

## The “Teaching to Teach with Technology” Project: Promoting Advanced Games Technologies in Education

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### Abstract

*In a recent review-article Selfton-Green [1] has discussed different definitions of formal and informal learning linked to the context of learning. Both trainers and students have rules, strategies and learning patterns that differ according to age. Therefore, it is crucial to identify strategies of using technology that will be appropriate and consistent with the target of the intervention, in order to produce effective teaching strategies and able to stimulate a real path of “active processing” of information. In this respect, it is known that the use of serious games is particularly appropriate for young people, but the use of new technologies is difficult in formal learning contexts, with mature individuals accustomed to different types of training. Against this background, the “Teaching to Teach with Technology (T3)” project (funded by the EU Leonardo Da Vinci Life Long Learning Program, [www.t3.unina.it](http://www.t3.unina.it)) designed and validated an innovative teacher/trainer program, demonstrating realistic ways of exploiting advanced techniques within the real constraints facing teachers in their work. This contribution presents main steps of this project (in which university teaching staff, school teachers and trainers familiarize with technologies and simulated learning sessions), with a specific focus on the selection of technologies, and discusses the future implications for educational programs. Results of T3 program are consistent with the literature and they stress the importance of game-based learning, clarifying that it is a balance between conceptual (teaching about) and procedural (teaching how to do) knowledge. In brief, advanced games technologies (computer games, augmented reality, robotics) could address many of the limitations of traditional instructional methods; games have the ability to motivate learning, increase knowledge and skill acquisition and support traditional teaching methods.*

### 1. Education and Games

Educational research has generated many methodologies, tools and practices exploiting the potential of technology. Beyond some experimental contexts, however, uptake of advanced techniques remains low. Despite technical and methodological advances, the majority of e-learning still consists of video-lessons and page-turning web sites.

New to learning is the use of computer games; interest in exploiting the educational potential of computer games is surging as instructional games involve a direct focus on active participation of the learner. Alessi [2] stress the importance of game-based learning, clarifying that game-based learning is a balance between *conceptual* (teaching about) and *procedural* (teaching how to do) knowledge. Computer games address many of the limitations of traditional instructional methods; games have the ability to motivate learning, increase knowledge and skill acquisition and support traditional teaching methods.

Much attention has been given to so-called serious gaming (the use of commercial or ad hoc games for serious educational purposes) [3].

The effectiveness of serious games based approach: “The extent to which these games foil expectations (create cognitive disequilibrium) without exceeding the capacity of the player to succeed largely determines whether they are engaging. Interacting with a game requires a constant cycle of hypothesis formulation, testing, and revision. This process happens rapidly and frequently while the game is played, with immediate feedback. Games that are too easily solved will not be engaging, so good games constantly require input from the learner and provide feedback” [4].

Furthermore, games take up large periods of time of people (adolescents and adults), and promote levels of attention and concentration that teachers and educators expected people applied to learning.

Therefore, what can the education sector learn and use from these games in order to improve the learning process and to make learning fun?

## 2. The “Teaching to Teach with Technology” Project

In order to give an answer to that question, the “Teaching to Teach with Technology (T3)” project (funded by the EU Leonardo Da Vinci Life Long Learning Program, [www.t3.unina.it](http://www.t3.unina.it)) designed and validated an innovative teacher/trainer program to promote the use of advanced learning technology by: university teaching staff in Spain; secondary school teachers in UK; trainers involved in VET in Italy. The Project started in December 2009 and is organized into work packages. The milestones of the project are: Needs Analysis; Selection of technologies; Methodology and Learning program; Testing, Trials of the Training Programme, production of guide-lines for games use.

Key features of the program include: theoretical classes discussing the features and advantage of the new technologies; practical workshops, in which learners (university teaching staff, teachers and trainers) simulate learning sessions and familiarize with technologies; project work, in which learners prepare learning projects for use in their own classes, implement the project, and evaluate the results; joint assessment of the results by participants in the program.

The final output of the project is a set of freely available tools, designed to encourage uptake of new learning technologies for use in universities, schools and professional training.

### 2.2 How can we use the games? Learning to teach

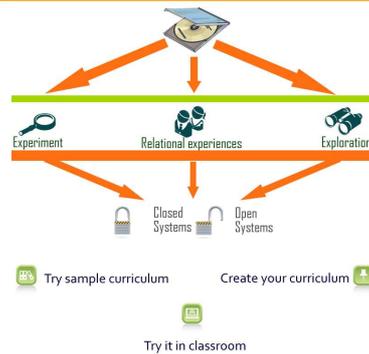
It's important to underline that before games can take on a meaningful role in formal or informal education, the education sector and the wider public need to better understand the potential and diversity of such 'tools'. In fact, Blunt [5] advocates that pedagogical methods are typically influenced by the available technologies of the period. Due to the pervasiveness and evolution of technology, students often learn differently from how their educators learnt.

Both psychological and educational literature stressed that the real context, which takes place in the educational relationship, plays a key role in the choice of methods and processes that involve the teaching-learning process [6]. The different learning contexts, in fact, need and use different means of transferring knowledge and they need to be calibrated on partners, setting, and real or virtual places. In fact, it is known that the use of serious games is particularly appropriate for young people, because in order to play the children have to learn something [7] [8]. Instead, the use of new technologies is difficult in formal learning contexts, with mature individuals, accustomed to different types of training [1].

For these reasons, T3 project defined different steps of exploring games for educators (for more details see [www.t3.unina.it](http://www.t3.unina.it)). The principle underlying the definition of the learning we're proposing is the classic of learning through doing [6]. Through the exploration of few steps, the user may initially familiarize with the use of games in education and, then, he can learn to use them in order of increasing complexity ranging from a closed mode to an open mode using.

The closed and open system definition aims at representing a training strategy based on instructions, closed systems, or on a more constructivist strategy (open systems). In a technological point of view, the new learning technologies can be distinguished in [9]: closed systems (tools and platforms developed by professionals which deal with a particular subject area and can be used for educational / training purpose), and open systems (tools and platforms that enable teachers to realize learning environments).

The training program proposes three steps: 1. *try sample curriculum*; 2. *Create your curriculum*; 3. *Try it in classroom* (Tab. 1).



**Tab. 1. The training steps of T3 project.**

## 2.2 What games can we use? Learning strategies and game modes

A review of the DGBL (digital game-based learning) literature shows that, in general, educators have adopted three approaches for integrating games into the learning process: have students build games from scratch; have educators and/or developers build educational games from scratch to teach students; and integrate commercial off-the-shelf (COTS) games into the classroom. According to Van Eck [4], we assume that the third approach to DGBL is the most promising in the short term because of its practicality and efficacy and in the long term because of its potential to generate the evidence and support we need to entice game companies to begin developing serious games.

This approach involves taking existing games, not necessarily developed as learning games, and using them in the classroom. In Figure 2 same examples of games.

		TYPE OF TEACHING/LEARNING STRATEGY		
		<i>Experimenting</i>	<i>Experiencing soft skills</i>	<i>Exploring</i>
TECHNOLOGY	<b>Closed System</b>	<ul style="list-style-type: none"> <li>• Avida</li> <li>• BestBot</li> <li>• SimCity</li> <li>• Nerone</li> </ul>	<ul style="list-style-type: none"> <li>• Dread-Ed</li> <li>• Palma</li> </ul>	<ul style="list-style-type: none"> <li>• Civilisation</li> <li>• Age of Empires</li> <li>• The Sims</li> </ul>
	<b>Open System</b>	<ul style="list-style-type: none"> <li>• NetLogo</li> <li>• Lego MindStorms</li> </ul>	<ul style="list-style-type: none"> <li>• Eutopia [13]</li> <li>• E-circus</li> <li>• Forio</li> </ul>	<ul style="list-style-type: none"> <li>• Anima</li> <li>• E-adventure</li> <li>• QR Code</li> </ul>

**Figure 2. Selection of technology.**

Figure 2 shows a select in of technology linked to the type of teaching/learning strategy involved in games use. The types of technology selected: a. experimenting; b. experiencing soft skills; c. exploring.

a. the "demonstration-experiment" as a teaching strategy is one of the most popular and traditional strategy used by teachers. Perform laboratory experiments is, in fact, the core teachings of many disciplines.

b. “learning by experience” is a fundamental model and is referenced in literature pertaining to “the learning organization”. This form of learning has the following characteristics [10]: it is an explicit learning focused on the working environment; it is both individual and collective; it is focused not on knowledge, but on skills, attitudes and expertise; the learner has an active role and consciously learns through collaboration with others and under the guidance of experts in safe environments.

c. “exploring” is an innate human propensity to experience the environments in which they are to act. Many educational practices used to explore this tendency to transfer their skills and knowledge. The adventure games are transpositions in technological environment of this type of educational practice.

### 3. Conclusions

In light of these considerations, we considered appropriate to calibrate the choice of technologies to be tested taking into account a combination of factors: learning environments, characteristics of the trainers to be trained and subject matter. The learning process is highly dependent on the direct participation within a specific activity. This implies that very little learning is achieved in the traditional sense of the term. Describing the learning process using the metaphor of “scaffolding” may be useful as a guideline and provide assistance in understanding it [6].

The different learning contexts, as stressed above, need different means of transferring knowledge and they need to be calibrated on: partners, setting, and real or virtual places. Both trainers and students also have rules, strategies and learning patterns that differ according to age (as cognitive and psycho-social development; eg “digital natives” vs. “digital immigrants”; [11]). Therefore, it is crucial to identify strategies of using technology that will be appropriate and consistent with the target of the intervention, in order to produce effective teaching strategies and able to stimulate a real path of “active processing” of information [12].

In conclusion, the experimental step of T3-project, that is still under way, leads us to believe that the use of new technologies can also be applied in education. According to scientific literature [12], in fact, there are advantages to strictly cognitive aspects: the spatial and temporal proximity of stimuli facilitating learning, the relevance or consistency of the material proposed, the different ways of transmitting information, the customization of dynamic teaching / learning.

However, we believe that the use of games in education should be preceded by a period of training and familiarization of educators, in order to bridge generational distance in learning modality. Last few generations of adolescents are much more used to frequent on-line platforms, to engage in video-games, compared to teachers met in various training agencies.

We think it's useful that teachers are approaching the language of learners, to provide a better educational dialogue. In this sense, the project's results are highly encouraging, and T3- program is especially useful in providing a first pragmatic approach to the the use of games in education.

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