MAGICAL
Collaborative game building as a means to foster reasoning abilities and creativity

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Abstract—This proposal describes the aims and the expected outcomes of the MAGICAL (MAking Games In CollaborAtion for Learning) project that was funded in 2011 under the LLP transversal ICT Programme. MAGICAL is proposed here as an example of how digital games can fruitfully be employed to support students’ intellectual development, which actually represents one of the main objectives of contemporary education. As a matter of fact, MAGICAL ultimate aim is that of triggering and enhancing students’ key/transversal skills among which reasoning abilities, creative attitudes and digital competence. The project investigates game creation as an innovative educational framework and addresses the development of the above mentioned abilities/attitudes by adopting a collaborative, “learning by doing” approach to digital game construction (game building in groups), which is actually quite new in the field. The outcomes of the project, which is still on-going, will hopefully trace new avenues for engaging students in both highly motivating and effective game-based educational activities. In a wider perspective, the working methodology adopted in this project could also be fruitfully re-used to inform further different educational initiatives.

Keywords—Technology Enhanced Learning; game-based learning; creativity; reasoning skills.

I. INTRODUCTION

Nowadays what Europe requires from leading Technology Enhanced Learning (TEL) research is mainly “to develop new technologies and methodologies that will make people learn more effectively and support the acquisition of new skills” [1]. According to Laurillard and al. [2], one of the main concerns of today’s TEL research should be not “the optimization of knowledge transmission” but rather the “enhancement of intellectual expressiveness and creativity” which should be regarded both as “new” and “transversal” skills. As a consequence, it is important to define new methods for employing digital tools to trigger and enhance intellectual “expression and production”; ICT use in education should be mainly targeted to “enable and enact new types of learning experiences and to enrich existing learning scenarios” [2] and special emphasis should be put in supporting students’ intellectual development.

Among the variety of existing digital tools that are presently adopted for educational purposes, games are widely considered very promising and a wide number of significant research experiences have been carried out aimed at exploiting game potential for supporting teaching and learning [3]. The analysis of an extensive literature review, carried out by the authors [4] in the framework of the FP7 network of excellence GaLA (Game and Learning Alliance), covering more than 250 papers from leading journals and scientific books and dedicated to digital games and pedagogy revealed two main findings:

- in most of the educational experiments, games are used on an individual basis,
- in the vast majority of cases, games are used merely as closed environments in which learners rarely have margins for self-directed and creative activities

This proposal describes how the MAGICAL (MAking Games In CollaborAtion for Learning) project (financed in 2011 under the LLP Programme / sub-programme Transversal ICT) led by ITD-CNR, aims at fulfilling the new EU requirements by also going beyond the above mentioned widespread approaches (individual basis – closed environments).

MAGICAL actually employs a digital game-based open environment and a collaborative approach to trigger and sustain the acquisition by young learners of those key transversal skills, such as reasoning abilities and creative attitudes, that are considered fundamental for their intellectual development and for allowing them to live and be proactive in today’s Knowledge Society.

II. THE MAGICAL PROJECT

MAGICAL proposes “game building” (instead of “game use”) as key activity to be performed by school students and primarily aims at verifying how such a “learning by doing” approach can actually contribute to develop some children’s key skills. In doing so, this project also shifts from the traditional individual dimension of gaming (typical even of Massive Multiplayer Online Role-Playing Games) to a collaborative one, by engaging groups of students in collaborative game building experiences. All the foreseen activities are addressed by adopting the “design for all” principle [5], which implies addressing all the students in a classroom without exclusion, thus targeting also the e-inclusion of students with special needs/disabilities.
A. Objectives

Main objective of the project is to develop a methodology to trigger and support the development and enhancement of the following key/transversal skills in primary school students:

- “reasoning and logical abilities”: as a matter of fact, producing games means possessing all those abilities required to reach the solution (those required during the traditional playing sessions) plus also the ability to embed them effectively within a specific game format thus originate a new meaningful game to be played by other gamers;
- “creativity”: actually it is not to be considered an innate attitude but a potential skill that can be supported and enhanced by means of appropriate educational interventions such as the ones proposed in the project where students are invited to “create” their own games to be played by both themselves and pairs.
- “digital competence”: designing and building new games entails much more than simply “playing”, it means, to some extent also mastering basic conceptual know-how/capabilities typical of the information technology/programming field (although quite simplified, given the age of the ultimate target population).

B. Target populations

The project is targeted to students of the primary schools but this is not the only addressed population. Given that a cornerstone of MAGICAL is the methodology to be developed for fostering learning innovation through “collaborative game building”, it was considered crucial to engage relevant stakeholders groups. The project then addresses also:

- teachers and students teachers, namely those professionals that will be ultimately responsible for making an effective classroom use of the material (software and guidelines) produced in the framework of the project
- health professionals dealing with the education of students with special needs, a target population that should also benefit greatly from adopting this approach, although it requires specific attention and, possibly, personalized educational approaches.

C. Outcomes

The project will produce specific outcomes for each of the above mentioned three different target populations. As a matter of fact, as a result of the project actions:

- Teachers and Student Teachers will be guided to learn and practice how to enact innovative teaching activities using digital games by adopting specific methodologies (social constructivism). They will gain significant hands-on experience in adopting digital games as a means by which students can construct their own knowledge.
- Staff in social services and health (i.e. educators of special needs students) will gain competences in both the educational use of digital games and the use of the “learning by doing” approach with students with special needs. At the end of the project they are expected to be able to design and enact innovative learning itineraries focusing on the needs of students with learning difficulties.
- School students (who are to be considered the project’s very ultimate target population) will be engaged in an innovative learning process based on the “learning by doing” approach, allowing them to build/create their own games; this approach will let them acquire some key logical and creative abilities together with basic digital competence by approaching the process of “programming” (although in easier way in accordance to their age and available prerequisites).

III. IMPACT OF THE OUTCOMES ON TECHNOLOGY ENHANCED EDUCATION

At this stage we aren’t yet able to define which will be the full impact of MAGICAL’s outcomes on future TEL projects and, what’s more important, on the actual enactment of real, in-field innovative teaching/learning experiences.

It certainly opens the door to considering “game creation” as a valuable educational activity, provided, of course, that it is adopted within specific learning contexts and that it is aimed at reaching specific learning objectives. It also corroborates the idea and the concept that games, by offering a highly motivating learning environment, can contribute to fulfill a variety of learning objectives, including those of sustaining reasoning skills and creativity.

To date, the main lesson learnt regard one uncommon (but important) aspect of the adopted working methodology: the methodological choice of addressing in the framework of the same experimental project both the main actors of the learning process, teachers and students. As a matter of fact, this methodological choice, provides the research team with a twofold view of the same learning material, that can, thus, be better tuned and adjusted so to meet the different needs of the two populations. It also allows giving a deeper insight into the different collaborative attitudes of the two different target groups and appears to allow teachers better design the activities with the students and having a better overall view of classroom dynamics.

REFERENCES