PlayLearn: Supporting Motivation through Gaming in E-Learning

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Abstract

The area of technology-enhanced e-learning has seen significant improvement during the last decade. E-learning now relies heavily on network connectivity and makes use of the latest gadgets for accessing the educational content. At the same time, only a small number of e-learning systems use learning through gaming despite the well known fact that games can act as effective learning environments producing learning experiences that are intrinsically motivating. This paper presents PlayLearn- a new component for the adaptive e-learning systems that supports motivation through gaming. The PlayLearn adds support for playing educational games that aim at transferring knowledge by being both competitive and entertaining so learners will want to return to play again.

Keywords: motivation, gaming, adaptive e-learning

1   Introduction

Less than a quarter of century ago, no one imagined that Internet will play such an important role in our life helping us with the day –to day activities such: communication, learning, entertainment, etc. In [1] has been shown that young people use the Internet technology for school, work and recreation and they spend on average almost 20 hours per week being engaged in various activities. In this context the teaching model has been adapted by using electronic learning (e-learning) as a specific mode to present a course or to use the educational facilities provided by the educational institutions.

The number of professors from USA that use e-learning platforms for teaching has increased with 12 per cent per annum and just over 25 per cent of all American post-secondary students are taking at least one course fully online in 2007 [2].

Adaptive e-Learning Systems (AeLS) represent an alternative to the traditional e-learning environments where the same content is delivered to each learner. These systems personalise and adapt the educational content and other aspects of the e-learning environment in order to match learner's knowledge, goals, preferences, skills, etc and to improve the Quality of Experience (QoE) of the learners.

The generic architecture of an AeLS consists of a user model, domain model and adaptation model (Figure 1). Domain Model consists of concepts to be taught organised in a hierarchical structure where relationships exist between concepts. User Model contains information on learner's knowledge,

goals and preferences. Adaptation Model consists of rules used during both content and navigation support personalisation process. These rules combine information from both DM and UM in order to provide a personalised educational content.

Various AeLS [3, 4, 5, 6, 7] were proposed over the last decade and they were successfully tested within different educational institutions.
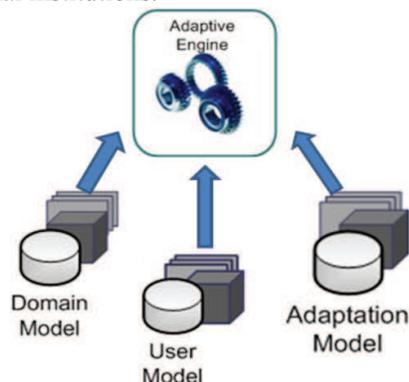

Figure 1. Generic architecture of an AeLS

The latest development of the IT technology has enabled the integration of gaming in the learning process. Research study [8] has shown how the game can act as effective learning environment producing learning experience that is intrinsically motivating. "When people are intrinsically motivated to learn, they not only learn more, they also have a more positive experience" [9]. As motivation is considered an important step in the learning process, this paper presents PlayLearn, an e-learning component that uses game to motivate the learner to achieve knowledge or skills.

Students using PlayLearn are feeling motivated to continue with learning, increasing the knowledge level and being rewarded with a new game as a bonus for their effort. The game they receive is a game from their list of preferences.

The paper is structured as follows. Research efforts in the area of gaming based learning are presented in section two. Section three introduces PlayLearn while preliminary testing results are presented in section four. The paper finishes with conclusions and future work.

2   Game in E-learning

If we introduce a challenge in the learning process, a challenge not to easy to bore the learner and not too hard to be impossible to be resolved, the result can be an increase in the student's motivation and their satisfaction. According to [10], playing takes place in a 'magic circle', where the student fells confident, secure and motivated.

Educational computer-based games [11, 12, 13] are becoming now a part of curriculum in school and they are used as an additional tool for teaching. These games supplement traditional educational method. The goals of the educational games are to support transfer of knowledge, and to provide a competitive and entertaining place so that learners are motivated to return to play the game. "Computer games provide straightforward navigation and increased motivation, which is easier for student to stay with the game in order to learn the concepts" [14].

Games developed intentionally for educational purpose were proposed by some researchers. Some experimental results on using educational games with teaching session were presented in [15, 16]. The results show that computer games clearly facilitate students learning performance.

Nowadays more and more people take into consideration the introduction of educational games in the e-learning content development. For example, [17] provides a theoretical framework for educational games in e-learning. Research is still at the beginning in this area and various techniques on using gaming into the learning process are proposed [18, 19]. The educational games have been considered as a Learning Object distributed within the learning system or as an evaluation tool integrated in the system.

3   PlayLearn

In order to motivate someone you give s/he a reason (or a set of reasons) that determines that person to engage in a particular behavior. Learning motivation can be used to focus the students' attention and to make them to want to acquire more knowledge. When the learner natural interest grows in an intrinsic satisfaction, it involves an interest in the learning task and it can become a challenge to do that task. Therefore, you can motivate students by giving them something that they like, for example a game. With PlayLearn, when a learner has passed a knowledge level they will receive a new game.

In order to integrate PlayLearn with an AeLS we have extended the generic AeLs architecture that mainly consists of a User/Learner Model, Domain Model and Adaptation Model with a PlayLearn component (Figure 2).
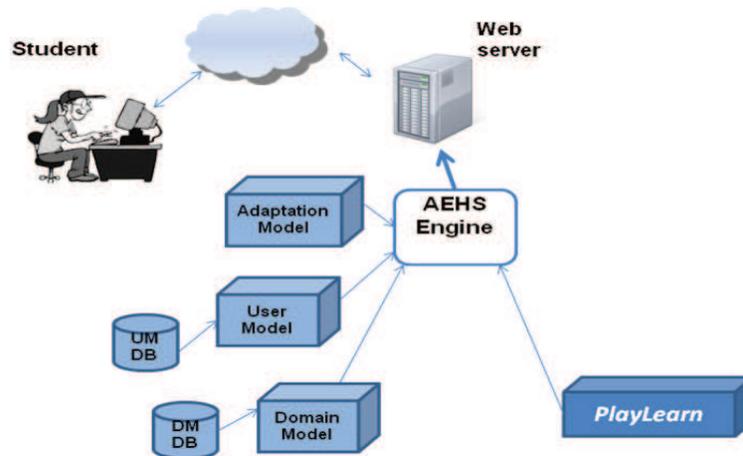

Figure 2. PlayLearn integrated with AeLS

The requirements for the PlayLearn module include a list of assessment items as input for the adaptation engine and the type of games a learner enjoys the most. The learner knowledge level is required from the User Model. Learner's game preferences and the current knowledge level stored by the User Model are saved in a PlayLearn profile database. Game adaptation rules are also created in order to determine when a student receives a new game and what kind of game should be. A game is presented to the learner through a game interface embedded in the web page that presents the learning content. Figure 3 shows in more details the PlayLearn module.
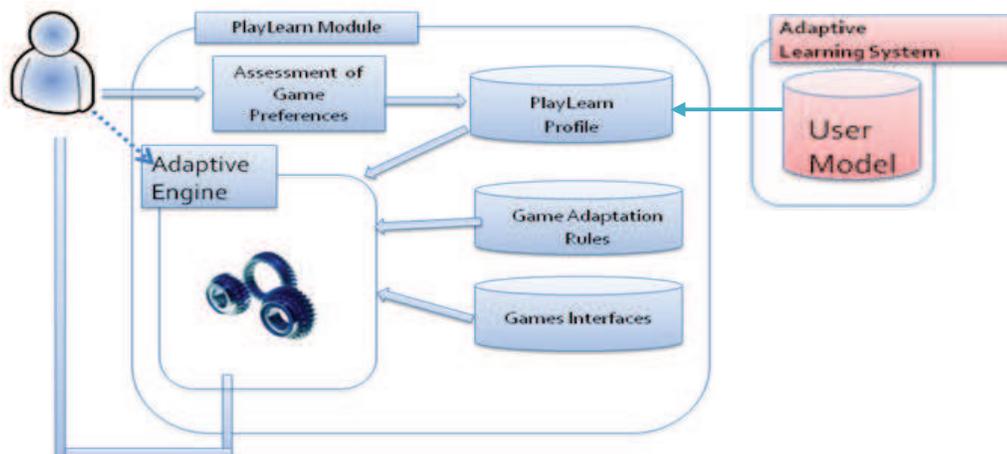

Figure 3. PlayLearn Module

The Adaptive Engine interprets the adaptation rules and selects game based on learner profile, their game preferences and current knowledge level. Game can be easily added (or removed) by loading the game into the PlayLearn Module.

4   Preliminary Testing Results

In order to motivate someone using an AeLS we integrated the proposed PlayLearn module with the AHA! System, and the tutorial course delivered by AHA! [5, 6]. AHA! is a generic adaptive e-learning system developed by the Database and Hypermedia group from Eindhoven University of Technology. It is currently used for delivering adaptive courses at Eindhoven University. The first version was developed in 1998, and since then the system has undergone several revisions.

Figure 4 presents a screen shot of the AHA!- PlayLearn system, for the user "gioana". The user has just received a new game because of increasing the knowledge level.
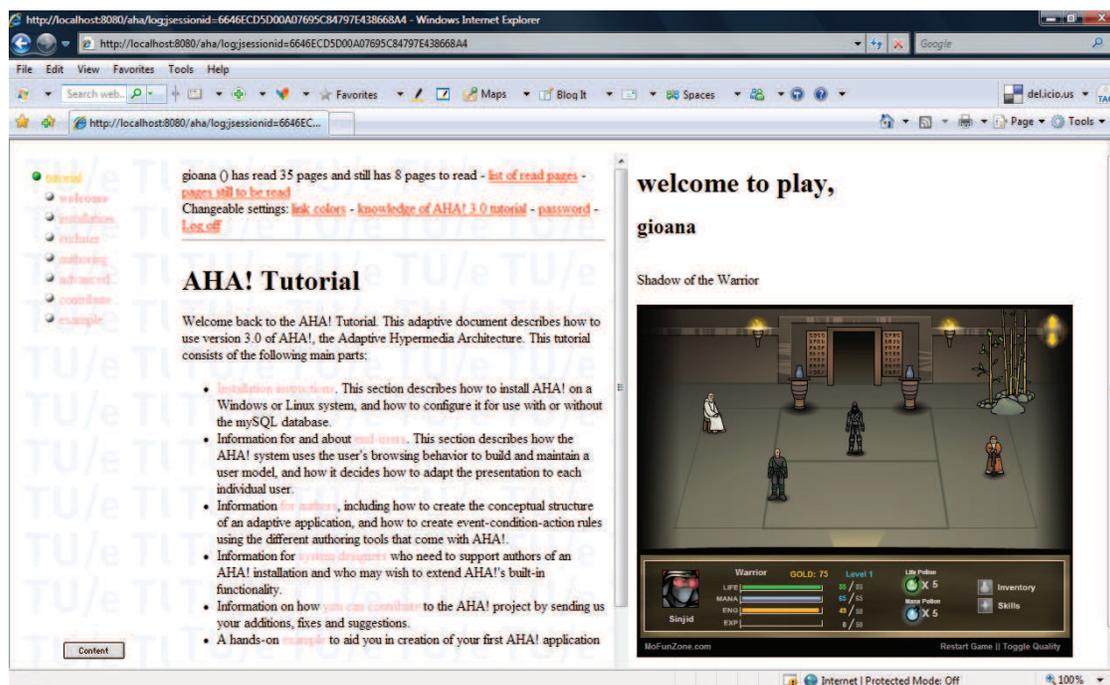

Figure 4. AHA-PlayLearn

Three types of games were used during our tests: action (3 D Space Hark, Orbit Coster and Ninja), adventure (Village, Shadow of the Warrior and Xnail) and racing games (Atomic Racer, Velocity and Hunt Dirt Bike). Each learner had to choose one type of game s/he prefers the most. Five levels of knowledge were considered. Passing from one level to another implies allowing the learner to play a new game.

The feasibility and people opinion on using AHA-PlayLearn system was assessed though interviews and questionnaires. 17 undergraduate students, both males and females from the University Politehnica of Timisoara, Romania took part in the testing. The testing session took 20 minutes. Learners' preferences for different type of games are presented in Figure 5. Four students have chosen to receive racing game, five students action game and eight students adventure game. The students have used the system for learning the AHA tutorial.
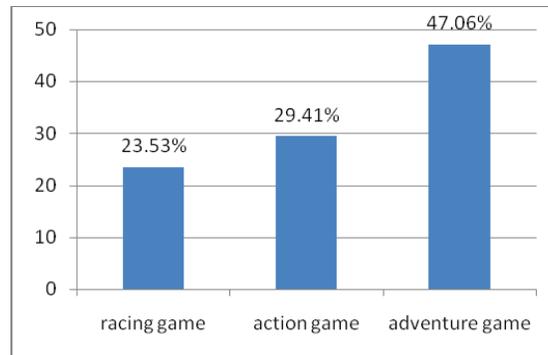
Figure 5. Learner game preferences

The questionnaire (Table 1) results (Figure 6) show that most of the subjects (88.24%), have felt as being benefic the introduction of a gaming based break in the learning process (Q1), 82.35 % also believed that the game have motivated their learning desire (Q2). Only a small number of students (17.65%) considered the introduction of a game as being distorbing in the learning process (Q3).

Summarising we belive that by introducing games during the learning process as an award for their knowlegde acummulation may motivate the students to continue their study.

Question Notation	Questions
Q1	Do you consider a necessity the introduction of a motivated break consisting of a game?
Q2	Have you been motivated to learn more just by the existence of the games?
Q3	Once you have received a game, do you have the trend of non-learning anymore and just playing that game?

Table 1. Questions used during the preliminary tests
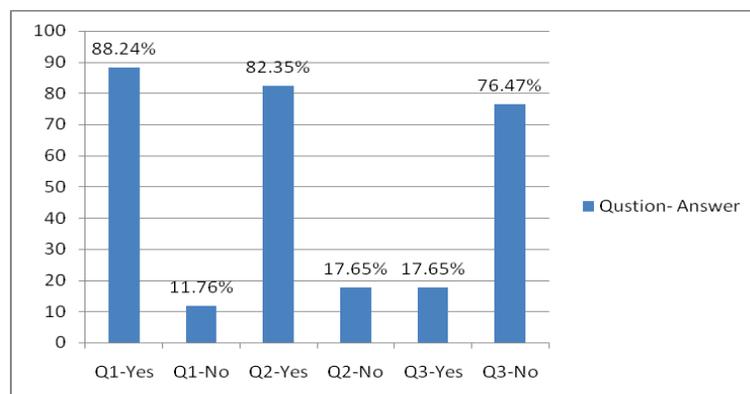

Figure 6. Learners opinion on combining gaming with the learning process

5   Conclusions

The proposed PlayLearn module enables motivation by gaming. The students are feeling motivated to continue to learn and to increase the knowledge level in order to receive a new game as a bonus for their effort. The game that they receive is a game from their preferences. Therefore, they will act more motivated to increase their knowledge level.

Additionally by making use of games, a significant increase in motivation is expected with direct effect on the outcome of the learning process and on the learner satisfaction.

A significant challenge for our future work is to find/create game types that best suit the learning process and they further consolidate the accumulated knowledge. We also intend to test PlayLearn in both secondary schools and third level institutions and to assess the learning ourcomes of the students.

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