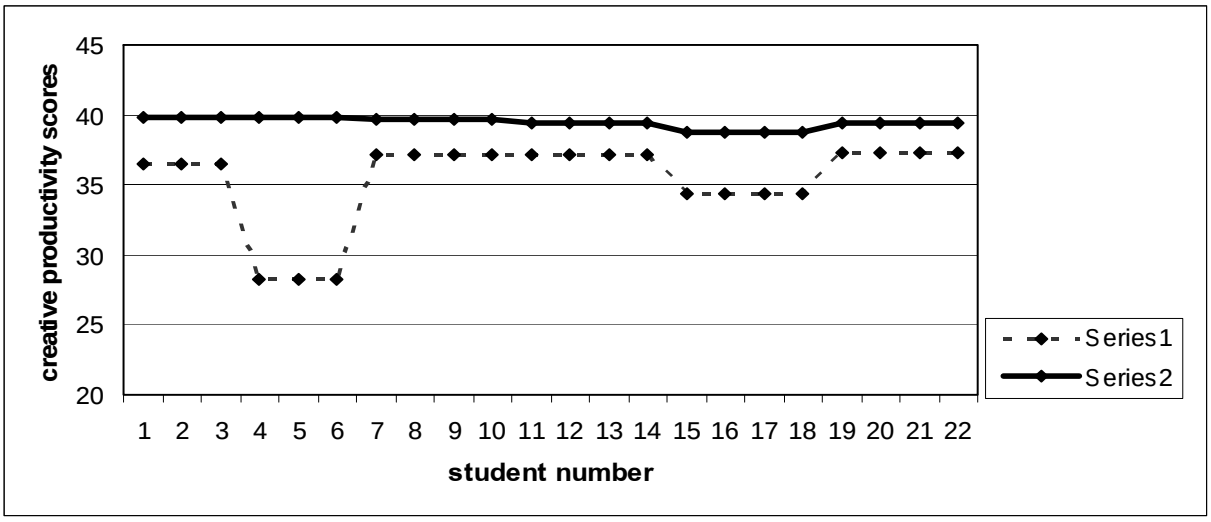

Figure 2: the comparison of students' creative productivity pre-test scores and post-test scores.

For students' projects there were 5 projects as follows:
1. The electric energy consumption in Mahidol Wittayanusorn School;
2. Study of the relation between light property and heat produced from light;
3. Nuclear electric power plant;
4. The effect of the angles on the efficiency of solar cell panel; and
5. The effect of electric line temperature on the rotation of motor.

The students' attitudes toward physics

The students' attitudes toward physics pre-and post-test scores and a paired-samples t-test was used to test the significance of difference of mean scores, the result of which is shown in Table 2.

Table 2: The t-test results of students' attitudes toward physics.

Test	M	SD	df	t	*p*
Pre-test	2.51	0.52	21		
Post-test	3.84	0.33	21	14.052**	.000

The t-test scores of students' attitudes toward physics indicate that the mean scores are significantly different at the .01 level. Therefore, the students' attitudes toward physics are significantly higher.

Figure 3 shows the difference of attitudes toward physics of each student before and after learning through the 4E-C learning model.

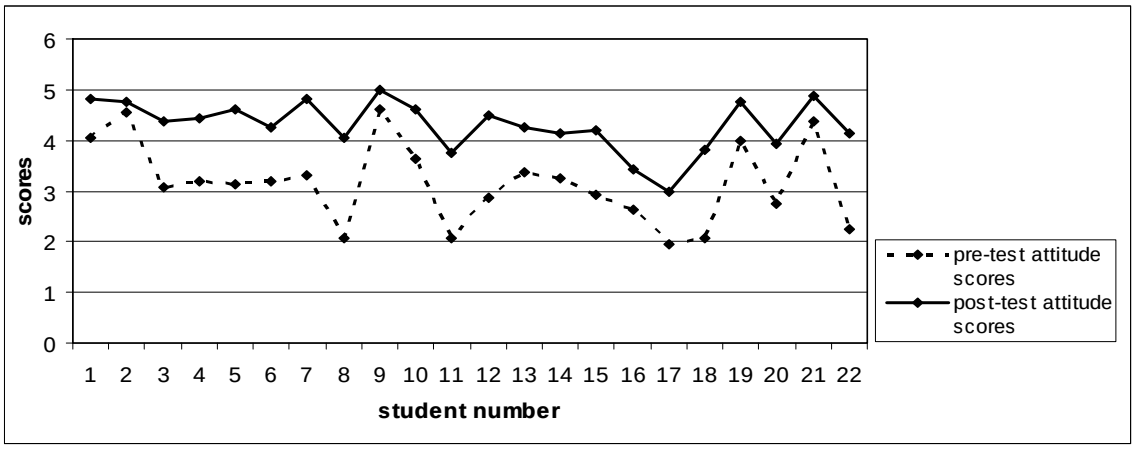

Figure 3: The comparison of pre-test and post-test students' attitudes toward physics scores.

The students' team assessment score

These data show that students in each group have no different team assessment score. This means if students have no different team assessment scores, students' creative productivity scores are confirmed. The students' team assessment scores are shown in Figure 4.

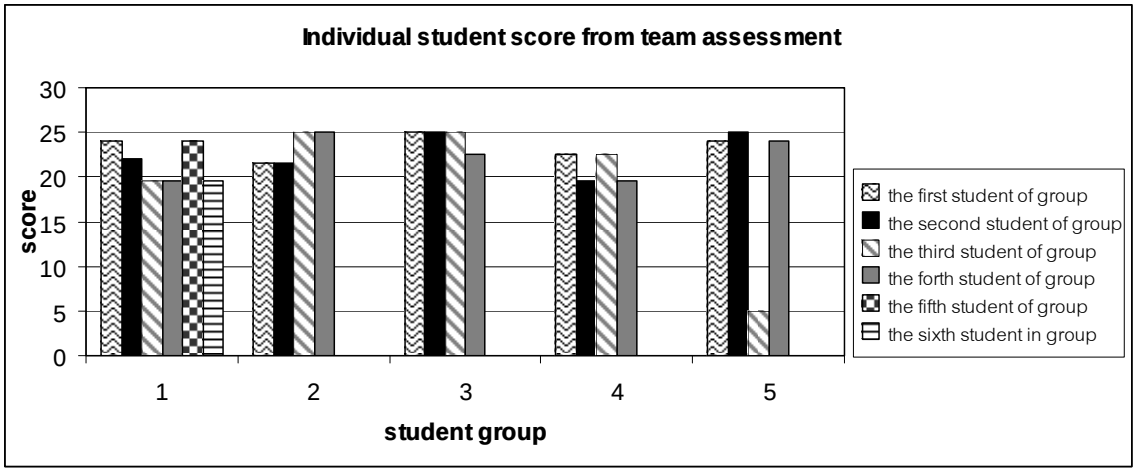

Figure 4: the comparison of students' team assessment score within group.

According to Figure 4, there is an obvious indication that each student in the same group works equally. There is only one student in the fifth group getting score less than other three students. The reason probably is that student was absent for one time because she had an appointment with a school dormitory officer. Since there were only 5 laboratory works, she could not make it once. This may effect on her team scores. In conclusion, nevertheless, they share and help each other to work in any given activity.

The students' peer assessment score

These scores strongly indicate that students' creative productivity scores from each project group assessed by teachers are reliable. The students' project scores assessed by teachers and students in the classroom were then compared, the results of which is shown in Table 3.

Table 3: The correlation of students' project scores assessed by teachers and students.

Score	df	r	t	*P*
From teacher and students	3	.861	2.932**	.061

According to Table 3, the correlation is not significant at .01 level. This result indicates that the students' projects scores assessed by teachers and students are not correlated.

The results of qualitative data were analyzed by using analytic induction are as follows:

Students' learning reflection

Group 1: students could satisfactorily explain concepts of each experiment, could adapt their experimental design by using other instruments, could explain what enrichment their knowledge was, could explain what new experiences they got from conducting experiments, and could also apply their learning from those experiments in the new situations.
Note: this group could apply their model to explain new situation such as they applied chain reaction physical model to explain the binary fission of bacteria.

Group 2: students could explain concepts. They could adapt their experimental design by using other instruments. They could also explain what the enrichment to their knowledge were, and explain what new experiences they gained from conducting experiments. They could apply their learning from those experiments in the new situations, but not all experiments. There was one experiment that they couldn't apply their learning in the new situation.

Group 3: students could satisfactorily explain concepts. They could adapt their experimental design by using other instruments, and could explain what the enrichment to their knowledge were, and could explain what new experiences from most of experiments were. They could apply their learning from some experiments in the new situations. Nonetheless, there were two experiments that they could not apply their learning in the new situations.
Note: this group could interestingly adapt experimental design; for instance, they adapted the experiment of Unit 1, energy transfer, by using light gate sensor instead of time counting because they could get more valid and reliable data.

Group 4: students could satisfactorily explain the concepts. They could adapt their experimental design by using other instruments, explain what the enrichment to their knowledge were, explain what new experiences were, and also apply their learning from those experiments in the new situations.

Group 5: students could satisfactorily explain the concepts. They could adapt their design by using other instruments, explain what the enrichment to their knowledge from most of experiments were, explain what some new experiences were, and also apply their learning from some experiments in the new situations.

***Observations of teaching and learning in the classroom*,** the results are shown in Table 4.

Table 4 : Observations of teaching and learning in the classroom.

List	**Result**
Students' behavior	1. Each group discussed topics about Thailand's energy issues and global energy issues. Each group presented their topics that students could discuss and debate by using scientific reasoning and also could integrate background knowledge to debate those topics. However, students wanted to have more time to discuss and debate. Each group was so active and stayed focus on doing first laboratory work. Students asked many
List	**Result**
Students' behavior	questions about activity. Each group was good at sharing work within the group. They shared and discussed many ideas all the time. They could finish this laboratory work on time and present their result. In the second laboratory work, each group discussed about issues on electric energy, especially electric power plants. They could tell the advantage and disadvantage of each kind of electric power plants. After that they conducted adapting motor experiment. In this activity, they had many problems with the instruments, but they did not give up and tried very hard to solve those problems. There was only one group that could overcome the difficulty. Other groups could not, but they made appointments with laboratory teacher to continue working outside schedule. One of these groups had an interesting idea to conduct experiment. They wanted to study the angle factor that effected to the rotation of motor. The teacher suggested that they could study this factor as a project. Finally, every group could solve the problem and succeed with excellent solution. Also, their presentation of laboratory work was equally good. In the third laboratory work, each group discussed issues about using heat in daily life. One of the interesting issues that they discussed was using geothermal energy to generate electricity. After that they conducted a laboratory experiment to convert mechanical energy into heat energy. But due to insufficient sets of some instruments, each group had to take turn to conduct laboratory activity outside schedule by arrangement with laboratory teacher. From observing them conducting this activity, every group showed task commitment and high motivation in doing this activity. They could understand how to use instruments so easily such as thermal sensor and presented the result of laboratory work very well. In the fourth laboratory activity, students discussed and debated issues about nuclear energy both its advantages and disadvantages, including nuclear energy power plants. Students played nuclear a energy post-it game to learn about nuclear energy from playing game. They liked it very much and looked so happy. After that they conducted creating
List	**Result**
Teachers' behavior	physical model of nuclear fission. They could so ingeniously create these models. Every group had different types of models. They could also come up with very good presentations. 5. In the fifth laboratory activity, students discussed and debated issues about solar energy. They were very interested in studying the real solar cell. After that they conducted laboratory experiment on what factor had an effect on solar cell. This laboratory experiment to work after hours needed a lot of time; they therefore took instruments back to their dormitory. They made appointments with the laboratory teacher to ask or get some advices. However, in this laboratory activity they could design laboratory experiment very well. Also, they could give a very good presentation. 1. In the first laboratory activity the teacher acted as a coordinator of discussion. He summarized students' ideas and concepts after discussion. He explained concepts of fundamental energy such as the importance of energy, types of energy, and the calculation for kinetic and potential energy, etc. While he was teaching these concepts, he also posed many questions to students. During laboratory work, he walked around while students were conducting laboratory activity and gave some advices. He also encouraged students to solve any problem that happened during activity. Moreover, he helped students to conclude ideas after they finished their presentations. For laboratory teacher, he

	facilitated instrumental need of the students. He also advised students how to use those instruments. 2. In the second laboratory work, teacher was coordinator of discussion. He also concluded students' ideas and concepts after discussion. He explained concepts of electric energy such as the importance of electric energy, sources of electric energy, current, voltage, resistance, how to convert any kind of energy into electric energy, how electric power plants work and so on. During laboratory activity there were many problems, so both teachers always walked around and helped with suggestion to students how to set up instruments. Laboratory activity teacher also made appointments with
List	**Result**
Teachers' behavior	students in each group to continue conducting laboratory activity after the scheduled hours. 3. In the third laboratory activity, teacher was coordinator of discussion. He explained about heat, transformation of different kinds of energy, calculation of heat, the use of heat, for example. During laboratory activity, laboratory teacher guided students how to use instruments, especially the temperature sensor that had to be connected to computer to make a graph and table of data. Students who could not complete the activity made appointments with the laboratory teacher to conduct laboratory outside the schedule. Also, they made an appointment for every group to present their laboratory results outside schedule. 4. In the fourth laboratory work, teacher moderated discussion. He explained about the definition of nuclear energy, nuclear reactions, nuclear energy power plant, their advantages and disadvantages, for example. He taught students by using a nuclear energy post-it game. During laboratory activity, he walked around to help students in case advice was needed (but none was sought). Moreover, for presentation, teacher joined the students to conclude ideas on nuclear energy. 5. In the fifth laboratory activity, teacher moderated the discussion. He asked students for explanation of how solar cell works. Then, after students studied about solar cell by using real solar cell panels on the roof of the school building, he helped students conclude of how solar energy can generate electricity by means of solar cell. He asked students a question on factors affecting solar cell working. Then, students conducted laboratory work on the factors affecting solar cell working to answer that question. Laboratory teacher arranged instruments for this experiment and suggested a little about how to use them. Then, both teachers told them of their schedules so that students could ask some advice about this experiment. Also, they made appointment with students to present their results of laboratory work.

Student interviews

Five representatives of each group were individually interviewed for 5-10 minutes after they had learned through this course. They were asked to express their opinions towards the 4E-C learning model. Results of the interviews were as follow:

Question 1: The opinions of students toward 4E-C learning model

Student 1: *"This learning model is interesting*".
Student 2: *"This learning model is new for me. I like it".*
Student 3: "*It is one of the interesting learning models that is good".*
Student 4: *"It's okay. It's better than other courses that usually use lecturing"*
Student 5: *"This learning model is very good because it allows me to learn from conducting laboratory experiment like scientist".*

Question 2: The opinions of students toward learning activities

Student 1: *"The most favorite activity is adapting motor. The first time I thought it was easy, but actually it was not. And I think that it was very challenging".*
Student 2: *"I think that activities were challenging, especially adapting motor".*
Student 3: *"I like all activities. The most favorite is the discussion about energy issues because we could debate about those issues".*
Student 4: *"The most favorite activity is conducting project".*
Student 5: *"I like all activities. For the most favorite activity is the study of the relation between kinetic energy and potential energy because it was the first time I could make physics model".*

Question 3: What students got after learning through this learning model?

Student 1: "*I know the method of creating physics equation that I've never known before*".

Student 2: "*I know how scientist creates model and how they work*".

Student 3: *"I know how to conduct project to create physics model*".

Student 4: "*I know more about contemporary issues about energy that Involved in our life and about conducting project*".

Student 5: *"I know how to create physics equation and know how scientist works and studies about the phenomena and fact*".

Question 4: The opinions of students towards assessment

Student 1: "*I think it was good that there was no test because we already had many tests in other subjects*".

Student 2: "*I like the fact that teachers told us what they would assess by using assessment form and I prefer this assessment than the test*"

Student 3: "*I like the fact that teachers allowed us to conduct project as The way of assessment because it was the one of comprehensive knowledge strategies*".

Student 4: "*I like to conduct project instead of taking tests and teachers assessed our performance".*

Student 5: "*I like this way of assessment because it could really measure our performance* and *because sometimes the paper test cannot measure students' real knowledge that actually some students can perform to create their products better than someone who gains good score in paper test*".

Question 5: Students' recommendations

Student 1: *"I want more time to conduct laboratory activities and project and I want this course to add the teaching of statistics and also the teacher to conclude more about concept after doing laboratory work"*

Student 2: *"I think that we should have more time to conduct project".*

Student 3: "*I want to conduct more laboratory experiment and I want teachers in other physics courses to allow us to conduct more laboratory work*".

Student4: "*I know that other physics course can't have many laboratory activities because there are a lot of content. But other elective physics courses should focus on conduct in laboratory activity like this course*".

Student 5: "*I think that this kind of course should extend to other subject such as chemistry, biology, and other physics course. I want other subject to be taught through by conducting experiment".*

According to student interview, students were positive of the 4E-C learning model. They know how to conduct experiment like scientist and also to creative physics model. They thought that other subject should use this learning model to teach students.

Teacher interviews

Participating teacher in teaching physics content and laboratory activities:

"I think that the objectives of the 4E-C learning model could encourage scientifically G/T students' creative productivity because they could conduct experiment, especially new project. Students' outcomes were very good and in accord with expected learning outcomes. As for content, it was suitable because this course didn't focus on content, but focused on creating scientific model. The resources of this course were good because students could search and find information by themselves. The assessment form was very good. They could directly assess students' creative productivity. The results from assessment could identify students' creative productivity".

Participating teacher in physics laboratory activity:

"I think that these objectives could improve scientifically G/T students' creative productivity. Students' conducting experiments and projects were excellent and in agreement with expected learning outcomes. The content of this course was suitable. The learning resources were various and new. The assessment form was good and easy to assess. So I think that this learning model was very good and suitable to scientifically G/T students".

According to teacher interview, teachers have positive opinion of the 4E-C learning model. Teachers could have more understanding about the theory of giftedness and also how to develop learning unit to enhance creative productivity.

Conclusion

The research findings were concluded as follows:-

1. The 4E-C learning model was to use in the elective physics course, Energy in Daily Life. The researcher developed learning units following the 4E-C learning model phases. They were also based on the 4^{th} and 5^{th} standard strands of Thai National Education Standard. The 4E-C learning model consisted of 4 phases: 1) encouraging issues, 2) experiments for modeling, 3) creation of new model, and 4) exhibition. The 4E-C learning model was to enhance creative productivity by creating physics model both of physical and mathematical in nature for scientifically G/T students in grade 10. The students worked in small groups to discuss contemporary issues about energy and conducted experiments related to energy. These experiments were to create either physical model or mathematical model. Both of these activities were in the first and second phase of learning model that could be switched back and forth. Then, in the third phase, students conducted projects in small groups to create new physics model. After that they presented their projects in school in the last phase. The teachers facilitated extra time outside schedule among other thing, and assessed their products in every phase of the learning model.

2. Learning model implementation: After students learn through the 4E-C learning model as Energy in Daily Life, they have higher creative productivity scores. This hypothesis aims to test students' creative productivity after they have completed the 4E-C learning model, Energy in Daily Life. The pre-test and post-test scores were used to test this hypothesis by comparing the mean scores with a paired-samples t-test. The pre-test scores were students' average laboratory scores from the second phase of the 4E-C learning model and post-test scores were students' project scores from the third and the last phases. According to the t-test result, it was found that the pre-and post-test scores of students were significantly different at the .01 level. This indicates that students gained higher scores after they learned through 4E-C learning model. Students who learned through the 4E-C learning model, Energy in Daily Life course, have higher post-test attitudes scores than pre-test. This hypothesis aims to test students' attitudes toward physics after they learned through the 4E-C learning model. The pre-and post-test scores were used to test this hypothesis by comparing the mean scores with a paired-samples t-test. According to the t-test result, it was found that the pre- and post-test scores of students were significantly different at the .01 level. This indicates that students gained higher post-test attitudes scores than pre-test. The data of team assessment scores were to support that students' creative productivity scores are reliable if team assessment scores of each student are not different. According to these data, it was found that students who worked in the same group had no different team assessment scores. For qualitative data were collected through 1) interviewing students and classroom activity observations, and 2) observing classroom activities as follows:

2.2.1 Student interviews and classroom activity observations: according to the data, it was concluded that the students had positive attitudes towards 4E-C learning model. They also had learned how to create physics model and improved their creative productivity. It is obvious that they have gained scientific skills from their physics class, especially modeling skills and higher-order thinking skill that are so important to be developed in high ability

students in science. Moreover, the students not only improved their scientific skills, inquiry abilities in physics, and fulfilled their high potential, but also developed their searching skill, communication skill, and social skill. They also learned to be a leader in science. In addition, they were more self-confident. However, they want to have more time to conduct laboratory investigation and project. Also, they want to learn statistics to use for analyzing data from experiment. Students recommended that other subjects should use this learning model to teach students and not only focusing on lecture.

2.2.2 Teacher interviews: according to the data, it was concluded that the participating teachers had positive attitudes toward 4E-C learning model. They claimed that the 4E-C learning model was a good model of teaching physics for scientifically G/T students because it was the student-centered approach. In regard to the learning activities, they helped the students improve creative productivity, inquiry skill, scientific skill, leadership skill, and communication skill. In other words, students improved all the learning aspects, especially higher-order thinking. The teachers were also satisfied with teaching the students by using the 4E-C learning model because their students had learned physics from their daily life. This enables them to be aware of the importance of energy in their daily life. However, the participating teachers found some problems while teaching Energy in Daily Life. These problems were 1) limitation of instruments, 2) limitation of time, and 3) limitation of advisors for doing projects. In conclusion, the participating teachers are confident that they are able to apply the 4E-C learning model to teach other physics courses or topics.

Discussion

The following are discussions on the study results:

1. Students' creative productivity

In regard to the learning activities, students were allowed to focus on discussing and debating energy issues, conducting experiments of their own design as a small group, and creating physics model as well as design and conduct their own project to test their new physics model. The students then presented their findings' experiments and projects. As a result of these procedures, the students gained higher creative productivity. The result supports the article of Rutgers University (2006: 34-39) that claimed the role of model in physics instruction as being the effective approach in physics. Wells; Hestenes; & Swackhamer (1995: 606-619) also found that students who learned physics by using modeling method gained significantly higher score and had more understanding in mechanics. The result supports the findings of Tsai (1997: online) which found that enrichment model was an effective learning model for gifted students. Tsai studied primary students who participated in enrichment model pilot program based on Renzuli's enrichment triad model. Also, the result is similar to the finding of Cooper; Baum; & Neu (2004, 162-169) which found that G/T student in science who participated in "project high hope science program" that followed three procedures -identification, curriculum, and assessment - gained higher scores in science. Moreover, the result supports Van Tassel- Baska (1998, online) that claimed how planning science programs for high ability learners should focus on inquiry, higher-order thinking, and science process skill. The result support Alan Colburn (1997: 30-33) that learning cycle is a great strategy for middle school and high school science teaching. Also, it supports Mary M. Bevevino, Joan Dengel, and Kenneth Adams (1999. 275-278) that using the learning cycle format; the teachers can make learning meaningful for students and give students opportunities to use their prior knowledge and experiences to construct their own frames of thought.

However, the one important thing is that these G/T students already have high potential. They can learn very fast and have task commitment. So this learning model is one part that helps them to improve their creative productivity based on their high ability.

2. Attitudes towards physics

The result indicated that students have significantly higher attitudes toward physics scores. The finding supports the second research hypothesis. The result is similar to the findings of

Stake; & Mares (2001, 1065-1088) which found that science enrichment programs for gifted high school girls and boys improved confidence in science and motivation of gifted students.

3. Students' opinions

The opinions of students who learned through the 4E-C learning model were positive. Students thought activities of the 4E-C learning model, especially adapting motor experiment were interesting and challenging. They also liked conducting project because it was the integration of knowledge that led to become a creative product. Some students really liked discussion and debating. They had opportunity to improve their communication skill and become a leader in science. However, they wanted to have more time to discuss in the first phase and to conduct project in the third phase.

4. Teachers' opinions

Teachers thought the 4E-C learning model was a student-centered approach. This learning model encouraged creative productivity of students through conducting experiments and projects. Teachers understand about the three ring conception of giftedness. This result was different from the first survey that the researcher carried out before developing 4E-C learning model. Those results of the survey indicated that teachers didn't have good understanding about learning theory of G/T students. But after the two teachers used the 4E-C learning model to teach Energy in Daily Life course, they had more understanding about theory and strategy of teaching G/T students.

Recommendations

To further enhance the effectiveness of this learning model and to stimulate students to achieve in all expected learning outcomes, the researcher recommended the followings:

- The 4E-C learning model can be used for other physics courses or topics such as electricity, nuclear physics, mechanics, etc. Also, this learning model can be adapted for use in other subjects such as biology, chemistry, biophysics, etc. However, the teacher should consider content and objective to be suitable to those topics or subjects.

- For application of this learning model to be the most successful, there should be at least two teachers because the 4E-C learning model focuses on conducting laboratory activity. So students should have teachers to help them most of the time. The teachers have to set up and check some instruments for laboratory experiment before the class, and also to prepare extra and unexpected instruments just in case students ask for. The teachers should have enough time for students even outside class time. Also, students should have expert advisor to help them for conducting project. However, if there is only one teacher that is still manageable, but the number of students in classroom should not be too large. The teacher may integrate mathematical skill or mathematical program to teach students in phase 2-3 of the 4E-C learning model.

- The students' creative productivity scores were significantly higher. However, when each phase was considered there were still some problems. So further studies should allocate the time for each phase more suitably, especially the third phase should have at least three-fourth of the total time. Also, there should be more instruments in number. However, some of them are expensive, so the researcher should devise different activities that lead to the same outcome.

- Further studies should consider the content change from energy in daily life to other physics content or special topic content such as nuclear topics, renewable energy, biophysics, etc. Also, further studies should change the content from physics to be chemistry, biology, or any other science area.

References

Bass, G.M. and Ries, R.R. (1995, April). "Scientific Understanding in High Ability High School Students: Concepts and Process Skills." In*: paper presented at the annual meeting of the American Educational Research Association*. Retrieved September 27, 2005, from URL: http://www.ericec.org/digests/ed387319

Buchanan, N. and Woerner, B. (2002, Summer). "Meeting the Needs of Gifted Learners Through Innovative High School Programs." *Roeper Review*. *24*(4): 213-219.

Chan, D.W. (2000, Summer). "Identifying Gifted and Talented Students in Hong Kong." *Roeper Review*. *22*(2): 88-93.

Cognard, A., Bednar, R., Roweton, B., Ward, N., Wells, L. and Zweifel, D. (2000, January). "Procedures for the Identification of High Ability Learners Manual." Retrieved December 6, 2005, from URL:http://www.ericec.org/digests/ed448561

Coleman, M.R. (2003, June). "The Identification of Students Who are Gifted." Retrieved December 2, 2005, from URL: http://www.eric.ed.gov/ED480431

Cooper, C.R., Baum, S.M. and Neu, T.W. (2004, Summer). "Developing Scientific Talent in Students with Special Needs: An Alternative Model for Identification, Curriculum, and Assessment." *The Journal of Secondary Gifted Education*. *XV*(4): 162-169.

Dana, J. (1995, Winter). "Science Curriculum Review: Evaluating Materials for High Ability Learners." *Gifted Child Quarterly*. *39*(1): 36-44.

Erez, R. (2004, Summer). "Freedom and Creativity: An Approach to Science Education for Excellent Students and Its Realization in the Israel Arts and Science Academy's Curriculum." *Journal of Secondary Gifted Education*. *XV*(4): 133-140.

Halloun, I.A. (1996, November). "Schematic Modeling for Meaningful Learning of Physics." *Journal of Research in Science Teaching*. *33*(9): 1019-1041.

Halloun, I.A. and Hestenes, D. (1987, May). "Modeling Instruction in Mechanics." *American Association of Physics Teachers*. *55*(5): 455-462.

Hestenes, D. (1987, May). Toward a Modeling Theory of Physics Instruction. *American Journal of Physics Teachers*. *55*(5): 440-454.

Miller, L.C. (1994, September). "Integrating the CPS and Schoolwide Enrichment Models to Enhance Creative Productivity." *Roeper Review*. *17*(1):4-7.

Neu, T.W., Baum, S.M. and Cooper, C.R. (2004, Fall). "Talent Development in Science: a Unique Tale of One Student's Journey." *The Journal of Secondary Gifted Education*. *XVI*(1): 30-36.

Newman, J.L. (2005, Winter). "Talents and Type IIIs: The Effects of the Talents Unlimited Model on Creative Productivity in Gifted Youngsters." *Roeper Review*. *27*(2): 84-90.

Pyryt, M.C. (1993, September). "Helping the Scientifically Gifted." In*: Nurturing potential, proceedings of the society for the advancement of gifted education annual conference.* Retrieved September 29, 2005, from URL: http://www.ericec.org/digests/ed371559

Rash, P.K. and Miller, A.D. (2000, Summer). "A Survey of Practices of Teachers of the Gifted." *Roeper Review*. *22*(4): 192-194.

Reis, S.M. and Renzulli, J.S. (1991, Summer). "The Assessment of Creative Products in Programs for Gifted and Talented Students." *Gifted Child Quarterly*. *35*(3): 128-134.

Renzulli, J.S. (2005). "The Three-Ring Conception of Giftedness: A Developmental Model for Creative Productivity." In: Sternberg, R.J and Davidson, J.E. editors. *Conception of Giftedness*. Cambridge: Cambridge University Press.

Renzulli, J.S. (2006). "A Practical System for Identifying Gifted and Talented Students." Retrieved May 13, 2006, from URL: http://www.gifted.uconn.edu/sem/semart04.html

Rutgers University. (2006, January). "The Role of Model in Physics Instruction." *The physics teacher*. *44*(1): 34-39.

Sheppard, k. and Robbins, D.M. (2003, March). "Physics Last: A Historical Study of the Development of the US High School Science Sequence." Retrieved October 6, 2005, from URL: http://www.ericec.org/digests/ed413693

Stake, J.E. and Mares, K.R. (2001, December). "Science Enrichment Programs for Gifted High School Girls and Boys: Predictors of Program Impact on Science Confidence and Motivation." *Journal of Research in Science Teaching*. *38*(10): 1065-1088.

Stepanek, J. (1999, December). "The Inclusive Classroom: Meeting the Needs of Gifted Students: Differentiating Mathematics and Science Instruction." Retrieved October 25, 2005, from URL: http://www.ericec.org/digests/ed444306

Tsai, D.M. (1997, July). "An enrichment Model: A Study of Developing a Pilot Program for Gifted Students." In*: paper presented at the world conference of the world council for gifted and talented children*. Retrieved September 27, 2005, from URL: http://www.ericec.org/digests/ed413693

Van Tassel- Baska, J. (1993, Summer). "Scientific Experimentation". *Gifted Child Today*. *16*(5): 42-46.

Van Tassel- Baska, J. (1998, fall). "A National Study of Science Curriculum Effectiveness with High Ability Students". *Gifted Child Quarterly*. *42*(4): 200-211.

Van Tassel- Baska, J. (1998, September). "Planning Science Programs for High Ability Learners" Retrieved September 29, 2005, from URL: http://www.ericec.org/digests/e546.html

Watters, J.J. (2004, June). "In Pursuit of Excellence in Science." *Australasian journal of Gifted Education*. *13*(2): 41-53.

Wells, M.; Hestenes, D. and Swackhamer, G. (1995, July). "A Modeling Method for High School Physics Instruction". *American Association of Physics Teachers*. *63*(7): 606-619.

About the Author

Sumalee Waiyarod received a B.Sc. in Physics from Srinakarinwirot University (SWU), Bangkok, Thailand in 2001. After that, I studied for a graduate diploma in teaching profession at the Faculty of Education, SWU. All my undergraduate education was funded by the Royal Thai Government's Institute for Promotion of Teaching Science and Technology (IPST). Then, I became a physics teacher at Mahidol Wittayanusorn School (MWITS), Thailand's first science school for gifted and talented students. After a year at MWITS, I further my education in a doctorate level in the field of Science Education on which I received scholarship again from IPST. In this program I also spent my third year at School of education, Indiana University Bloomington, USA. In 2007, after graduation, I returned to work at the Department of Physics at MWITS where I teach physics for grade 10 level and also conduct research on development of teaching and learning in science for gifted and talented students. My research interests include creativity, inquiry-based learning, and physics education.

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Symposium I:

Planting the Seeds of Creative Education in Taiwan

Se-Hwa Wu Jing-Jyi Wu

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In Taiwan, education has been criticized for lack of creativity. Entrance examinations have always been blamed as the single most detrimental factor.

The Ministry of Education (MOE) is therefore under heavy pressure to promote creativity, and without hesitation must assume its responsibility to plant the seeds of creative education in Taiwan.

In 2001, the MOE commissioned a pilot study on creative education. The research project was a collaborative effort that incorporated six research teams. Each team observed and studied creative education at the elementary, junior high, senior high, and university levels, both in Taiwan and abroad, over a period of ten months. The project's results were the basis for the "*White Paper on Creative Education*", in which six action programs were initiated.

The six action programs to actively promote creative education in Taiwan are funded by the Ministry of Education. The scope of the "creativity education movement" ranges from the central government to local education bureaus and from elementary school teachers and administrators to university professors and executives. Most projects can be subsumed under "cultivating students' creativity", "creative teachers and teaching", "creative environment/campus", "creative course design", and "cross-discipline programs".

Starting from 2002, many special projects were planned and implemented at all levels of schools. But each major project must involve one or more professors as mentors.

To share with the participants of this conference, we, as organizers of the creative education program and directors of various implementation projects are proposing the following two related symposia:

Symposium I: Planting the seeds of creative education in Taiwan at the elementary and junior high schools. The first symposium includes three papers, namely:

(1) Ying-yao Cheng; Hsu-chan Kuo; Jing-Jyi Wu, **The development of Taiwan creativity education indicators**;

(2) Jason Chihyu Chan, **What kinds of teachers are helpful in cultivating creativity of students?**; and

(3) Hsu-Chan Kuo; Jing-Jyi Wu, **Teacher engagement and the perceptions of the effectiveness of the creative education program**.

The Development of Taiwan Creativity Education Indicators

Ying-Yao Cheng **Hsu-Chan Kuo** **Jing-Jyi Wu**
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Abstract

To implement 5 of the 6 initial action programs stated in the *White Paper on Creative Education*. 24 out of 25 county governments asked all elementary and junior high schools within their own districts to submit proposals for promoting creativity in schools. From 2005 to 2007, 1954 proposals were submitted for competition, and 1720 were granted. Altogether, more than 36,000 teachers and 1,200,000 students were involved. In order to evaluate the effectiveness of the implementation of creativity education, this research aimed to develop creativity education indicators. The indicators were selected principally from the intended objectives stated in the *White Paper on Creative Education* and other related documents and the results from interviewing three experts who were key planners of the programs. We then constructed a questionnaire consisting of 80 indicators, and an expert validity was established for the questionnaire before it was administered. The questionnaire was administered to 615 teachers and administrators. Using principal factor analysis, these indicators yielded 5 factors: *"Nurturing Creative Teachers"* consisted of 14 indicators (α = .938;) *"Cultivating Creative Students"* included 23 indicators (α = .959;) *"Building Creative Schools"* embraced 16 indicators (α = .961;) *"Establishing Creativity Database of Online Learning"* comprised 14 indicators (α = .971;) and *"Interdisciplinary"* consisted of 13 indicators (α = .960.) These 5 factors reflected the contents of 5 initial action programs for fostering creativity at the primary and junior high school levels and confirmed the intended objectives stated in the *White Paper on Creative Education.* The results suggested that the Taiwan Creativity Education Indicators Questionnaire was a reliable and valid instrument for evaluating creativity education.

About the Author

Jing-jyi WU obtained his Ph.D. in educational psychology from the University of Minnesota in 1967. Before and after 1967, he taught at the University of Minnesota in Minneapolis, CUNY - Queens College, and Yeshiva University in New York. He returned to Taiwan in 1972 to teach in and later chair the Department of Psychology of National Chengchi University (NCCU). In 1977, after serving for one year (1976-77) as a Fulbright Scholar of Theater Arts and Visiting Professor of Psychology at Grambling State University in Louisiana, Dr. Wu became Executive Director of the Foundation for Scholarly Exchange (commonly known as the Fulbright Foundation), a position he still holds. He is also artistic director of Lanling Theater Workshop and was a resident artist of the well-known La MaMa Theater in New York. He has written an educational film script in English, has had several plays produced in the U.S. and has been a director, co-director, and choreographer for several plays, as well as a judge for the Asian Pacific Film Festival, National Dance Competition, Golden Horse Film

Awards, Golden Bell (Television and Radio) Awards and other competitions. Four of Dr. Wu's books on psychology were for several years on Taiwan's best-seller lists. One of them, *Four Great Dreams of Youth*, was published in China in 2006. Altogether, he has written and edited twenty books, as well as many articles. Dr. Wu was board chairman of the National Chiang Kai-Shek Cultural Center, member of the Council for Cultural Affairs and President of the Chinese Theatre Association. He served as National Policy Adviser to the President of the Republic of China from 1996 to 2004. He is currently a member of the Arts Education Committee of the Ministry of Education and National Culture and Arts Foundation and a governor of the Federation of Asian Cultural Promotion. Currently he is teaching "Theories of Creativity" and "Leadership & Teams" at NCCU.

What Kinds of Teachers Are Helpful in Cultivating Creativity Of Students?

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Abstract

In order to promote education for creativity, people need to know what kinds of teachers and schools are helpful in cultivating creativity of students. The current study is based on a questionnaire survey originally designed to evaluate the conditions for creativity education in elementary schools and to write the "White Paper on Creative Education－Establishing a Republic of Creativity (R. O. C.) For Taiwan." A sample of 843 teachers, each from a different elementary school, assessed the proportion of creative students in their own school. They also estimated the proportion of both students and peer teachers with traits that are theoretically relevant to creativity. All traits were indicated by different items, which formed distinctive scales with satisfying reliabilities respectively. Statistical analyses revealed many significant and meaningful relationships, with the significance level set at .01. It was found that creative students tend to be intrinsically motivated, autonomously progressive, and to have a positive attitude toward the trial-and-error learning process. Extrinsically motivated students tends to be less autonomously progressive and to have a negative attitude toward trial-and-error. In addition, teachers who pursue personal growth for students and themselves, appreciate students' potentials, experimentally try out innovative changes on instruction and environments, and are intrinsically motivated to be a teacher, were found to be beneficial to creative students. Dogmatic teachers who value only academic grades have a narrow definition of "success," require students to obey, and resist change, increase the proportion of extrinsically motivated students and cultivate students' negative attitude toward trial-and-error.

Introduction

Personal creativity comprises personality, potential and power to produce something new and valuable. Therefore, the personal creative process is an interactive process intertwined with divergent and convergent thinking. Divergent thinking helps to produce new ideas while convergent thinking helps to judge the value of new things.

Children's Creativity and Related Variables

Children must produce something personally new and valuable in order to be creative. This type of creativity may be called "psychological creativity" or "mini c." Psychological creativity stands in the core of children's learning processes and serves as the evolutionary prerequisite for big creativity ("big c") in later life.

Boden (1991) divides creativity into two types: psychological and historical. Psychological creativity indicates a breakthrough in personal development, while historical creativity indicates a breakthrough in social/cultural history. Mandler (1995) views psychological vs. historical creativity as two directions of a straight line representing gradual creativity change. Personal creativity is on the left side, local creativity on center, and global creativity on the right side. If learning and education facilitate creativity, a child should theoretically move from the left to the right side of the line while growing up.

Although historical creativity or "big c" is important (Csikszentmihalyi, 1988, 1999), some scholars emphasize psychological creativity or similar concepts. Stewart (1950) argues that a person engages in creative thinking when he/she figures out an idea new to him or her, even though this idea has been proposed somewhere else. Thurstone (1952) also emphasizes that the creative problem-solving process implies creative strategy or solution new to the solver.

For primary school children, psychological creativity is more important and relevant than historical creativity. No one makes revolutionary historical contributions without a long history of progressive insights constructed, reconstructed, accumulated and restructured. Gardner's case study (1993) shows that all outstanding creative persons go through a long developmental creative process. For example, Picasso began drawing as a toddler and always experimented with new materials, new

forms, new combinations, new angles, new themes and new emotions. Early experimentation in childhood and adolescence formed the basis of his later outstanding achievements that continued throughout his life. Gruber (1981) estimates that a highly creative person produces one or two small insights per day, gaining more than five hundred insights per year, accumulating to more than five thousand insights in ten years in order to make a historical/cultural breakthrough.

Numerous trial-and-errors occur in such a long creative learning process described above. Evolutionary epistemologists (Campbell, 1960; Cziko, 1998) view genuine creative problem solving as coming from blind variation because prior knowledge does not contribute to this situation. Therefore, persons proposing more hypotheses and acting out trials have higher success rate than those who do less and try less. Thomas A. Edison is a well know example, having tried thousands of materials as glowers for the light bulb but failing. Some of his friends advised not trying anymore because he failed so many times. However, Edison replied that he did not fail at all because he learned thousands of materials not appropriate for a glower. The trial and error theory and the famous Edison case imply that students who learn from errors will be more creative than those who are timid or have a negative attitude toward trial-and-error. Students fearful of failure or making mistakes in the problem-solving process will avoid challenging tasks or give up difficult problems quickly. Consequently, they lower the probability of searching out a creative solution and learn less in the process.

Individuals in the creative learning process also internalize values and critical principles, which they utilize for judging, correcting, and appreciating their own works. Without such internalized critical principles, individuals cannot differentiate between good or bad works, and consequently, cannot feel like or dislike for their own works. Through comparing their current works with their previous works, creative individuals make self-comparisons and autonomous progress, freed from unnecessary and unstable interpersonal comparisons.

Self-focus rather than interpersonal comparison also provides intrinsic rather than extrinsic motivation. Intrinsically motivated persons work or learn for the sake of fun, meaning, passion, and satisfaction. Extrinsically motivated persons work or learn for reward, praise, money, fame, or averting punishment from others, organizations, or social institutions. In Taiwan, extrinsic motivators for children's learning typically include tangible rewards, exams, grades based on interpersonal competition, and aversion of punishment. Amabile's earlier works demonstrate extrinsic motivators as harmful to creativity (e.g., Amabile, 1983). Her later works differentiate two kinds of extrinsic motivators: controlling factors that interfere with attention and consume internal motivation, and information feedback that does not harm internal motivation but may enhance creativity with high intrinsic motivation.

Learning with high intrinsic motivation may cause "flow" experience in learner's mental state. Case studies of many creative persons reveal a common phenomenon (Csikszentmihalyi, 1996; Gardner, 1993; Gruber, 1981; Policastro & Gardner, 1999), i.e., almost all creative persons love their work—they are so attentive to and immerged in their work that they usually disconnect with others around them. They even forget eating and sleeping. Csikszentmihalyi & Csikszentmihalyi (1988) specifically point out that flow is a mental state composed of attention, joy, hard work, and disappearing self-consciousness. They propose that flow occurs when task challenge matches worker's ability. Flow mental state is possible for students in their learning task.

Teachers Helpful to Children's Creativity

Creative teachers can foster children's creativity because they not only create strategies, processes, and environments for nurturing children's creativity but also serve as creative models. A well-known Chinese proverb states, "education is nothing more than loving and being a model for students." The following theoretical analysis of creative teachers is based on ideas from many studies (e.g., Collins & Amabile, 1999; Csikszentmihalyi & Wolfe, 2000; Jay & Perkins, 1997; Sternberg & Lubart, 1999).

Creative teachers should first regard cultivating creative students as important instructional goals. Helping students develop self-confidence enables them to value their own creative works and wait for "selling high" opportunities (Sternberg & Lubart, 1995, 1999). Creative teachers also need to help students develop independent study and coping with frustration and failure because those abilities are necessary components of self-scaffolding and autonomous progress.

Progressive teachers not only need to help students make progress but also need to pursue their own personal progress, including professional growth. They should improve their pedagogical practice as a life-long learning process. In this process, they need open-mindedness, appreciation for other teachers' creative ideas, and willingness to change thinking patterns.

Individual differences exist and student potential is not always easily discerned. One of the most important aspects of creative teachers is the ability to appreciate student potential, mental strength, and multiple intelligence (Gardner, 1993). After recognizing students' natural gifts and creativity, teachers can create opportunities and platforms for students to display ideas and gain a sense of achievement.

Creative teachers manifest creativity in many situations. They may set up rich and colorful classrooms for their students to learn in an insightful environment and display creative works. They may actively develop action research, carry out teaching experiments, and foster instructional innovation. Their teaching ideas are abundant, their teaching strategies evolve every year, and their teaching styles lively.

Creative teachers love their job, are intrinsically motivated and have a passion for teaching. Lin (2002) finds that intrinsically motivated teachers frequently reflect on their teaching and make it more innovative. Consequently, they willingly cooperate with colleagues and participate in professional development, which strengthens team learning in an organization (Senge, 1990). They obtain a greater sense of achievement from teaching than other teachers and serve as good models for creative students.

Dogmatic teachers on the other hand, only emphasize academic grades. In their eyes, a student succeeds only by acquiring good grades. They emphasize standard questions and correct answers, punishing students who give wrong answers. They care more about interpersonal comparisons than personal progress. Their teaching repeats every year and does not change except with outside pressure.

Methodology

Subjects

A questionnaire survey evaluating creative education in elementary schools forms the basis of this study and for writing the "White Paper on Creative Education－Establishing a Republic of Creativity (ROC) for Taiwan." This study sent a total of 2601 questionnaires to each primary school principal in Taiwan. Questionnaire instruction for principals stated, "Please invite one of your non-administrative school teachers to answer this questionnaire. This study prefers objective rather than outstanding teachers to complete this task."

After cleaning a few invalid questionnaires with missing data, 843 valid questionnaires formed the basis of this study, occupying 32 percent of total questionnaires sent out. Respondent teacher age averaged 35 years and their service seniority averaged 10.5 years. Sixty-three percent of respondent teachers were female and thirty-four percent were males, roughly reflecting the gender distribution of primary school teachers in Taiwan. Teachers taught a wide range of subjects, including seven main learning fields of primary school children.

Questionnaire Construction

Part I: Questionnaire for Estimating Proportion of Creative Students

Based on theories and literature reviews of "Children's Creativity and Related Variables" described above, questionnaire items were written. For avoiding response set, negative and positive items were interweaved. Subject teachers were invited to judge "the proportion of students in your

school who fit each item description." Teachers indicated one number on a five-point-scale for each item. Table 1 shows labels of each point on the scale.

Table 1: Labels of Each Point on the Questionnaire Scale for Estimating the Proportion of Creative Students.

1	2	3	4	5
close to 0%	about 25%	about 50%	about 75%	close to 100%
almost no student	roughly 1/4 of students	roughly half of students	roughly 3/4 of students	nearly all students

(in your school fit the description of the current item.)

Part II: Questionnaire for Estimating Proportion of Creative Teachers

According to theories and literature reviews of "What Kinds of Teachers Foster Children's Creativity" described above, questionnaire items were designed. For avoiding response set, negative and positive items were interweaved. Considering that people assess their peers more objectively than themselves, this study invited subject teachers to judge "the proportion of peer teachers in your school who fit each item description." Teachers indicated one number on a five-point-scale for each item. Table 2 shows labels of each point on the scale.

Table 2: Labels of Each Point on the Questionnaire Scale for Estimating the Proportion of Creative Teachers.

1	2	3	4	5
close to 0%	about 25%	about 50%	about 75%	close to 100%
almost no teacher	roughly 1/4 of teachers	roughly half of teachers	roughly 3/4 of teachers	nearly all teachers

(fit the description of the current item in your school.)

Results

Questionnaire Components

This work applies Principal Component Analysis to the questionnaire for estimating the proportion of creative students and retains six components with eigenvalues greater than one. The components explain a 58 percent proportion of total variance. They are rotated by the Equamax method with Kaiser Normalization. Table 3 shows the rotated component matrix, where loadings lower than .40 are dropped from the table for easy reading.

Table 3: Rotated Component Matrix of Students' Creativity and Related Variables.

	Component					
	1	2	3	4	5	6
TS22	.816					
TS24	.704					
TS21	.701					
TS25	.682					
TS20	.679					
TS23	.673					
TS12	.422					
TS3		.713				
TS1		.694				

TS2		.685				
TS5		.621				
TS9		.561				
TS10		.438				
TS19			.775			
TS18			.770			
TS17			.581			
TS16			.431			
TS6				.773		
TS7				.729		
TS4				.653		
TS8				.600		
TS13					.762	
TS28					.669	
TS14					.513	
TS11					.504	
TS15					-.478	
TS26						.871
TS27						.867

This work also applies the same procedure and criteria to the questionnaire for estimating the proportion of creative teachers. It retains and rotates five components. The components explain a 62 percent proportion of total variance. Table 4 shows a rotated component matrix, where loadings lower than .40 are also suppressed.

Table 4: Rotated Component Matrix of Teachers' Creativity and Related Variables.

	Component				
	1	**2**	**3**	**4**	**5**
TT42	.739				
TT43	.710				
TT41	.693				
TT34	.638				
TT36	.575				
TT35	.554			.481	
TT37	.551			.410	
TT47		.729			
TT46		.673			
TT39		.628			
TT48		.605			

TT38		.588			
TT44		.585			
TT45		.583	.426		
TT53			.781		
TT54			.769		
TT55			.668		
TT52			.635		
TT51	.433		.518		
TT29				.752	
TT30				.749	
TT32				.593	
TT31	.417			.577	
TT58					.724
TT56					.709
TT57					.670
TT49					.651
TT50					.577
TT40					.536
TT33					.488

Concepts and Reliabilities of Components as sub-scales

The current study assigns the following six labels to the six components of students' creativity and related variables to conceptually explain item commonality within each component: Psychological Creativity, Flow in Learning, Autonomous Progression, Extrinsic Motivation, Inhibition of Trial-and-Error, and Parental Competition (Table 5 to 10). The first five components refer to students , while the last component refers to students' parents. Component reliabilities, indicated by Cronbach α, sequentially report as .879, .793, .687, .749, .650, and .768. Table 5 to 10 also presents means, standard deviations, and corrected item-total correlations for inspecting item quality. Items with a "-" sign indicates negative items within each scale/component context . Scale points need reversing before computing reliabilities and total scores of each component.

Table 5: Scale name: Psychological Creativity (α=.879).

No.	Item statement (The proportion of students who…)	Mean	SD	r
22	create works for delight and preserve works for themselves .	2.60	.934	.792
21	make something novel for themselves.	2.93	.982	.686
24	are good at explaining their own works to others.	2.51	.892	.707
25	are good at communicating their creative ideas to others.	2.42	.852	.711
23	treasure their own works so much that they are hardly willing to give out their works as gifts.	2.59	.924	.572
20	like creating new works such as composition, painting, drama, toys or games, different from their previous works.	2.75	.978	.671
12	set up personal goals and form problem structures by themselves.	2.04	.801	.504

Table 6: Scale name: Flow in Learning (α=.793)

No.	Item statement (The proportion of students who…)	Mean	SD	r
3	are very absorbed, very curious in class.	3.36	.781	.531
1	are very satisfied and feel a sense of accomplishment when engaged in study.	3.29	.805	.568
2	like meeting new challenges in the learning process .	3.23	.925	.600
5	are absorbed in studying certain fields or subjects.	2.63	.866	.557
9	often find a problem worth exploring during study.	2.36	.825	.543
10	frequently propose questions in class.	2.72	.845	.473

Table 7: Scale name: Autonomous Progression (α=.687).

No.	Item statement (The proportion of students who…)	Mean	SD	r
19	do not care about lower grade points compared with others so long as they are making progress.	2.62	.916	.544
18	pursue their own progress and do not compare themselves with others.	2.60	.869	.563
17	feel very happy when making progress.	3.87	.983	.410
16	would rather think alone, unwilling to obtain answers from others for a challenging question.	2.37	.802	.377

Table 8: Scale name: Extrinsic Motivation (α=.749).

No.	Item statement (The proportion of students who…)	Mean	SD	r
6	feel very bored if no reward is given for studying.	1.86	.904	.605
7	feel very uninterested without competition or contest in class.	2.27	.961	.590
4	cannot wait for class to be over.	1.96	.763	.478
8	are not motivated to study without examination or other compulsory measure.	2.60	.975	.517

Table 9: Scale Table name: Inhibition of Trial-and-Error (α=.650).

No.	Item statement (The proportion of students who…)	Mean	SD	r
13	fear giving a wrong answer in class.	2.3599	.96080	.543
28	feel too shy to present their own unique ideas, if the idea is different from their classmates'.	2.4443	.84100	.499
14	laugh at classmates who respond to a question with a wrong answer.	1.9672	.83151	.385
11	never raise questions except for answering or solving a problem given by the teacher.	2.6553	.94736	.312
15	are willing to try answering the question challenged by the teacher, even though they are not certain about the correctness of their answers (-)*.	3.1829	.89303	.296

* The scoring of the item with a negative sign must be reversed.

Table 10: Scale name: Parental Competition (α=.768).

No.	Item statement (The proportion of students whose…)	Mean	SD	r
26	parents only care about their children surpassing others, not whether their children progress.	2.48	.956	.624
27	family only pays attention to academics, to the neglect of other educational aspects.	2.67	.993	.624

An additional five labels assigned to the five components of teachers' creativity and related variables indicate: Progressive Teachers, Appreciative Teachers, Innovative Teachers, Enthusiastic Teachers, and Dogmatic Teachers (Table 11 to 15). The first four components include all positive items, while the last component includes all potentially negative items within the "creative teacher" context. Reliabilities (αcoefficient) of each component as a sub-scale report as .913, .895, .914, .772, and .740 respectively. Table 11 to 15 also present means, standard deviations, and corrected item-total correlations.

Table 11: Scale name: Progressive Teachers (α=.913).

No.	Item statement (The proportion of teachers who…)	Mean	SD	r
42	regard cultivating students' self confidence as an important teaching goal.	3.55	.915	.791
43	regard cultivating students' ability to cope with frustration and failure as an important teaching goal.	3.45	.953	.766
41	regard cultivating students' ability of independent study as an important teaching goal.	3.46	.927	.749
34	appreciate other teachers' creative ideas.	3.77	.856	.667
36	like to change thinking habits.	3.36	.843	.684
37	pursue progress and have a positive attitude toward life long learning.	3.66	.900	.731
35	emphasize professional growth and improve their educational practice frequently.	3.61	.853	.755

Table 12: Scale name: Appreciative Teachers (α=.895).

No.	Item statement (The proportion of teachers who…)	Mean	SD	r
53	are good at recognizing students with natural gifts.	3.33	.875	.765
54	are good at finding out students' potentials.	3.35	.842	.777
55	are good at creating opportunities for every student to succeed.	3.34	.869	.741
52	are good at guiding students' imaginative strength.	3.34	.819	.758
51	encourage students to put forward creative ideas.	3.61	.865	.666

Table 13: Scale name: Innovative Teachers (α=.914).

No.	Item statement (The proportion of teachers who/whose …)	Mean	SD	r
47	classroom decor elicits student curiosity and inspires students.	3.29	.876	.750
39	actively develop action research, with the spirit of spontaneous reform.	2.83	.948	.692
46	classroom decor is rich and colorful enough for students to display their creative ideas.	3.41	.888	.715
38	carry out teaching experiments voluntarily with the spirit of innovation.	3.08	.942	.731
48	always introduce changes and innovation in teaching every year.	3.28	.891	.750
44	teaching ideas are abundant and very creative.	3.20	.837	.757
45	teaching is lively and enlightening to students.	3.28	.815	.783

Table 14: Scale name: Enthusiastic Teachers (α=.772).

No.	Item statement (The proportion of teachers who…)	Mean	SD	r
29	have a great sense of achievement in teaching.	3.40	.847	.612
30	are passionate about their own teaching field or subject.	3.46	.817	.686
31	are willing to cooperate with colleagues or coordinate teaching, to facilitate integrative curriculum.	3.61	.931	.563
32	participate in teachers' community of learning spontaneously.	2.64	1.058	.476

Table 15: Scale name: Dogmatic Teachers (α=.740).

No.	Item statement (The proportion of teachers who…)	Mean	SD	r
58	emphasize academic grades above other aspects.	1.71	.854	.585
56	define "success" very narrowly.	2.23	.913	.532
57	punish students when students give a wrong answer to the question.	1.66	.825	.471
49	repeat their teaching routines every year.	2.38	.873	.497
50	strongly require student obedience.	2.75	.874	.389
40	do not change without pressure.	2.76	.975	.382
33	love comparing with their colleagues and strongly competitive.	2.08	.915	.341

The following sections present relationships among components described above. This work notably employs component analysis only for categorizing variables and computes total component or sub-scale score on raw scores of items specifically included in that scale. Consequently, components or sub-scales can correlate with each other though obtained from orthogonal rotations.

Internal Structure of Components—Assessing Students

Table 16 presents component internal structure of students' creativity and related variables. Findings show that Psychological Creativity, Flow in Learning, and Autonomous Progression positively correlate as a group of variables. In other words, a higher proportion of students with psychological creativity results in a higher proportion of students with flow experience in learning and autonomous progression. On the other hand, Extrinsic Motivation, Inhibition of Trial-and-Error, and Parental Competition correlate in the same direction as the second group of variables, understood as the following two phenomena. First, students whose parents love interpersonal competition tend toward extrinsic motivation learning and inhibit trial-and-error in learning process. Second, students with extrinsic learning motivation inhibit trial-and-error action.

Table 16: Correlations among Components of Students' Creativity and Related Variables.

	Psychological Creativity	Flow in Learning	autonomous progression	extrinsic motivation	inhibition of try-and-error
Flow in Learning	.604 **	1			
autonomous progression	.591 **	.494**	1		
extrinsic motivation	-.081	-.230**	-.173 **	1	
inhibition of try-and-error	.010	-.101**	.024	.404 **	1
Parental competition	-.002	-.069	-.043	.327 **	.354 **

** $p < 0.01$ (two tailed).

The first and second group of variables tend to negatively correlate. Students with higher extrinsic motivation particularly tend toward less flow experience in learning and make less autonomous progression. Students who inhibit trial-and-error also demonstrate a slight tendency toward less flow experience in learning.

Internal Structure of Components—Assessing Teachers

Table 17 presents component internal structure of teachers' creativity and related variables, showing obvious positive correlation between Progressive Teachers, Appreciative Teachers, Innovative Teachers, and Enthusiastic Teachers. In other words, progressive, appreciative, innovative, and enthusiastic teachers tend to overlap with one another. Viewed from another angle, dogmatic teachers tend to be less progressive, appreciative, innovative, and enthusiastic than non-dogmatic ones.

Table 17: Correlations among Components of Teachers' Creativity and Related Variables.

	progressive teachers	**appreciative teachers**	**innovative teachers**	**enthusiastic teachers**	**dogmatic teachers**
progressive teachers	1				
appreciative teachers	.726 **	1			
innovative teachers	.744 **	.725 **	1		
enthusiastic teachers	.678 **	.595 **	.669 **	1	
dogmatic teachers	-.250 **	-.150 **	-.155 **	-.120 **	1

** $p< 0.01$ (two tailed).

Relationships between Creative Teachers and Creative Students

Table 18 presents correlations between Students' and Teachers' Creativity and Related Variables. Findings show that the higher the proportion of progressive, appreciative, innovative, and enthusiastic teachers, the higher the proportion of students who pursue psychological creativity, obtain flow experience in learning, and engage in autonomous progression. On the other hand, the proportion of dogmatic teachers positively correlates with the proportion of extrinsically motivated students who inhibit trial-and-error learning and whose parents strongly emphasize academic competition. Dogmatic teachers and competitive parents possibly reinforce each other.

Table 18: Correlations between Students' and Teachers' Creativity and Related Variables.

Students' / Teachers'	**Psychological Creativity**	**Flow in Learning**	**autonomous progression**	**extrinsic motivation**	**inhibition of try-and-error**	**Parental competition**
progressive teachers	.285 **	.244**	.296 **	-.050	-.007	-.066
appreciative teachers	.351 **	.302**	.275 **	-.030	-.006	-.061
innovative teachers	.402 **	.361 **	.283 **	-.063	-.060	-.034
enthusiastic teachers	.358 **	.327 **	.286 **	-.082	-.023	-.057
dogmatic teachers	.069	.004	.013	.260 **	.349 **	.303**

** $p< 0.01$ (two tailed).

Conclusion

Primary school children may not be able to have historical creativity that contributes to cultural heritage. However, they definitely can have psychological creativity that lies at the core of true learning. Students with psychological creativity like making something novel for themselves and creating things for delight. They are additionally very good at explaining their own works and communicating their creative ideas to others.

Psychological creativity is intimately related with flow experience in learning. Students with flow experience are very absorbed in a class or soak up certain areas of study. They like meeting new challenges in the learning process and finding new problems for exploring. They persist in learning and find satisfaction in their accomplishments.

Both psychological creativity and flow experience in learning are intimately related with autonomous progression. Students engaged in autonomous progression do not care about interpersonal comparison but value self-comparison and personal progress. Students who pursue psychological creativity, obtain flow experience in learning, and engage in autonomous progression may be called "creative students."

Extrinsically motivated students inhibit trial-and-error, reduce flow experience in learning, and block autonomous progression. At the same time, competitive parents or families who emphasize interpersonal competition and care only about academic success induce extrinsic motivation and inhibit trial-and-error in children. Dogmatic teachers who emphasize only academic grades, narrowly define "success," harshly deny wrong answers, routinely repeat teaching habits, strongly require student obedience, firmly resist change, and love interpersonal competition also induce extrinsic motivation and inhibit trial-and-error in students. Competitive parents and dogmatic teachers probably interact with each other in a mutual-reinforcing process.

In conclusion, what kinds of teachers cultivate "creative students?" First, progressive teachers set up adequate instructional goals, appreciate peer teachers' creative ideas, change thinking patterns, improve educational practice, and pursue life-long learning. Second, appreciative teachers are good at recognizing students with natural gifts, find out students' potentials, create opportunities for every student to succeed, guide students' imaginative strength, and encourage students toward creative ideas. Third, innovative teachers elicit student curiosity by classroom decor, invite students to display creative ideas, develop action research, carry out teaching experiments and exhibit innovative teaching each year with rich creative ideas. Fourth, enthusiastic teachers love their teaching field, cooperate with colleagues in integrating curriculum, participate in teachers' learning community, and pursue achievements by teaching. Teachers who are progressive, appreciative, innovative, and enthusiastic may be called "creative teachers." The current study clearly shows that "creative teachers" cultivate "creative students."

References

Amabile, T.M. (1983). *The social psychology of creativity.* NY: Springer-Verlag.

Boden, M. A. (1991). *The creative mind: Myths and mechanisms.* New York: Basic.

Campbell, D. (1960). Blind variation and selective retention in creative thought as in other knowledge processes. *Psychological Review, 67,* 380-400.

Cizko, G. A. (1998) From Blind to Creative: In Defense of Donald Campbell's Selectionist Theory of Human Creativity, *The Journal of Creative Behavior*, 32, pp. 192-209.

Collins, M.A. & Amabile, T.M. (1999). Motivation and creativity. In R.J. Sternberg (eds.), *Handbook of Creativity(p297-312).* Cambridge University Press.

Csikszentmihalyi, M. (1988). Society, culture, person: A systems view of creativity. In R.J. Sternberg (Eds.), *The Nature of Creativity(p325-339).* Cambridge University Press.

Csikszentmihalyi, M & Csikszentmihalyi, I.S (Eds.). (1988). *Optimal experience: Psychological studies of flow in consciousness.* Cambridge University Press.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychological discovery and invention.* NY: HarperCollins.

Csikszentmihalyi, M. (1999). Implications of a systems perspective for the study of creativity. In R.J. Sternberg (eds.), *Handbook of Creativity(p313-335).* Cam-

bridge University Press.
Csikszentmihalyi, M. & Wolfe, R. (2000). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In K. A. Heller, F. J. Monks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International Handbook of Giftedness and Talents* (pp. 81-93). New York: Pergamon.
Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, Gandhi.* NY: Basic.
Gruber, H. E. (1981). On the relation between 'aha experiences' and the construction of ideas. *History of Science, 19,* 41-59.
Jay, E.S. & Perkins, D.N. (1997). Problem finding: The search for mechanism. In M.A. Runco (Eds.), *The Creativity Research Handbook(p257-294).* Cresskill, NJ: Hampton Press.
Lin, W. (2002). Relationships among Organizational Culture, Creative Teaching Potentials, and Creative Teaching in Primary and Secondary Schools. Unpublished Dissertation. Taipei: National Chengchi University.
Mandler, G. (1995). Origins and consequences of novelty. In S. M. Smith, T. B, Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 9-25). Cambridge, MA: MIT Press.
Policastro, E., & Gardner, H. (1999). From case studies to robust generalizations: An approach to the study of creativity. In R.J. Sternberg (eds.), *Handbook of Creativity(p213-255).* Cambridge University Press.
Senge, P. M.（1990）The fifth discipline: the art and practice of the learning organization. NY: Doubleday/Currency.
Stewart, G. W. (1950). Can productive thinking be taught? *Journal of Higher Education, 21,* 411-414.
Sternberg, R.J. & Lubart, T.I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity.* NY: Free Press.
Sternberg, R.J. & Lubart, T.I. (1999). The concept of creativity: Prospects and paradigms. In R.J. Sternberg (eds.), *Handbook of Creativity(p3-15).* Cambridge University Press.
Thurstone, E. P. (1952). Creative talent. In L. L. Thurstone (Ed.), *Applications of Psychology* (pp. 18-37). New York: Harper & Row.

Teacher Engagement in the Creative Education Program and the Perceptions of the Effectiveness of the program.

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Abstract

The purpose of this research was to investigate the relationships between elementary and junior high school teachers' engagement and their perceptions of the effectiveness of the implementation of creativity education. Teacher engagement was measured by: (1) motivation to participate; (2) the role in the program; (3) total amount of time spent per week; (4) hours of related study during the year, and (5) participation in the community of practice. The effectiveness of the program was measured by teachers' perceptions of: (1) positive effects of the program; (2) satisfaction, (3) frustration during the process, and (4) willingness to continue the program in the future.

The subjects were 615 teachers, drawn from more than 36,000 teachers who were involved in the program. This research employed the *Nurturing Creative Teachers scale* (14 indicators, α = .938) from *Taiwan Creative Education Indicators Questionnaire*, which was a reliable and valid instrument for evaluating creativity education. (Cheng, Wu & Kuo, 2008). The results showed that: (1) Active participants and those who initiated and wrote the project proposals, spent more hours per week and more hours of further study for the program, were significantly more positive, more satisfied, and more willing to continue the program than other groups; (2) teachers who participated in the community of practice were also significantly more positive in their perceptions and more satisfied; and (3) those who felt that they were forced to participate were significantly more frustrated and less satisfied.

Symposium II:

Planting the Seeds of Creative Education in Taiwan

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Center for Creativity and Innovation Research, National ChengChi University

In Taiwan, education has been criticized for lack of creativity. Entrance examinations have always been blamed as the single most detrimental factor.

The Ministry of Education (MOE) is therefore under heavy pressure to promote creativity, and without hesitation must assume its responsibility to plant the seeds of creative education in Taiwan.

In 2001, the MOE commissioned a pilot study on creative education. The research project was a collaborative effort that incorporated six research teams. Each team observed and studied creative education at the elementary, junior high, senior high, and university levels, both in Taiwan and abroad, over a period of ten months. The project's results were the basis for the "*White Paper on Creative Education*", in which six action programs were initiated.

The six action programs to actively promote creative education in Taiwan are funded by the Ministry of Education. The scope of the "creativity education movement" ranges from the central government to local education bureaus and from elementary school teachers and administrators to university professors and executives. Most projects can be subsumed under "cultivating students' creativity", "creative teachers and teaching", "creative environment/campus", "creative course design", and "cross-discipline programs".

Starting from 2002, many special projects were planned and implemented at all levels of schools. But each major project must involve one or more professors as mentors.

To share with the participants of this conference, we, as organizers of the creative education program and directors of various implementation projects are proposing the following two related symposia:

Symposium II: Planting the seeds of creativity education in Taiwan at the senior/vocational high schools and universities. The second symposium includes three papers, namely:

(1) Jing-Jyi Wu; Cheng-Hsien Li; Wei-Wen Lin, **Valuing new ideas, attitudes toward team creativity, creative self-efficacy and innovative behaviors**;

(2) Chih-Wen Kuo; I-Heng Chen; Ying-Yao Cheng, **Construction of creative high school campuses in Taiwan**; and

(3) I-Heng Chen; Ying-Tsu Lin**, Educational strategies for the curriculum of innovation: examples, outcomes and recommendations**.

Valuing new ideas, attitudes toward team creativity, creative self-efficacy and innovative behaviors

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Abstract

To implement the six initial action programs stated in the *White Paper on Creative Education* at the senior and vocational high schools' level, the scholars responsible for these programs recognized that the directors of academic affairs, as gatekeepers, play a key role in promoting creativity education in Taiwan. Therefore, the primary purpose of the present study was to explore the relationships of valuing new ideas, attitudes toward team creativity, creative self-efficacy and innovative behaviors among the directors of academic affairs of senior and vocational high schools. A total of 131 directors from public and private senior and vocational high schools completed four questionnaires: the *Valuing new ideas scale*, a subscale of divergent thinking attitudes scale, (Basadur & Hausdorf, 1996; Wu, Lin, & Su, 1998), the *Attitudes toward team creativity scale* (Wu & Yang, 1997), the *Creative self-efficacy scale* (Tierney & Farmer, 2002; Li & Wu, 2004) and the *Innovative behaviors scale* (Scott & Bruce, 1994; Wu, Kuo, Wang, Liu, Chen, & Li, 1996). These four scales have been used in other studies in Taiwan and found to be reliable and valid. The results showed that valuing new ideas and attitudes toward team creativity were significantly related to innovative behaviors (γ=.489, $p<.01$; γ=.280, $p<.01$). Individual creative self-efficacy was strongly associated with innovative behaviors. The obtained$\gamma$was as large as .74 ($p<.01$) beyond expectation. We also tried to construct the causal model among valuing new ideas, creative self-efficacy and innovative behaviors. The results revealed that creative self-efficacy and valuing new ideas have direct and positive effects on innovative behaviors.

Construction of Creative High School Campuses in Taiwan

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Abstract

This paper describes an experimental study performed from 2006 to 2007 in Taiwan in an attempt to construct creative campuses among numerous participating senior high schools and vocational schools. The creative campus is built up through the execution of six major programs with funding from the Ministry of Education. These programs include organizational and operational innovations, creative learning environment, creative teachers, creative curricula, creative student societies, and screening of applicants with potential creativity. High schools which are interested in infusing innovations into their organizational hierarchy and/or creativity into their management can apply for the funding to experiment with their ideas. The creative learning environment program provides funding for school administrators and teachers to change spatial design inside the campus, the "campus" includes both buildings and land, but it seems that this funding is only for the buildings; so it might be better to say "of the school buildings"; but if it does include the school grounds (playgrounds, gates, walls, etc.) then it should say "on the campus" such as classrooms, hallways, and stairways, etc., from their traditional appearance to more modern ones, to inspire students' learning. The creative teachers program encourages teachers to form and participate in study groups that focus on improving and exchanging creative thinking and teaching skills. Teachers who wish to authorize curricular materials which could be innovative itself or stimulating to students' creativity can request funding from the creative curricula program. The creative student societies programs sponsor student societies with interests in creation or innovations. Students enter senior high schools or vocational high schools through very competitive entrance exams in Taiwan. In order to let applicants who do not perform well in the entrance exams but may have potential creativity enter, every participating high school is required to devise a screening system to identify students' potential creativity for admission.

Through the execution of the six major programs, most of the participating high schools and vocational schools demonstrated new vitality with good results.

Educational strategies for the curriculum of innovation: Examples, outcomes and recommendations

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Abstract

A significant challenge confronting educators is how to teach creativity and innovation and how to blend them into a course, making it inspiring, participative and effective. This paper describes a feasible pedagogical approach to introducing the panorama of innovation, from the generation of creative ideas to the implementation of innovative project, to undergraduate students. Based upon Amabile's componential theory (1997) and Bandura's social learning theory (1977), this approach provides a foundational framework that intentionally puts research results into practice. Through doing real world problem-solving projects, students were intrinsically motivated to solve the problems they wanted to work on. This kind of approach facilitates learning and anchors students' experiences via teamwork. A description of this innovative semester-long course on "generation and implementation of creative ideas" offered at 51 universities, the materials and manpower involved, explication of working mechanism, student feedback, benefits, and suggestions for faculty and educational bureaus are presented.

Symposium III:

A Systematic Approach of National and International Policy in Gifted Talented Education

The Symposium is being organized by Evgenia T. Meletea & by APOLLON International Interactive Educational Network (IIEN). The study begun in 2007 and is a lifelong process and one of the goals that also APOLLON IIEN has developed a network for dialogue between policy makers in gifted and talented student education in several countries with different cultural backgrounds, by using "*Systematic Dialoque Frameworks*" in order to develop international cooperation of policy makers in gifted education. Some of the cases that the dialogue (in this Symposium) will focus on different topics pertinent to: (i) Theoretical approaches to talent behaviour, definition and development; (ii) Practical/ applied approaches to defining the related conceptions and developing students talents. The purpose and the ultimate goal of this dialogue that takes place on a research and also experimental level is to a) systematically record the dialogue, and b) to enhance dialogue interactivity. Two different dialogue structures are mainly being used: "*Stochastic Dialogue*" & "*Dynamic Dialogue*" (Meletea 2005). These will also be further discussed in a forthcoming paper (**B21; E37**).

Coordinator:
Evgenia T. Meletea (APOLLON International Interactive Educational Network)

Presenters:

- Introduction: "*Systematic Dialoque Frameworks*" in order to develop international cooperation of policy makers in gifted talented education:
Eugenia T. Meletea (APOLLON International Interactive Educational Network, Greece)

- Gifted and Talented Policy in England:
Yvonne Burke (Hammersmith and Fulham Local Authority, England)

- Activities for Gifted and Talented Students in Sciences (in France):
Livio Riboli-Sasco (Pari Montane, France)

- Lithuanian Gifted and Talented Policy:
Daiva Karkockien (Educational Centre for Gifted Youth, Lithuania)

- Talented Students & Creativity in Mathematics (in Poland):
Agnieska Posiniak (Institute of Mathematics University of Szczecin, Poland)

- Romanian Gifted and Talented Policy:
Florian Colceag (IRCA Gifted Education, Romania)

- Spanish Gifted and Talented Policy:
Prieto, Lola (University of Murcia, Spain) (Director of the High Abilities Research Group); Bermejo, M.R. (Alicante University, Spain); Dr. Ferrándiz, C (University of Murcia, Spain); Dr. Ferrando, M. (Yale-Tufts Universities, USA); Dr. Garrido, C. (Department of Education, Murcia Region, Spain)**;** Hernandez, D. (University of Murcia, Spain); Martinez, M.C. (University of Murcia, Spain); Dr. Rojo, A. (Department of Education, Murcia Region, Spain); Sainz, M. (University of Murcia, Spain) and Sanchez, C. (University of Murcia, Spain).

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ICIE 2008

"And in order to succeed in later life, you need creative skills because look at how fast the world is changing."

Robert Sternberg

"It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science."

Carl Sagan

On behalf of both the International Centre for Innovation in Education (ICIE) and the Université Paris Descartes, I would like to welcome you to our conference proceedings entitled "*Excellence in Education 2008: Future Minds and Creativity*".

This conference was an arena in which we shared our concerns, innovative educational practices, strategies and theories as we envision new horizons for a different world.
Based on feedback from the participants, I believe that we all left the Conference very much inspired by what we had heard and discussed. I also believe that the Conference has paved the way for further dialogue, interaction and international collaboration to reinvent educational systems towards more participatory and sustainable development. I hope that we have collectively started the process of removing the walls that often surround education institutions.

"Thank you very much for inviting me to the Congress and for the warm hospitality extended to me during my stay in Paris. You have done a magnificent job of organizing this event and promoting awareness about creativity and giftedness to the European community as well as others that were there from other parts of the world. I am proud to have been a part of the first ICIE congress and hope to continue to work with you in the future."

Joseph S. Renzulli

"It is fair to say that this Conference has set a high standard. Overall the Conference was very successful in achieving its objectives."

Ken McCluskey

"I really enjoyed the Paris conference and was very glad to see so many people I knew. Well done!"

Joan Freeman

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