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New Horizons on Education Inspired by Information and communication technologies

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Abstract

Nowadays, society is affected by the information and communication technologies (ICT) challenges that come with the Internet network and the World Wide Web. We are talking about e-society, e-commerce, e-learning, web of things … and so on. For education, what has changed after the ICT challenges? Are there improvements with this new "materiel"? What are the new horizons?
First of all, ICT introduces e-learning which is a way to learn using networks with a distant tutor. Second, we have digital learning resources to manage, which gives new learning scenarios and disciplines. Third, we can access a lot of pedagogical resources over the world, a good and a problematic fact. Recently, some studies present the finding that ICT are used without a mature integration in educational contexts. As result, sometimes there is no added value to the teaching/learning processes. Blended learning is a new direction to find how to integrate ICT tools to real classes so that the quality of teaching and learning will be really improved. This paper discusses these different points of views and gives a conclusion about some horizons where ICT will take the adequate place in classes.

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1. Introduction

Information and Communication Technology (ICT) services are now used with various types of tools to aid the different learning tasks. Every day, new technological advances affect the way information is handled in education institutions, libraries and information centers. The impacts of new technologies are felt by every actor in schools and universities because computing, communication and mass storage technologies reshape the way that learners, teachers and education staff access, retrieve, store, manipulate and disseminate information to each other. The way of learning has changed and will change since ICT are in all ways a part of our lives and the former teacher isn't now the once and main source of information and the focal point of the teaching learning process.

Today we talk about two categories of people who learn and teach in different ways: the "digital natives" (Prensky, 2001), born in the digital age, who spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. The second category, the "digital Immigrants" one, is composed of those who were not born into the digital world but have, at some later point in their lives, become fascinated by and adopted many or most aspects of the new technology. Consequently, using Prensky's "terminology", digital immigrants instructors are teaching digital natives, it is clear that they can't teach the same way they were thought. Different works in the literature analyze this problem or change.

In this paper, the first point presents, the main horizons given by ICT for learning/teaching commonly called Information and Communication Technologies for Education (ICTE). The second point synthesizes the noticed changes as positives or negatives ones. After that, before we conclude, point three discusses some recommendations to get improvements or future horizons in learning with the ICTE use.

2. Horizons on Education Inspired by Information and Communication Technologies

The 1990s was the decade of computer communications and information access, particularly with the popularity and accessibility of internet-based services such as electronic mail and the World Wide Web. At the same time the CD-ROM became the standard for distributing packaged software (replacing the floppy disk). This allowed large information-based software packages such as encyclopedias to be cheaply and easily distributed. As a result educators became more focused on the use of the technology to improve student learning as a rationale for investment. Today, computers and networks, in schools, are both a focus of study themselves (technology education) and a support for learning and teaching (educational technology).

It has been suggested by LeBaron and Bragg (LeBaron & Bragg, 1994) that the role of technology in education is so important, that it will force the issue of didactic versus constructivist teaching. Teachers will no longer have a choice but will be compelled to use a constructivist approach in a technology-rich environment. Indeed, according to Mann (Mann 1994), the use of new technologies in an educational setting has caused the theory of learning, constructivism, to receive new attention. Students in these settings become empowered by gaining access to real data and work on authentic problems. We observe compatibility between constructivism and the use of ICTE and join Collins (Collins, 1991) who states, "So, inadvertently, technology seems to be coming down on the side of constructivists, who have been trying--unsuccessfully to date--to change the prevailing societal view of education".

We discuss below four key words presented in the literature as the bases of the different ICT challenges in learning and teaching: e-learning and MOOCs, digital workspaces, digital resources, and blended learning.

2.1. E-learning and MOOCs

Different concepts have been attributed to e-learning, but the term has also been substituted by others, such as computer based learning, technology-based training, and computer-based training, distant learning … Moreover, some people confuse the concept of e-learning with the concepts of a virtual campus or online courses, which can be part of the e-learning universe but do not sufficiently define it. In (Sangra & al., 2012), a detailed study is presented about the 'e-learning' concept which has different views related to sociology, education science, psychology, ICT or computer science.

Simply, we can define e-learning as the domain that covers all methods of training using computers. This broad definition includes several independent axes such as: medias online or offline, learning individually or collectively, formatter present or absent … Other terms are sometimes used, we find: online training/learning, online education, distance learning, web based learning ...
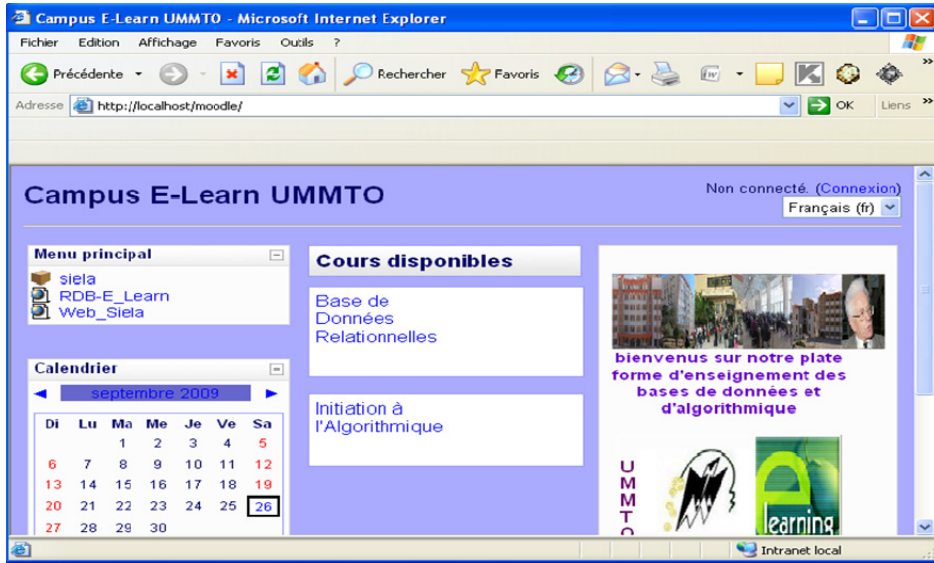
Fig. 1. Example of MOODLE LMS config   niversity

In practice, e-learning is often seen as a means of training from any computer station equipped with an Internet connection where many types of technologies (information and communication ones) can be used, for example: audio, video, computers, laptops, tablets, whiteboards, learning management systems (LMS) (see Fig. 1), intelligent and /web based tutoring systems (see Fig. 2) and mobile devices (like Smart phones) that give the concept of m-learning …

Fig. 2. Example of web based intelligent tutoring system, the WebSiela system, for Algorithmic

The most important horizon today for e-learning are the MOOCs (Massive Open Online Courses) that are online courses aimed at unlimited participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem solving, MOOCs provide environments where there are interactive user forums that help build a community for students, professors, and teaching assistants. Since 2012, the development of MOOCs became faster where several well-financed providers, associated with top universities, emerged, including *Coursera*, Udacity, and edX.

2.2. Digital workspaces for education

To accurately reflect their staff's changing work experience, leading organizations have begun to implement an entirely new working environment – the digital workplace. By integrating the technologies that employees use (from e-mail, instant messaging and enterprise social media tools to specific applications and virtual meeting tools), the digital workplace breaks down communication barriers, positioning you to transform the employee experience by fostering efficiency, innovation and growth. The key to success, however, lies in the effective implementation of a digital workplace strategy capable of driving true cultural change.
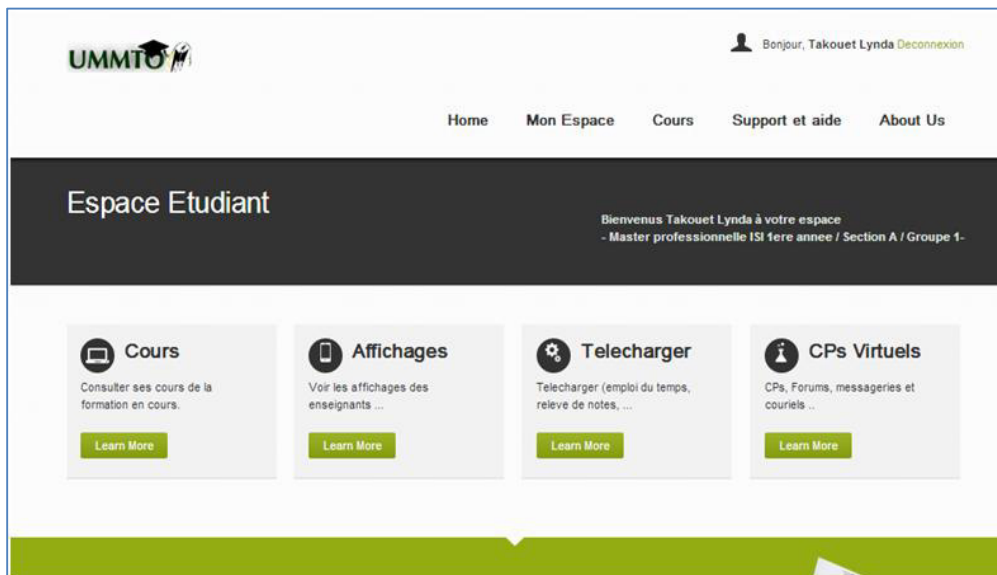

Fig.3. Example of a workspace prototype developed for Tizi Ouzou University department

A digital workspace for education institutions called virtual school; virtual campus … allows its students, teachers and staff to access individualized information and services at any time, from any place, only with an Internet connection and a web browser (Fig. 3 gives an example from a workspace prototype developed for Tizi Ouzou university department). In different developed countries (like USA, France, Canada …) these spaces are used and managed. They offers many services accessed via a secured user account already created and activated by the workspace administrator:

- news about the current and upcoming events, whether academic, scientific, community, cultural, related to sports, etc;
- access to administrative information for students: back-to-school calendar, personal timetable, assessment information: regulations, calendar, results and grades,

- access to teaching services: submission of practical work, access to e-learning modules;
- access to library resources and/or information retrieval,
- online access to existing computing services: management (reading/sending/sorting) of emails, access to personal document storage space;

- additional services provided through the digital workspace: access to personal files (whether of studies or career), access to local intranet, online personal or shared calendar, access to shared document storage spaces, allowing, for example, a teacher and his/her students to share documents, whatever their geographical situation, bookmarks, access to online software.

2.3. Digital Learning Resources

Digital learning content or digital learning resources called also learning objects consist of data files and software applications (programs) that may be distributed online or on disc. Therefore schools and systems need to provide teachers and students with ready and easy access to these resources. Increasingly this access will be online, particularly for data files, and while there is a huge quantity of such resources there are two major problems: accessing high quality resources and choosing appropriate resources. In the other side, the design and use of digital learning resources to support effective learning and teaching have to respect quality principles that are divided into two groups, which are interrelated:

- Core pedagogic principles, which underpin effective learning and teaching, drawing from learning theory and commonly accepted best practice;
- Core design principles, covering issues such as resource design, accessibility and interoperability.

Today, one has to learn how to design, search and use digital learning resources.

2.4. Blended Learning

To adapt to the changing trends in education, One of the innovative solutions is blended learning (see Fig. 4) in which modern technologies are integrated into the teaching and learning process, attempting to overcome some limitations that are experienced in the conventional classroom environment (Wakefield & al., 2008).
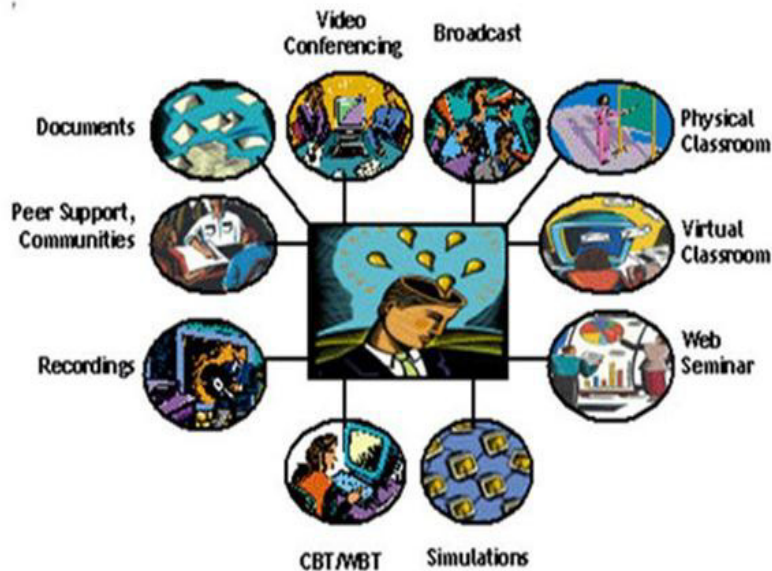

Fig. 4. Blended Learning†

In (Lopez-Perez & al., 2011), the authors point out that when ICT is adopted to complement traditional modes of classroom teaching, tertiary students seem to prefer this approach. Also Harris et al. (Harris et al., 2009) reckon that blended learning is a resource-effective methodology, with the potential to support teaching and enrich student learning experience.

3. Synthesis About The Changes Brought By ICT and Discussion

There's more to be written about the impact of ICTs on learning and teaching. Hence, one can't diagnose the changes but just summarize the main positives ones and negative ones, given in what follows. The most positive changes are:

- Learn and access information anywhere and anytime. For some people such as the disabled or the sick, it is a challenge.
- Communicate to any where so collaborate easily: get support, learn from other experiences, conform the problem complexity and collaborate to get a solution …
- Compose a new course or any other content easily with multimedia possibilities which can be a challenge for some people like blind and deaf.
- Enhance of constructivist approach what can help improve of competencies for some training
- …

The main negative ones are:

- Superficial learning: Most of learners just copy the way so don't really "construct" anything;
- Too many time in front of digital material what can cause health problems.
- Difficulties in teaching technologies: the speedy changes don't give time to learn them enough to be thought.
- Learners must demonstrate rigor and discipline, especially if they are isolated in a distance education.
- Isolation: Contacts with other learners and with the trainers are reduced or absent.
- Proficiency: ICTEs use requires sufficient mastery of the tools and the Internet. This gives more to learn.
- …

Technology is developed to solve problems associated with human need in more productive ways. If there is no problem to solve, the technology is not developed and/or not adopted. Applying this principle to educational technology would mean that educators should create and adopt only technologies that address educational problems, of which there are many. It means also avoid "Techno-centric Thinking" (Papert, 1987). Indeed, most educators would claim not to be technocentric, however, when discussing the use of computers in schools there is always the danger that the focus will be on the technology, particularly the hardware. When making decisions about the use of computers in schools, particularly budgetary decisions, there is a tendency to start with a consideration of the hardware, then the software and perhaps consider the users and learning last and least.

It is necessary to develop a thorough rationale before beginning to use computers in schools and classrooms. With the increasing availability of computer hardware, it is important that teachers do not become engrossed in the machine but focus rather on their primary role as educators. Teachers need to extend their imaginations with the awareness that as developments in computer technology occur they will be able to achieve more of their goals.

Since the 1960's the computer has been heralded, by some, as the solution to many problems in education. For example, many early computer scientists saw the possibility of the computer replacing teachers in schools. However these pictures of students sitting behind computer terminals for much of the day have largely not occurred in mainstream schools and most would not like this to be realized. There are three main rationales for ICT in schools: one concerns the organizational productivity of the school, and the other two focus on the needs of students: technological literacy and support for their learning.

The need for ICT competent teachers stems from the need for ICT competent students and for ICT-rich learning environments that enhance students' learning across the curriculum.

Historically, technology has been developed to solve problems, improve living standards and to increase productivity. Therefore, it is reasonable that we should expect educational technology to be developed with similar objectives. Within the educational context these objectives become: to increase productivity and solve problems in teaching/learning processes. Productivity is a concept most happily found in economics textbooks where the productivity of a worker or economic unit is defined by dividing the output (revenue) by the input (costs). This is more difficult to define for the education industry since the output is not easily measured, particularly not in monetary terms to compare with the costs. The output is largely the quantity and quality of learning demonstrated by students, or learning outcomes. How to measure the quality of training using ICT can also be a new horizon for education today.

We conclude this discussion with a set of recommendations for a good use of ICT for learning and move towards

positive changes:

- Give opportunity and time to children to learn ICTs from the beginning of their schooling
- Define when and how to use ICT to improve each learning process with a dynamic way to equilibrate, in a blended mode, the face to face learning, e-learning and self learning modes. Each education organization has to become a learning organization. A learning organization is one that creates and instils a vision and culture in which employees are skilled at creating, acquiring, and transferring knowledge (Garvin, 2008). According to Hannah & Lester (Hannah & Lester, 2009), learning organizations should utilize strategies that focus on the macro, meso, and micro levels of the organization. Targeting all layers of the organization ensures that all employees, operational procedures, and systems have the same set of guiding standards and characteristics that create a culture of continuous and adaptive learning.
- Analyze the ICT needs in each educational institution to implement an adapted information system. For that some questions such as: how to get, manage and/or change technologies will be a permanent process to insure the quality of the information system so in a certain way the quality in learning. The implementation of ICT culture will be progressive.
- As with any other product, ICT are to be consumed in moderation. Every human being must learn how to use them to improve its living and this is also a challenge for learning from sociological point of view.

4. Conclusion

Computer based systems, ICT and any technology in general should not be viewed as "add ons" but as tools which are an integral part of a person's learning experience. These tools have to be used in an adaptive way depending on the different parameters around the learning process to give positive new horizons. Consequently, the need to invent digital natives methodologies for all subjects, at all levels, will lead schools and universities to become learning organizations since there are continuous changes with ICT. Learning organizations adapt easily to new change because the employees are accustomed to creating, acquiring, and transferring knowledge. They are able to adapt to new challenges and situations by creating solutions to problems. In non-learning organizations, employees wait for leadership or other employees to address new obstacles. As a result of the innovative culture of learning organizations, employees feel the freedom to make decisions and respond to new events. The problematic is nowadays present in all schools and universities over the world with different aspects. This imposes a migration to a learning organization mode, which cannot be accomplished only by establishing new policies and decisions at the macro level but expecting changes in the other organizational levels. We are currently working on blended learning pedagogies and didactics using computer based self learning tools in higher education in a learning organization context.

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