

Integrating serious games in the educational experience of students with intellectual disabilities: towards a playful and integrative model

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Abstract

The purpose of this paper is to present a series of observations made by researchers and educators on the incorporation of serious games in the educational experience of users with intellectual disabilities (ID). Different games and different teaching models were used in order to identify a successful model of integration with the educational process and signs of change in the intrinsic motivation of the students, leading towards a promotion of self determination were documented.

Trying to assist the educational efforts of special education teachers, we will present the results of a series of case studies and applications, including practical consideration, the role of the educator and game design, that resulted in the sketch of a model of playful game-based learning integration.

According to our findings, special education can be highly benefited by the integration of digital games in the educational scenario, creating a safe and personalized educational environment for the students as well as a valuable motivational tool for the educator, especially if the educator takes a threefold role, able to support a hybrid model of digital and non digital play.

Keywords/Key Phrases: serious games, intellectual disability, special education, motivation, self-determination, role of the educator, games based teaching

Games, Serious Games and Intellectual Disability

Children and young people with intellectual disabilities seem to enjoy using games (Fitros, 2005) and for the past decades special education has been trying to integrate serious games in their practice. The need of generating new motivational strategies and learning methods in special education is high and digital games provide a motivational tool with a potential to enrich the learning process. Moreover according to studies, digital games help to improve social relationships, raise the communication level, introduce new skills and learning strategies as well as augment the intrinsic motivation of the user (Griffiths, 2002; Green & Bavelier, 2007; Pivec, 2007)

According to researchers and educators, students with cognitive disabilities use educational software and open source online games in order to experience everyday situation, curriculum learning subjects such as mathematics reading and vocabulary, to promote problem solving skills and to virtually prepare themselves for social integration, vocational training and safety (Fitros, 2005). Gamers with developmental disabilities enjoy gaming satisfying gamers' need for rapid reinforcement (Durkin, 2001).

Over the past years, serious games have been documented at the literature review as a promising educational tool with motivational perspectives to demotivated students or students who deal with low self esteem and special educational needs (Saridaki et al, 2009; Brown et al, 2009; Buhler, 2001).

Besides the long- established importance of gameplay as a privileged framework for learning and socialization, modern digital games enjoy a number of additional features. According to studies, digital games implicitly include many educational

theories and their qualities, such as their enhanced capability to simulate real-world and everyday-life situations in a straightforward fashion, as well as their ability to attract the player's engagement through augmented playability mechanisms and balanced game feedback (Saridaki et al, 2009). Additionally, qualities such as promotion of equality along with acceptance of differences, motivation through challenge and absence of punishment in the case of errors, have been present in recent studies about the usage of games as an educational tool (Pivec, 2007; Griffiths, 2002).

All these features introduce digital games a very promising learning tool, in both formal and informal settings of education. However, what has not been documented are the integrating attempts of the educators, as well as their thoughts regarding serious game application in real classroom settings where they have to make all the decisions and integrate serious games to their educational scenario, while their own prior gaming experience is not adequate. Until recently, gaming had been used in the educational environment almost solely for recreational purposes or purely as an extrinsic reinforcement.

For many decades, the common attitude towards the motivational abilities of students with ID has been to consider these students as unable to approach the typical logical reasoning and for many decades the main focus regarding motivation, was extrinsic motivation, thus rewards or punishment. However, according to Switztky (1995), researchers have demonstrated over the past years that the efficiency of students with ID is the result of the interaction between personality and internal-intrinsic motivation and sometimes the differences between students with ID and without ID of the same age are actually based on the lack of motivation and experience.

In many occasions, special education teachers embrace change and new technological tools much easier, due to the specific needs of their pupils, including needs for playful educational scenarios, simulations, repeat of the information as well as the need for personalization and adaptivity. However, practical implications and poor game design make it difficult to create alternative strategies that implement serious games in the curriculum and educators become sceptical towards using games in their educational scenarios (McFarlane et al, 2002; Saridaki & Mourlas, 2012)

Reports from Findings

In a period of four years we had the opportunity to observe in three different studies, the application of serious games in classrooms and daily centers for students with mild and moderate intellectual disabilities.

Epinoisi Project: The first study was conducted during the EPINOISI R&D project¹ on 2007 that has been implemented by the Laboratory of New Technologies in Communication, Education and the Mass Media of the Faculty of Communication and Mass Media Studies of the University of Athens. The objective was to realize a specialized training program for primary, secondary and special education teachers supporting students with mild intellectual disability (MID) on the subject of serious games and new technologies and at the same time develop digital games-based learning (DGBL) material for MID students to be deployed and tested within the special classroom, as part of practical seminars and hands-on activities.

The total duration of the EPINOISI formation program on DGBL for MID has extended to 400 teaching hours, of which 100 hours were allocated to seminars of theoretical formation and 300 hours to practical hands-on seminars, presentation of digital game-based educational material and supervised application of this material in the special classroom. More than 200 teachers that have used especially designed games for users with ID and freely available educational games into their classrooms with students with ID, and documented

¹ <http://www.media.uoa.gr/epinoisi/>

the design and progress of their application. Each week the educators had to design a game based learning educational intervention for their students according to different kind of curriculum activities. The educators had to choose the games they would use from a list of games created during the project and from freely available serious games and integrate them into their educational scenario. During such interventions each educator documented in detail the design and actual instructional experience as well as his/her views on future GBL interventions in special education classrooms, providing feedback regarding the implications and benefits of such an effort.

Goal Net Project: The second study was applied during the Goal Net Project² using specifically designed serious games to three different classrooms of students with intellectual disability. The sessions occurred from September 25 to October 9th 2009, twice a week, with two trainers who administered the specifically designed vocational training games and software to each participant in a different order, depending on her abilities, interests and the progress they made through sessions. The gaming material was a blend of accessible and motivating e-learning material and serious games especially designed for users with intellectual disability on the educational scope of vocational preparation. Topics such as time and stress management, preparation before the first day at a new job, personal hygiene, job related quizzes etc, were introduced through the use of the Goal Net Project material.

Results from the game based learning pilots were gathered using a Soft Outcomes Star Tool, an observational checklist provided to the participant educators as well as with end point interviews with the educators. This pilot research included six young adults with mild and moderate intellectual disability and their two educators. The students, who ranged in age from 19 to 23 years of age, were registered in a School for users with ID in Athens, and were receiving vocational training.

Long Term Case Studies: Last but not least we conducted a series of game based learning sessions in a Special Elementary School for students with moderate intellectual disability and in an integrated classroom of an General Education Elementary School at 2011 for a period of a year and documented the outcomes. The research was designed by the researchers and the educators and conducted by the educators in order to document the actual implementation and practical issues of game based learning integration in the educational experience of users with special needs. The educators documented their experience regarding the design of the integration, the application and the aftermath and they were also interviewed by the researchers. The students, who ranged in age from 8 to 12 years of age, were diagnosed having intellectual disability and/or serious learning disabilities.

Based on the various outcomes of the studies, we had the opportunity to analyze the view of the educators when using serious games in their classroom from different scopes, which will be presented in the following section.

Integrating Digital Games in the SEN classroom – practical considerations

All studies were conducted in real classroom settings and in some cases there was just one laptop or one desktop computer for a group of five or more students. The majority of the schools had an organized computer classroom but no gaming consoles and it should also be mentioned that the vast majority of the educators had no prior experience in gaming and especially using games in the classroom. All schools had internet connections available and teachers had adequate knowledge of computer usage.

² <http://www.goal-net.eu>

In our studies, the majority users (both the educator and students) were more than happy to use serious games. The vast majority of the educators described the usage of serious games in a special educational setting as "motivational" and "inspiring", while they characterized digital games as a "highly engaging activity" that "*encouraged repetition of their prior knowledge and helped the trainer introduce various new topics*". There were occasions where educators were initially unwilling to use the games and were convinced after observing their students, while few cases of educators decided that using games could not benefit themselves or their students.

The majority of teachers preferred to use the games with small groups of three students of the same cognitive level and attention span, however there were many cases that the educator used students as mentors to students with less cognitive abilities or less IT experience. According to the educators, high engagement and participation were documented when the students had a successful communication flow between them.

They proposed that each session should always have a clear time limit that should not be extended and that approximately 45 minutes of gaming session is ideal in order to continue with the classical methodological approach in the classroom without interruptions. Additionally, it was advised that even though it would be better to have one gaming device per students, it could be beneficial to create small groups of 2-3 students in order to promote their communication and enhance challenge between students. Extra attention should be given to students with communicational issues in order to make sure that their needs are met during gameplay and that they do not feel high levels of stress or frustration.

One of the main findings of our research, was that the educational outcomes and self-determination promotion were more when the educator was able to integrate the digital with the non digital experience and create a playful approach to her entire educational scenario. For example, by using role play before or after the GBL experience the learning outcomes were much more positive and students had the opportunity to identify and understand the learning material as well as their ability to use this information in real life settings.

It was also mentioned by the educators of our last study that when blending digital games with play in the educational scenario, students had the time to try and were able to relate with the educational material. According to the educators, this educational scenario actually led the students to create strategies for effective decision making. These findings lead the educators to express interest in promoting self-determination and decision making through digital games blending with non digital playing.

According to the educators, when gameplay was integrated in the educational process, students demonstrated alterations in their attitude towards educational issues and seemed able to identify real life issues through gameplay, documenting a possibility of increase in their intrinsic motivation towards the educational content.

Game Design Issues – reports from findings

Accessibility and usability was one of the main factors when choosing a game in the classroom. The educators seemed unwilling to use a game that would frustrate the students due to an incomprehensive interface, vast amount of text or inconsistent gameplay options. However, in cases that a game was not especially designed to be accessible but presented qualities of high playability and a simple and consistent control system, the students were willing to try harder and overcome some accessibility issues (e.g. very quick gameplay, presence of textual information, complicated instructions etc).

Moreover, it became clear in our studies that both educators and students preferred highly interactive games with an appealing storytelling, while

adaptation and personalization were characterized as essential. It seems that educational games should focus on these characteristics along with more personalization options regarding age, cognitive status, preferences and motor abilities of the users. Regardless their cognitive state, students were able to differentiate and prefer a well designed game since it could actually provide them with a much more understandable and satisfactory experience.

The elements of fun, fantasy and challenge (but not too challenging for their abilities) were proven to be the most important characteristics of the most successful educational games. Easily identifiable games as educational and curriculum based, would be easily discarded by more experienced gamers as boring. However it was observed that if the educator believed in a game even if it was more an edutainment product than a serious game, he/she was able to enhance its drawbacks in the classroom by integrating it to an interesting educational scenario and use it with success.

The educators stated that they felt much more secure to use adaptable games but also mentioned that lack of time to make changes is always an issue when choosing a game. They mentioned that students seem to enjoy replaying a game with an interesting scenario as long as the educational content e.g. questions were altered accordingly. It was documented that the majority of the educators in our studies, insisted that they need to be able to adapt the educational content according to their needs, but seemed highly reluctant in creating gaming content from scratch due to lack of time and/or programming knowledge. Therefore it seemed clear that educators prefer a list or even better, a database of accessible, adaptable and suitable games in order to be able to create the educational content and alter some elements or even the structure of the game easily, without the requirements of a programming background and the time consuming implications of interfering with programming and game design.

The role of the educator

It has been mentioned by almost all educators that the most essential phase in order to apply serious games in the SEN classroom is the good preparation of the educator. The teacher should take on the role of the researcher in order to identify the potentials of her user group and their needs for educational and gaming content. At the same time she should understand the mechanics of the chosen game and prepare the intervention in order to link the gameplay with the classic method.

Setting time limits and rules of play is essential and using the games as a treat or as a method of discipline is not always effective. On the contrary, it might have opposite results regarding intrinsic motivation and ability to concentrate. The educators in our studies seem to realize that the intrinsic motivation that the games could provoke to the students, was much more important than using the game as another external motivational tool of reward.

According to our findings, the role of the educator becomes much less intervening, as the gaming experience of the students progresses. As the trainee becomes more familiar with in-game task elements and develops the ability to carry it out independently, the tutor intervenes less. However it was mentioned by the majority of the educators that it is of cardinal importance to maintain a balance between success and challenge in each educational session and the educator should be always present in order to maintain this flow. This role was characterized as the role of the animator, balancing between the classical educational method and the immersive gaming sessions, maintaining the flow of the game and the cooperation between students.

Although the goal of SE is to achieve self-directed, self-motivated learners, educators mentioned that they should also provide support for knowledge construction. Constant but less interventional supervision was mentioned as essential in order to guide the students and to observe and intervene in case of a

technical failure. Preparing the students before the gameplay and debriefing them afterwards seemed to augment the educational attributes as well as the motivational qualities of the procedure, both for the educator and the students. However it was described, that the more the educators were able to follow the game flow. the more they were able to create a better intervention the next time. As it was mentioned and documented in various cases, the educators revisited the conclusions they had regarding the cognitive, communicational abilities and skills of their student(s), embracing the fact that they demonstrated much more enhanced skills and intrinsic motivation than they initially expected.

At the same time the educators felt more motivated in participating during gameplay, designing the intervention and even designing and creating games themselves. Educators characterized the gaming interventions with terms such as "communicative", "cooperative", "experiential" and highly engaging", when they needed to describe the interventions. Since these are some of the most highly anticipated qualities when working with students with ID, it seems that educators are ready to use games as an educational tool and benefit by their motivational power.

The educators seemed to believe that their role could be altered when using a game from the role of the behavioral educator to the role of the supportive co-gamer, being able to participate and reassess the intervention. The communicational and informational quality of such an alteration even for the short period of a gaming intervention was characterized as highly motivational and informational.

Towards a model of playful game based learning integration: The "three pillar" role of the educator

The role of the educator as described by the success stories of our researches, can be based on three pillars: as a researcher, a facilitator and of course, as a co-gamer. The truth is that the last few years there is much discussion on the type of mediation which should be adopted by the educators when incorporate games in their lesson. According to the frequency and quality of the educator's assistance, mediation may constitute either a simple supervision or a full guidance. In many cases, this divide is indicated by the chosen position (near, far or very close to the student) of the educator in order to support his student's gaming experience.

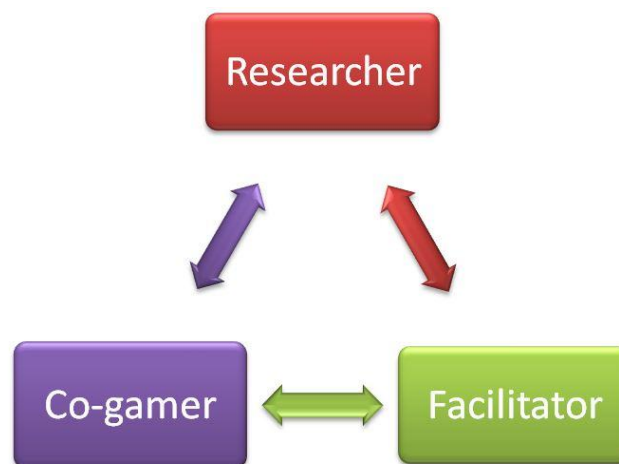


Figure 1. The role of the educator

Researcher

Studies (Paravy & Martin, 1996) show that the most efficient is a joint approach, which maintains the balance between close guidance and distance supervision. However, the teacher is the one that should have a clear image of his/her role – even prior planned- depending on the context of the classroom and the specific needs of his/her students.

This is why is essential to take the role of a researcher. For the effective integration of digital games in the educational process, an educator should be prepared both regarding his/her theoretical and practical background since they are equally necessary for reflection and framing of a successful educational intervention. The teacher should be able to identify the needs and potentials of each student as well as to correlate them with games suitable for classroom usage, according to his/her learning scenario.

Based on our findings we strongly believe that digital games do not constitute a perturbation to the educational process but especially when used in the SE settings there are some issues to be considered. However, the various practical issues that might arise, should not discourage the educator but to become points for processing, analysis and further research. Therefore, it is proposed that when using games in the classroom, the teachers should base their educational scenario and choices on their own research (Belanger, 1992), and as a teacher researcher to adopt 'open' methods and techniques. For this reason it is proposed to use a technical participatory observation and some aspects of the methodology of the case study, where necessary, particularly through the use of questionnaires or observation logbooks. Based on the above mentioned findings we created a framework of questions in order to facilitate the educator when designing a GBL intervention in SE settings. This set of questions help the educator design and prepare the intervention, conduct a list of questions and answers that will accompany him/her during the entire GBL application.

To sum up, it is recommended to use prior planned lesson projects which will suit to the framework of the classroom, and will enable the educator to adapt the digital material, according to the needs of his/her students or to amend the whole lesson in accordance with the chosen digital game, as it would be unrealistic to seek the "ideal" game.

Facilitator

Additionally, the teacher involved in the process of integration of digital games in the classroom of SE students, is expected to find effective ways to encourage students during their gameplay. The second pillar refers to the maintenance of flow during gameplay. The term 'facilitator or encouraging partner' emphasizes the dimension of the educator's role, that integrates digital games with non digital play and educational methods, maintaining the gaming flow, while motivating the group and each individual student. In this pillar we also incorporate the integration of GBL with classical educational method. The educator is prepared and confident to make connections with former knowledge and maintain the level of gamers' satisfaction high.

The incentives promote the level of satisfaction throughout the group and achieve greater extent interaction and communication among class members. Also, in this approach a teacher avoids both to overrun the educational objectives of his lesson and to turn a lesson into a 'happy hour', or to lose the gaming atmosphere through continuous educational interventions, as for example to use a digital game as a repetitive test.

Co-gamer

The third pillar refers to the teacher as a co-gamer, in order to emphasize the experience of her students and the successful integration of games in the classroom. In this role the educator focuses in the observation of students' experience and cognitive interaction. Digital games may offer considerable changes in various skills and the development of thinking strategies. But as these changes are not always visible, they are not easily understood and especially in the case of ID not expressed explicitly by the students. So the teacher must be as close as possible to observe and document them.

The teacher as a co-gamer, the third pillar of our model, maintains a discreet position close to the child, may collect an important number of information by the observation of the GBL experience of the student during gameplay. It may also work as an assistant where necessary, either in order to overcome some obstacles during gameplay, or to broaden their students' cognitive procedures. One way to achieve this, could be even to verbally interact with the students about their difficulties regarding the game and how it intends to overcome them or about what they expect to find next, etc. In case of communicational problem it was advised to observe the gaming preference of the student. As a co-gamer is much more able to gather valuable information, reassess the intervention, and gather valuable data for the next "researcher" phase.

To summarize, the educator's role from the view of a threefold role, provides all those elements of the case studies, by offering an essential and continuous feedback through the evaluation of the whole process of the integration of digital games in the classroom.

Consideration and Future Studies

We had the opportunity to observe special education teachers integrating game based learning in their scenarios and document their considerations, success stories as well as their need for a playful integration and guidance.

Integrating GBL and non digital play in the educational method was considered as a successful blend by educators, however the focus of the GBL community should also be on supporting the educator to design of the educational scenario as well as promoting the creation of fun and accessible games for players with ID.

During our studies, educators described their role in a successful GBL interventions as a threefold role, the one of the educator as a researcher, as a facilitator and as a co-gamer.

Game based learning, through its motivational qualities and friendly environment might be able to help the student with ID to virtually prepare for social integration, vocational training and safety while test his/her abilities and make mistakes in a much friendlier and personalized environment. These qualities require further investigation in order to document the way that game based learning can be an intrinsic motivation tool that promotes self-determination to people with disabilities.

Nonetheless, the game as a medium of intrinsic and extrinsic motivation has to transform its educational potentials into educational assets. Especially regarding learning difficulties and intellectual disability, we should see the actual reality regarding the individual needs of each student, the available games and of course the classroom practices. It seems essential to continue studies that involve accesible and personalized game design with a respect to the practical considerations and focus on the experience of the educator.

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