THE MOTIVATIONAL CIRCLE OF GAMES: INTEGRATING LOCATION BASED GAMES AND COMPUTER GAMES IN THE EDUCATIONAL EXPERIENCE OF USERS WITH EDUCATIONAL DISABILITIES

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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 games in the educational experience of users with mild and moderate intellectual disabilities (ID). We will describe findings that sketch motivational alteration of users with intellectual disabilities, as well as the role of the educator and caretakers regarding the integration of games in their educational scenarios.

In a period of five years we had the opportunity to observe the application of serious games in classrooms and day care centers for students with mild and moderate intellectual disabilities. in four different studies. Specifically designed serious games were applied in different educational settings, in order to identify the motivational power of digital games in Special Education. During these four different studies, children and young adults with intellectual disability used digital online and standalone pc games, as well as location based games specifically designed for users with intellectual disability in formal and informal educational and social training settings.

The outcomes revealed that games have the potentials to be a motivational tool for Special Education, especially when applied along with playful analog narrative as a holistic approach.

Keywords: digital games, educational games, intellectual disability, location based games, instructional design, motivation, self determination

Introduction
According to Switztky [1], over the past years researchers have demonstrated 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. However, 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 [1].

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 reinforcement [2]. Gamers with developmental disabilities enjoy gaming and a stronger motivation in this population may be the fact that games can be attractive since they satisfy the students' need for rapid reinforcement [3] .

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 [4], [5]. These researches regarding the possibility to extend the will and motivation to play games with the personal intrinsic motivation towards change and self determination, have been supported by our findings, leading towards a promotion of self determination through gaming integration. There are also emergent indications that playful location based software promotes the development of better spatial mental models to users with ID.

Intrinsic Motivation of Students with Disabilities
Making choices and expressing preferences are often associated with intrinsic motivation and self determination and is a main element frequently addressed in the literature, particularly relating to students with disabilities [6], [7].

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 reasoning and the main focus regarding motivation, was extrinsic motivation, thus rewards or punishment [8]. However, according to Switztky [8], 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.

According to Poonam [9], retention and generalization improve when learning is intrinsically rather than

extrinsically motivated, while intrinsic motivation is strongly associated with academic achievement in students with learning disabilities. The literature review also found since students with learning disabilities usually do not attribute their successes and failures to their own ability and effort, there is a need to incorporate motivational theories into intervention programs and to train students to attribute performance outcomes to their own efforts [9].

Games as an intrinsic motivator

Malone [10] suggested that video games may promote engagement and intrinsic motivation, and possibly motivate to learn, while Rieber [11] also observed that game mechanisms, such as feedback cycle and intrinsic motivation, may benefit learning activities and therefore ought to be integrated into instructional settings.

Games seem to improve students' perseverance and confidence, and students as well as teachers welcomed the opportunity to use Game-Based Learning on a regular basis [2], [4], [12]. Games are engaging, fun, and they intrinsically motivate players to learn more about the game rules, its mechanics, and sometimes to learn and gather information when the game is over.

In researches that combined a tutoring system adapted to users' knowledge and behaviour with a Game-Based Learning environment [13] [14] [15], showed that adaptive mechanisms in GBL can significantly increase students' motivation to learn. Students felt less forced to learn accept new information and create learning strategies, after they played an educational video game that satisfied their need for autonomy and relatedness [15].

Digital Games in the educational experience of children and adults with ID

According the the literature review digital games and their intrinsically motivating mechanisms can apply to the educational efforts of special education teachers. However the question remains. Are games and serious games able to offer motivational change in the educational experience of students with ID? Having in mind this question, we will present the results from four different studies.

Reports from Findings

In a period of four years we have had the opportunity to observe (in four 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 project 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.

More than 200 teachers have used especially designed games for users with ID and freely available educational games into their classrooms with students with ID, and documented 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. These documents were analyzed based on the experience (successful or not) of the educator and the model she used in order to integrate digital games with the educational scenario.

According to our findings, educators documented change in the attitude of their students towards academic and social skills and in some cases documented retention, generalization and self determination during and after the games based learning session. Teachers who embraced an open, cooperative educational scenario and blended the educational content with digital games through playful integration, were clearly much more satisfied with the results and documented positive results from their students. [16].

Goal Net Project: The second study was applied during the Goal Net Project 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.

According to case studies usage of games promoted change in the attitude of the users. In some users especially regarding their will to apply for a job and requested further information from internet and relatives regarding job experience. They also requested more games and asked if they could use games for academic subjects [17]

RECALL Project Case Studies: The third study was a part of a European project that lead to the development of an accessible location based mobile and web application named RouteMate, to help people with various disabilities learn simple routes. This was supported by structuring the software using principles of game based learning, in order to scaffold the learning of new routes and promote ultimately independent travel. RouteMate application is designed for the Android Operating System, and provides the user with the option to create a new route, or load and modify an existing route with the help of a parent, care taker or trainer. RouteMate reinforces the learning of new routes, by allowing the user to rehearse the route a number of times accompanied by a trainer or teacher before independent travel through game based learning elements embedded on the actual application as well as playful scenarios during training supported by the design of RouteMate. The overall goal is to allow the user to travel more independently and rely less on the application and more on their own skills [18].

The playful narrative approach takes the form of digital scavenger hunts, by extending the landmark style and interactions in different ways, and using them to scaffold different phases of use of the application. This approach seeks to teach and reinforce the concept of maps and route learning, as well as promoting the connection between the map representation and its real world counterpart.

Methodology was adopted via a mixed qualitative and quantitative analysis for a period over two months, 43 end users in four different countries, by five different research partners (UK, Greece, Romania and Bulgaria). Participants worked together with their caretakers and parents together with one or two researchers. Ages ranged from 8 to 68 years. Ethnicity: 15 were British, 1 Pakistani British, 9 Bulgarian, 7 Romanian and 8 Greek. 45.2% were beginners (referring to technical knowledge), 45.2% were average users and 9.5% (4 out of 43) were described as experienced users. 34.9% experienced learning disabilities, 14% with autism and 4.7% communication problems. Cognitive, physical disabilities and sensory impairment were recorded in almost equal rates ranging from 25.6% to 27.9%.

Interestingly, preliminary qualitative results and focus groups at the end of each playful session concluded, that users retained information much better when using Route Mate as a scaffolding game than when using it as an assistive route learning application. An increase in self-determination, motivation and memory was also recorded in participants at the gamified piloting sites. Combining games based learning elements (GBL) with location based services (LBS) has proven to be a successful methodological approach with high motivational qualities for participants and caretakers. In summary participants made important progress in their IT skills and self-determination after the Route Mate sessions. In some case studies users expressed will to make changes in their lives and acquire academic and streetwise skills.

Research results, together with users' and caretakers' comments, showed that using Route Mate can lead to an increase in will for autonomous travel, producing at the same time the necessary motivation for further personal development, especially when blended with role playing games and playful narrative [19]. However apart from the results regarding positive change in self autonomy and intrinsic motivation, more research data is required in order to determine that the playful use of Route Mate improved the understanding of map based representations and how they developed their cognitive strategy.

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 a 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.

It was documented by the educators and the researcher, that when blending digital games with play in the educational scenario, students had the time to try, make mistakes 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 play in a motivational circle of digital games and playful scenarios.

Conclusion

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 actual classroom practices.

According to our findings digital games have the ability to integrate into special education and positive change towards self-determination and intrinsic motivation were documented. It was also documented that digital games can be blended with analog playful practices in order to extend their motivational qualities.

Game based learning, through its mechanisms, narrative power, motivational qualities and friendly environment seems able to help students with ID to virtually prepare for social integration, vocational training and safety while test their 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 applicable intrinsically motivational tool that promotes self-determination to people with disabilities.

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References

1. Switzky, H. N. (1995). Individual differences in personality and motivational systems in persons with intellectual disability. Chapter 15, Paper Presented at the Annual International Convention of the Council for Exceptional Children (73rd), Indianapolis, April, 5-9, 1995.
2. Saridaki, M. and Mourlas, C., (2011). Motivating the demotivated classroom: gaming as a motivational medium or students with intellectual disability and their educators. In P. Felicia (Ed), Improving learning and motivation through educational games: multidisciplinary approaches. Idea Group reference, April, 2011
3. K. Durkin (2010) "Video games and young people with developmental disorders". Review of General Psychology, Vol 14(2), Jun 2010, 122-140
4. D.J. Brown, E. McIver, P.J. Standen and P. Dixon (2008). Can Serious Games Improve Memory Skills in People with ID? Journal of Intellectual Disability Research. Vol. 52, Parts 8&9, p.678. August 2008. ISSN 0964-2633.
5. D. J. Brown, M. Shopland, S. Battersby, A. Tully and S. Richardson. (2009) "Game On: Accessible Serious Games for Offenders and those at Risk of Offending" , Journal of Assistive Technologies, 3(2), June 2009, pp.13-25.
6. Martin, J. E., Valenzuela, R., Woods, L., & Borland, B. (2004). Self-directed transition and employment. In J. L. Matson, R. B. Laud, & M. L. Matson (Eds.), *Behavior Modification for Persons with Developmental Disabilities*. Kingston, NY: National Association for the Dually Diagnosed.
7. Wood, W. M., Fowler, C. H., Uphold, N. M., & Test, D. W. (2005). A review of self-determination interventions with individuals with severe disabilities. *Research and Practice for Persons with Severe Disabilities*, 30, 121-146.
8. Switzky, H. N. (1995). Individual differences in personality and motivational systems in persons with intellectual disability. Chapter 15, Paper Presented at the *Annual International Convention of the Council for Exceptional Children (73rd), Indianapolis, April, 5-9, 1995.*
9. Poonam, C. D., (1997). Intrinsic Motivation and Academic Achievement, What Does Their Relationship Imply for the Classroom Teacher? Remedial and Special Education, 18 12- DOI: 10.1177/074193259701800104
10. Malone, T.W., (1982). Toward a theory of intrinsically motivating instruction. *Cognitive Science, 5(4), 333-369.*
11. Rieber, L., (1996). Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games. *Educational Technology Research and Development*, 44(2), 43-58.
12. Shaw, K. & Dermoudy, J., (2005). Engendering an empathy for software engineering. In Proceedings of the *7th Australasian conference on Computing education - Volume 42*. Newcastle, New South Wales, Australia: Australian Computer Society, Inc., pp. 135-144.
13. Marty, J. & Carron, T., (2011). Hints For Improving Motivation In Game-Based Learning Environments. In P. Felicia (Ed), *Improving learning and motivation through educational games: multidisciplinary approaches.* Hershey: Idea Group Reference
14. Virvou, M., Katsionis, G. & Manos, K., (2005). Combining software games with education: Evaluation of its educational effectiveness. *Educational Technology & Society, 8(2), 54-65.*
15. Deen, M. & Shouten, B., (2011). Games That Motivate To Learn: Design Serious Games By Identified Regulations. In P. Felicia (Ed), *Improving learning and motivation through educational games: multidisciplinary approaches.* Hershey: Idea Group Reference.

16. Gouscos, D., Saridaki M. & Meimaris, M. (2008) “Digital Game-Based Learning for Students with Mild Intellectual Disability: The EPINOISI Project”, 4th International Conference on Challenges and Uses of ICT - The dynamics of development: at the crossroads of the world (EUTIC 2008), Lisbon, Portugal, October 2008, p.p. 531-539
17. Brown, D., Standen, P.,J. & Rees, F. (2009) Effect of playing computer games on decision-making in people with intellectual disabilities. Journal of Assistive Technologies, 3 (2), 6-15
18. Brown, D., McHugh, D., Standen, P., Evett, L., Shopland, N. & Battersby, S. (2011) Designing location based learning experiences for people with intellectual disabilities and additional sensory impairments. Computers and Education, 56 (1), 11-20
19. Saridaki, M. and Roinioti, E. (2013) RouteMate, a location based route learning system for users with disabilities: a playful methodological experience in different urban European landscapes at The HYBRID CITY II: Subtle rEvolutions Conference, 23-25 May 2013, Athens, Greece