GameIt and a new paradigm on gaming in education

George Pavlidis*, Stella Markantonatou

Athena Research Centre
*corresponding author: gpavlid@gmail.com

Extended Abstract

Gamification is a process that targets the engagement and involvement of people in problem solving and development in various environments and in a pleasing manner. Gamification can draw its theoretical framework on various other fields and approaches. Recent studies have already indicated the positive effects of gamification [1][2]. Game-based learning is a special case of gamification where educational games are games that are either those expressly designed for educational purposes or those with educational value that emerges randomly or secondarily. These games are being designed to aid in learning about specific subjects, in expanding concepts, in stimulating growth, in understanding a historical event or a culture, in developing a skill while playing. All kinds of games can be used in an educational environment. The use of games to promote student's learning has been based on the motivation aspect that games involve [3], which in turn encourages curiosity [4] and creates the impression of controlling the learning process. In the recent literature, the use of games in education has been explored in various aspects. [5][6] study the case of data structures and programming courses. Other studies included game projects [7], interprocess communication [8], operating systems [9] and more. In games (in general), players engage in processes such as proactive/anticipatory, recursive thinking, organisation of information, general search heuristics, means–ends analysis, and the generation of alternative solution paths [10]. Game-based learning engages players in learning activities, usually by means of educational video or serious games [11]. It has already been shown that game-based learning can be combined with similar learning methodologies as Collaborative-based Learning [12], Problem-based Learning [13]-[15] and Project-based Learning [16][17].

The work presented here is a description of the approach taken by *Project GameIt*, a Greek national funded project that aimed at a novel paradigm on gaming in education. The vision in GameIt was to create a single integrated and easy-to-use educational game development platform based on educational principles and scenarios using content from national and international repositories and supporting commercialization. GameIt would not change the usage model – which is a typical first-person game. GameIt would definitely contribute with a new content integration model, a new model approach to the content, a new model and incentive for creators and a new business model in education. The GameIt approach is cantered on a novel knowledge integration and game development paradigm, contemporary gaming and effective entrepreneurship. The *knowledge integration* part of GameIt is a novel and innovative approach towards the integration of national and international resources into a single searchable knowledge system to support the creation of educational games, based on state-of-the-art technologies and international standards. This system is based on a novel CIDOC-CRM and LOM integration to seamlessly support cultural and educational resources. The next highly novel approach within GameIt is the *game development* part. This represents an innovative approach towards a cross-platform educational game-authoring environment based on state-of-the-art gaming technologies. This game authoring system supports the creation of game templates and complete game scenarios based on educational templates and contemporary educational approaches for effectively any kind of subject, using digital content provided by the knowledge integration system. The *gaming part* of GameIt is based on a first-person (and also third-person) gaming approach using cross-platform gaming technologies

that actually implement the game scenarios developed by the game authoring system. In overall, the whole construct of GameIt was built to support entrepreneurship using innovative techniques to include both business to business marketing and business to client approaches. An overview of the GameIt platform, which also includes the basic level functionalities is shown in Figure 1. The innovative knowledge management system includes a subsystem to accommodate management of external resources of cultural and educational content along with the management of user content stored in GameIt.

The adopted exploitation plan that reflects the entrepreneurship part of the system targets both developers and end-users, whereas it focuses mainly on developers and was inspired by the mobile app stores model. In this model developers have a prominent role in developing educational game templates and educational game scenarios. All these are based on well-established pedagogical approaches and can be supported by model-templates that already exist in GameIt. Game development is based on game templates, games scenarios and the content. Developers can distribute their games through the GameIt platform either for free or for a fee. They can also distribute their game templates. The games developed in GameIt are played on an island (see concept art in Figure 2). The island consists of various building and spaces to implement any educational game scenario; it is cross-platform and was implemented using the Unity game engine.
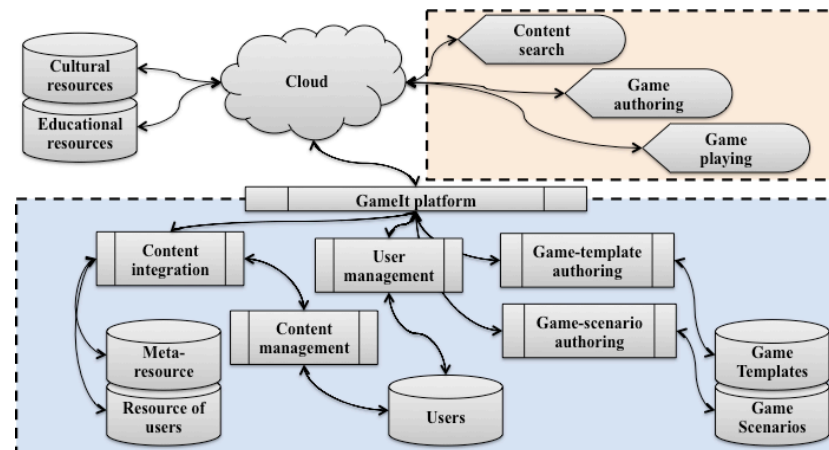

Figure 1. Overview of the GameIt platform

Figure 2. The GameIt island – concept art

Acknowledgements

References

[1]   Hamari, J., Koivisto, J., and Sarsa, H. (2014). Does Gamification Work? – A Literature Review of Empirical Studies on gamification. *In proceedings of the 47th Hawaii International Conference on System Sciences*, Hawaii, USA, January 6-9, 2014

[2]   Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35, 179-188

[3]   Bergin, S., & Reilly, R. (2005). The influence of motivation and comfort-level on learning to program. *In: Proceedings of the 17th workshop on psychology of programming – PPIG'05*. pp. 293–304.

[4]   Kumar, D., (2000). Pedagogical dimensions of game playing, *ACM Intelligence Magazine*, 10 (1)

[5]   Adams, J. (1998). Chance-it: an object-oriented capstone project for CS-1. *In: Proc. 29th ACM Special Interest Group on Computer Science Education (SIGCSE) Technical Symp. Computer Science Education.* pp. 10–14

[6]   Becker, K., (2001). Teaching with games: the minesweeper and asteroids experience, *Journal of Computing in Small Colleges*, 17 (2), pp. 23–33

[7]   Huang, T. (2001) Strategy game programming projects. *In: Proc. 6th Annu. Consortium for Computing Sciences in Colleges (CCSC) Northeastern Conf. Computing Small Colleges*, pp. 205–213.

[8]   Reese, D. (2000). "Using multiplayer games to teach interprocess communication mechanisms". *In: ACM Special Interest Group on Computer Science Education (SIGCSE) Bull.*, Vol. 32, pp. 45–47.

[9]   Hill, J., Ray, C., Blair, J., & Carver, C. (2003) Puzzles and games: addressing different learning styles in teaching operating systems concepts. *In: Proc. 34th ACM Special Interest Group on Computer Science Education (SIGCSE) Technical Symp. Computer Science Education*. pp. 182–186

[10]   Pillay, H. (2002). An investigation of cognitive processes engaged in by recreational computer game players: implications for skills of the future, *Journal of Research on Technology in Education*, 34 (3), pp. 336–351

[11]   Juan C. Burguillo, Using game theory and Competition-based Learning to stimulate student motivation and performance, *Computers & Education*, Volume 55, Issue 2, Sept. 2010, pp. 566-575

[12]   Slavin, R.E. (1980). Cooperative learning, *Review of Educational Research*, 50 (2), pp. 315–342

[13]   Hmelo-Silver, C.E., (2004). Problem-based learning: what and how do students learn?, *Educational Psychology Review*, 16 (3), pp. 235–266

[14]   Hmelo-Silver, C.E., Barrows, H.S., (2006). Goals and strategies of a problem-based learning facilitator, *Interdisciplinary Journal of Problem-based Learning*, 1, pp. 21–39

[15]   Merrill, M.D., (2007). A task-centered instructional strategy, *Journal of Research on Technology in Education,* 40 (1), pp. 33–50

[16]   Barrows, H.S., Tamblyn, R.M., (1980). Problem-based learning: an approach to medical education, *(Springer Series on Medical Education) Springer*, New York

[17]   Boss, S., Krauss, J., (2007). Reinventing project-based learning: your field guide to real-world projects in the digital age, *International Society for Technology in Education*, Eugene, OR