

DIGITAL GAME-BASED LEARNING FOR STUDENTS WITH MILD INTELLECTUAL DISABILITY: THE EPINOISI PROJECT

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Abstract

This communication presents and discusses the design and outcomes of the EPINOISI R&D project on Specialized Formation of General and Special Education Teachers and Production of Educational Material for Mild Intellectual Disability, implemented by the Laboratory of New Technologies in Communication, Education and the Mass Media of the Faculty of Communication and Media Studies of the University of Athens (UoA NTLab, <http://www.media.uoa.gr/ntlab>) and funded by the Greek Operational Program for Education and Initial Vocational Training (EPEAEK).

Introduction – the EPINOISI R&D project

The EPINOISI project (<http://www.media.uoa.gr/epinoisi>) has the objective to deliver formation seminars and develop digital games-based educational material for special education teachers supporting students with Mild Intellectual Disability (MID) during a 13 months' period (November 2007 – November 2008). In the course of the project a program of specialized formation for 200 primary, secondary and special education teachers supporting students with MID is realized, concerning the sensibilization of teachers to MID as well as the educational assessment, pedagogical approaches, didactic interventions and new technology applications relevant to students with MID. This program comprises seminars of theoretical formation, practical hands-on seminars, presentation of digital games-based

learning (DGBL) material and supervised application of this material in the classroom. Theoretical formation seminars have been realized during May – June 2008, whereas practical activities and supervised classroom application of digital game-based learning material are implemented during September – November 2008. The 200 teachers attending the EPINOISI formation program have been selected from schools and cities from all over Greece and are grouped in 20 formation classes located in 15 cities all over the country.

This communication focuses on the outcomes of the EPINOISI project with respect to evaluation and design of DGBL content for MID students, discussing the potential and limitations of using such content to enhance the inclusion and motivation of these students in the educational process.

The importance of (digital) play for students with Intellectual Disability

Intellectual Disability (ID) is a term employed for children and adults with certain limitations in mental development, communicative and social skills. These limitations will cause a child to learn and develop more slowly than typical, while children with ID may take longer to learn to speak, walk and take care of their personal needs. Students with ID are often described as “slow learners” and cannot easily integrate to the normal curriculum. With an IQ<70 and possible additional multiple handicaps, the need for special education adapted to their needs and capacities is essential.

The fact that children, adolescents and adults gain knowledge of important lessons about themselves and their surroundings by engaging themselves in play is uncontroversial. Using the game as a medium, students are able to explore and understand their environment and imitate behaviors and processes in order to increase their creativity and imagination (Piaget, 1962). Students with special educational needs (SEN), in particular, have an opportunity to learn through alternative educational frameworks that allow them to experience everyday situations through virtual drill-and-practice/role-playing in order to facilitate their socialization.

According to the literature, there is a strong connection between play and linguistic development, regarding children with or without SEN (Roskos & Neuman, 1998; Saracho & Spodek, 1996). Moreover, gameplay supports the concentration of attention and enables students to prove their skills and

knowledge (Detheridge, 1996). SEN and ID students, in particular, can additionally employ educational software and digital games in order to experience everyday life subjects such as mathematics, reading and vocabulary, improve problem-solving skills and prepare themselves for personal safety, social integration and vocational training (Fitros, 2005).

From a digital games-based learning perspective, besides the long-ago established importance of gameplay as a privileged framework for learning and socialization, which promotes equality alongside with acceptance of differences, motivation through challenge and absence of punishment in the case of errors, modern digital games enjoy a number of additional features such as their enhanced capability to simulate real-world and everyday-life situations in a straightforward fashion, as well as their ability to attract player's engagement through augmented playability mechanisms and balanced game feedback. All these features make digital games a most promising learning tool, in both formal and informal settings and for general and special education alike.

Based on the above, and taking into consideration the correspondence between current DGBL approaches and the educational needs of students with SEN/ID, the EPINOISI project has adopted a DGBL approach to the development of digital games-based educational material for students with MID.

DGBL material developed within the EPINOISI project

The digital games-based material for MID students developed within the EPINOISI project is based on game applications already available as well as material developed from scratch, covering subject matter relevant to language and mathematics skills for everyday life, interpersonal relations and communication, acquaintance with adult life, selected topics from the curriculum of secondary special education, as well as digital creativity activities and free-form digital gameplay.

The multidisciplinary R&D team of the EPINOISI project comprises more than 15 researchers, ranging from senior to graduate, with expertise in special and general education, cognitive psychology, communication studies, human

computer interaction, interactive applications and digital games design. Development of the DGBL educational material has started by identifying an agenda of learning objectives for the educational support, social integration and personal autonomy of students with MID. This overall agenda has been elaborated to subsequent levels of detail, down to specific objectives for the everyday curriculum, which have then been employed with a twofold purpose: firstly, as a guide for evaluating available digital games for K-12 children or adolescents with respect to their appropriateness for the support of MID students (Fig. 1); and secondly, as an agenda for developing new DGBL content for specific topics which do not seem to be adequately covered by the content already available.

<i>broad theme 1 : things around me</i>	<i>game</i>	<i>source</i>
1.1. sizes	Bon Appetit	Kaboose
1.1.5. heavy, light	Balance the scales properly	GCompris
1.2. colors	Hiyah Colors!	Hiyah
1.2.1. primary colors	Introduction to color	A Lifetime of Color
1.2.2. secondary colors	Mélange les couleurs	RadioCanada Jeunesse
1.3. shapes	Reflections	HelpKidzLearn
1.3.1. simple shapes (circle, square, triangle)	Shapes	Funisland
1.3.2. complex shapes (2-D)	Cookie Crumbler	Zeeks

Fig. 1 Excerpt from an agenda of learning themes / learning games for MID

In the course of this process it has been made clear that the important goal was not to re-invent the wheel; on the contrary, the added value of this effort was to compile well-documented references to selected DGBL material that seems to pass the tests for appropriateness and effectiveness for MID, and then deploy some high-quality additional DGBL content that supplements the available material as appropriate. Therefore, the final digital games-based learning content proposed by the EPINOISI project is structured as follows:

- selected free on-line entertainment games and digital creativity tools, to help students establish an engaging relationship with digital applications that can be smoothly re-purposed towards hidden learning goals

- compiled references to digital games for learning and edutainment software, also freely available on-line, annotated by learning themes and learners age
- a multi-episode adventure tale application developed from scratch within the EPINOISI project – the Magic Potion.

The Magic Potion: an adventure tale game for students with MID

Development of The Magic Potion game (tMP) within the EPINOISI project has been led by a twofold objective: from a learning outcomes perspective, to provide modular game-based material for basic literacy, numeracy and social skills that contribute to everyday life autonomy, the ultimate goal of special education; and from a learning process perspective, to provide an amusing game play experience that will mobilize students and enhance their self-confidence, hiding the educational agenda and taking away the feelings of stress and failure often inherent in the special education process.

The plot of the game is simple, to eliminate risks of confusion: One day a dark cloud in the sky makes the rainbow disappear, and the elders of the village ask the children to go and bring back the four colors; once this is accomplished, the final test is to mix the colors following a secret recipe and come up with the magic potion that will bring the rainbow back to the village and make everyone happy again.

tMP is a stand-alone Flash application but not a single-hero game; there is a whole company of characters who alternate in the control of the player and aid each other. Therefore, the game itself delivers the social and affective setting which is necessary for learning to occur. Apart from that, a fundamental objective of game plot, dialogues and outcomes was to have fun. Still, as this is meant to be a game for learning, game play needs to progress towards the end. Bearing in mind the eventual tendency of special education children towards repetition, game design has tried to (a) avoid tread-milling; and (b) make failure funny, and success even more funny than failure.

The game is made up of four episodes (corresponding to the pursuit of the four colors) and comprising narrative scenes and some 20 micro-games in total (mathematics, language, everyday life skills). Yet, this structure is

loosely-coupled; episodes can be entered and exited at any time and in any turn, narrative scenes and micro-games can be played or skipped, and there is no memory (objects gained etc.) persistent beyond the boundaries of any single episode, which would impose some sort of in-game linear dependencies. This is in line with the educational process itself for the game's intended audience, which is highly characterized by non-linear changes of focus on different learning subjects. Fig. 2 depicts the welcome screen of the game, from which any episode can be entered, whereas Fig. 3 presents a scene from an episode focusing on everyday life traffic rules.



Fig. 2 Welcome screen of the Magic Potion game

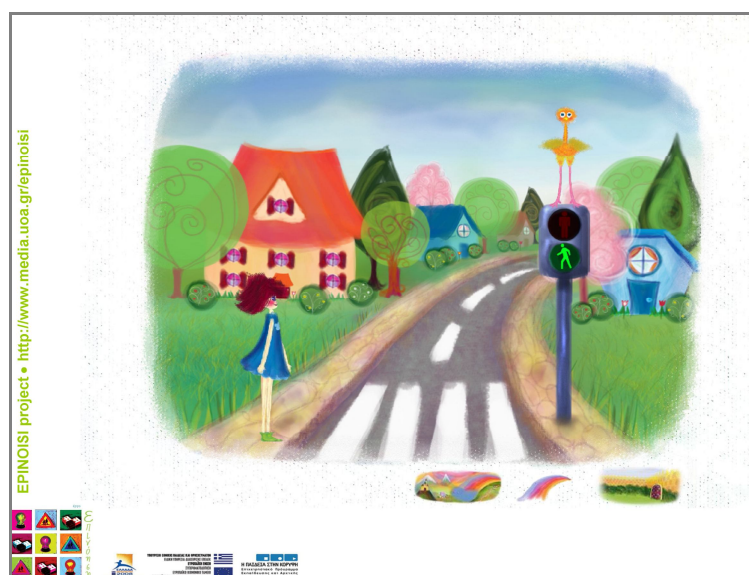


Fig. 3 Game content about community outings and social skills

The game comes with a simple tutorial mode for familiarization with the game controls (mouse and arrow keys), to cater for students not yet acquainted with these. And last but not least, the language and mathematics micro-games are also available as stand-alone games with an interface for loading dynamic content such as teacher-defined vocabulary and arithmetic problems (Fig. 4).



Fig. 4 Interface for instructor-defined content: a word-find puzzle

Currently (September 2008), tMP v1.0 has been released to the trainers and trainees of the project, to be tested in-class by about 200 teachers and 500 special education students during October – November 2008 when the final version of the game will be delivered.

Future work

The EPINOISI R&D project is trying to help SEN/ID teachers employ the potential of digital games-based learning as a supplementary in-class tool, in a blended learning approach for students with MID which will still maintain the social and affective aspects of classroom learning.

Two major issues arise in this effort: (a) SEN/ID educators need to be motivated and effectively empowered to employ digital games for learning and create their own learning content; (b) students need to establish an

engaging and recurring relationship with digital content, in order for learning to occur. Both these goals will be pursued and monitored through supervised introduction of the EPINOISI learning material in the classrooms, according to an application protocol that has been specifically designed for planning, implementation and evaluation of the corresponding educational interventions. Following project completion (November 2008) it is expected that detailed results will be available with respect to the outcomes, limitations as well as the critical success factors of this approach.

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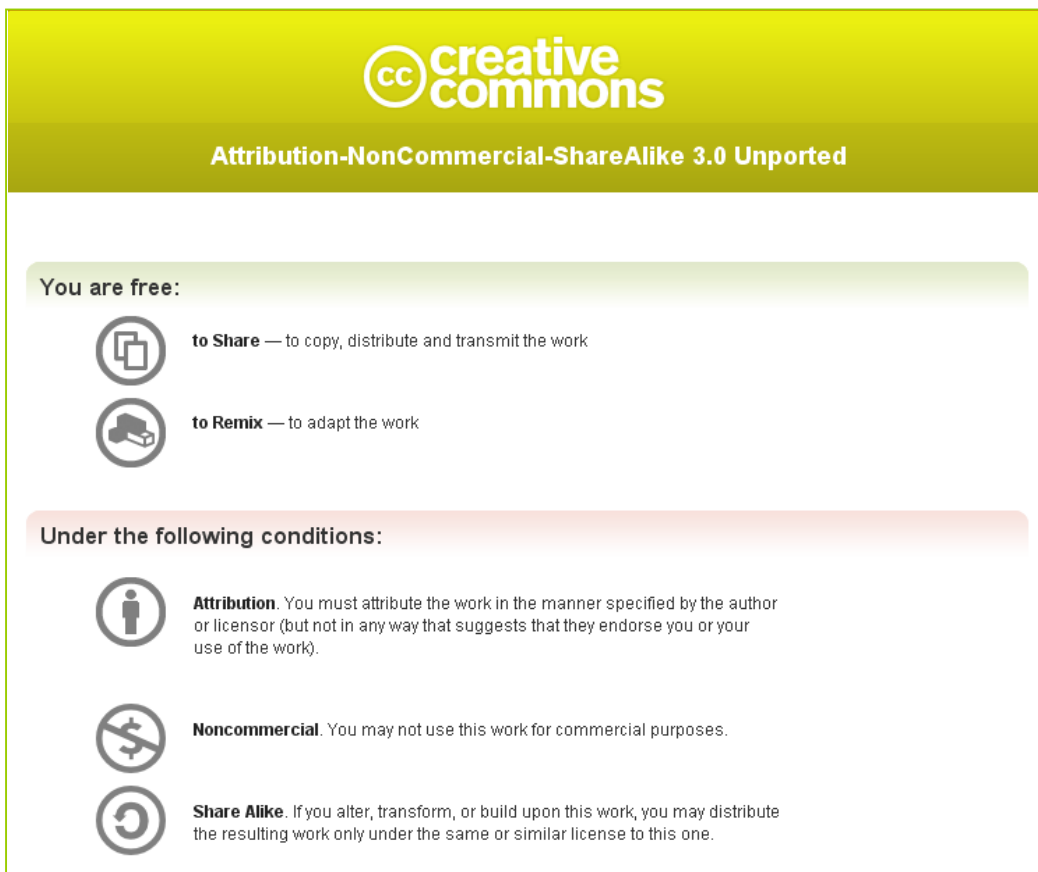
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