A Design of Smart-based Education Gamification Platform Using Mobile Devices

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Abstract. Recently, many domestic and foreign researchers are actively attempting to graft computer games, which have already established themselves as a new play culture, together with education. Accordingly, the studies to understand what elements of computer games are attractive as a learning media and actually have an educational effect are proceeding widely. Thus, the aim of this paper is to design the 'Eduction- Gamification Platform' on which mobile device-based games are being grafted with educational elements, not just following existing educational systems. By adjusting the level of the proposed game platform, developed games can be fully applied to children as well as adults and let them to experience the educational effects of such gamification. Although the study discusses the gamification process that utilizes mobile devices, this process can be achieved even without the IT technology and will be able to find possible problems which may occur during the process with just a simple mechanics.

Keywords: Education, Gamification, Game, Computer Science Education, Software Engineering, Smart Phone Game.

1 Introduction

Due to the rapid development of internet and mobile devices/equipments, many changes have resulted in every generation, daily life and play culture. The so called 'N-generations', referring to the people who handle and manage IT devices and networks, have grown up together with the advancement of digital technology and use computers or other IT devices in most of their living spaces, adopting new and novel mediae [1-6]. These people have their own personalities and are autonomous, preferring to be an active information user rather than just being a passive media audience. The changes in the recent play culture show that a transition is taking place from outdoor to indoor activities such that mobile phone and PC games which can be enjoyed while traveling or staying indoors are becoming a major part of the play
culture rather than traditional outdoor activities. In this aspect, teaching methods should also be adjusted to the recent generation change and many firms and educational institutes are attempting some new methods. Thus, the main idea of this study is to design a 'Eduction-Gamification Platform' that grafts or integrates games with education, not just following conventional education methods.

2 Related Work (Gamification)

The word, 'Gamification', is a newly coined word adding 'Game' with a suffix '-fication'. This means utilizing the usual elements of games (e.g., fun, reward, competition, etc.) to the other areas. The core idea of Gamification is that people are willing to participate in any kind of play if they are interested (cf. A Theory of Fun for Game Design). Having a fun time is a basic instinct of human beings so that Gamification is a method to make people enjoy the things which they normally do not feel fun or try to avoid by introducing some gaming elements into them, to have more fun [2-9].

A large number of firms are already involved in a task of Gamification for their contents and the reason for such Gamification can be applied across the society is that the history of computer games extends over 40 years so that most of middle aged people and elderlies are accustomed with the gaming culture [10-21]. On the other hand, the reason the Gamification is not active in the Republic of Korea (ROK) is that people in this country still have rather strong negative perceptions toward games. However, through Gamification, students will be able to enjoy learning even the subjects such as mathematics and science, understanding the pleasure of learning. Actually, there are some case reports that the students who were unable to concentrate on the school subject changed much when the experiment of Gamification was conducted at the school.

The on-line games industry in the ROK has reached the global level already. Although the industry is currently undergoing a difficult situation due to the rapid growth and advancement of Chinese on-line games industry into domestic market and the strengthening of regulations by the government, they have been relentlessly taking a leap forward as an independent industry despite of their rather short history of less than 30 years, lower turnover and slower overseas expansion, compared to international game conglomerates. At the same time, the game user base has expanded as well and it is promising to move forward with the Gamification that improves pessimistic realities with the game-oriented thinking and skills that by taking advantage of such situation.

3 Design of Game Platform

Referring to forementioned researches on the current status of use and game genres, the aim of this section is to design a portable mathematics (from the four fundamental arithmetic operations to higher education courses) learning platform using a mobile device. The reason a mobile game has been chosen is that compared to the PCs,
mobile games are much freer from temporal and spatial restrictions. Also, this platform can assume a form of learning not only suitable for the N-generations but also for preschoolers and elementary school students, aiming to learn a simple basic mathematics. Learners can share the information or compete with others in the game through interactions. As in [Fig. 1], the design adopted the elements of education gamification which pieced the studies by Schell, Hunicke et al., Werbach & hunter and Bunchball together [1-8], often used as the framework of education gamification.

![Fig. 1. The elements of Education Gamification and the Roles Played Between Students (Players)](image)

Here, the story refers to the flow of the provided incident in the game, which requires some aesthetic elements and technological assistant. Dynamics induces student's voluntary participation and provides some sort of fun elements for the story. Mechanics is a element that achieves Dynamics and Technology includes situations, materials and hardwares necessary for developing the game.

### 3.1 Dynamics

Dynamics for the education gamification is based on the 20 fun experiences (i.e., Challenge, Exploration, Relaxation, Completion, Discovery, Fascination, Sensation, Simulation, Thrill, Empathy, Fellowship, Nurturing, Expression, Turn over, Fantasy, Competition, Eroticism, Hardship, Cruelty and Control) of the PLEX Model suggested by (Korhonen et al., 2009) [4]. As a element that forms the aesthetic element, the dynamics assumes the role of inducing student's voluntary participation for the gamification of the educational contents.

### 3.2 Mechanics

Mechanics refers to the data expression and the algorithm used in the game. Its aim is to achieve detailed implementation of Dynamics and the included elements would be rewards, levels, points and badges.
4 Educational Implication in Gaming Process

The game is simple. [Fig. 2] shows game process. Starting with an opening screen, introduction of the game and the overall story will follow, after which the hero gets into his adventures. At each phase (village) he receives a certain task (quest) from each village NPC and after completing the task, he goes on to the next phase. Also, while performing the tasks, the hero will be cooperating with other players to achieve the goals and move on to the castle of devil king, the last phase. The hero will be able to rescue the princess after he reviews his learning contents.

Fig. 2. Game Process

5 Conclusion and Future Work

The aim of this paper is to facilitate the education Gamification that grafts Gamification with education. It is possible to fully apply the game platform to children as well as adults by adjusting its level of difficulty so that more people will be able to experience the education Gamification more easily.

Although we planned to proceed with the education Gamification scheme using the mobile devices, IT support is non-essential so that we have developed a design with which arising problems can be identified just by using a simple mechanics. As a future work, we plan to launch a service for the designed game by implementing it with Java Android and will release it after producing a demo version.

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References