Teaching Case of Gamification and Visual Technologies for Education

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ABSTRACT

This paper describes the use of gamification and visual technologies in a classroom for higher education, specifically for university students. The goal is to achieve a major increase in student motivation and engagement through the use of various technologies and learning methodologies based on game mechanics called gamification. Gamification is used to engage students in the learning process. This study adds learning methodologies like Learning by Doing to students' collaborative work, and mixes teacher support with new, accessible technology, such as virtual reality and visualization 3D on the web thanks to webGL. This creates a new management tool, called GLABS, to assist in the gamification of the classroom. Understanding the role of gamification and the technology in education means understanding under what circumstances game elements can drive a student's learning behavior so that he or she may achieve better results in the learning process.

Keywords: 3D Education, Engaging, Gamification, Learning Management System, Mixed-Methods Evaluation, Oculus Rift, Problem Based Learning, Quest Based Learning, Virtual Reality, Web GL

1. INTRODUCTION

Engagement is the main objective in applying gamification (Kapp, 2012; Huotari & Hamari, 2012; Dixon, 2011). Gamification isn't about turning the classes into a game; although the gamification technique is not truly an academic methodology, it may improve the performance of students in the learning process (Pozo, 1993; Trilla, 2011; Xu, 2012; Carr, 1998). Gamification is about applying game mechanics to any project, idea or situation (Zimmerman, 2003). In our case, we want to implement some game mechanics to make learning (Prieto, 2008) and instruction more fun (Sheldon, 2011; Hamari, 2014); consequently, this will allow longer

retention of the material among the students. To apply game mechanics and achieve a level of fun, we must first follow some rules. In gamification, rewards can be delivered through the creation of leaderboards, badges, and loyalty programs that encourage students to have fun and perform a learning activity as desired by the teacher. The gamification for learning purposes, we think, is not only about badges, rewards and points themselves; it is about measuring qualification and achieving motivation. Students need motivation when learning; they need the feeling of accomplishment and success of striving against a challenge. They need to feel that they have overcome a difficulty, to push them forward to the next level.

In this paper, a mixed-methods study evaluating the motivation, satisfaction and academic performance of degree students is presented. The methodology is both quantitative (through a structured test) and qualitative (using the Bipolar Laddering, BLA (Pifarré, 2007)), and it is based in the use gamification and the use of technology for 3D arts creation for multimedia purposes such videogames or films.

The working hypothesis to be confirmed is whether students who learn 3D with gamification techniques will obtain better academic results because they are more motivated and satisfied than they are under the classic working system. Our secondary objective is to ascertain through a mixed-methods analysis of quantitative and qualitative data the most positive and negative aspects of the experience, with the aim of adapting the implementation method in future iterations and for other subjects. Our final Objective is solve with a new platform all the needs for gamify a subject. This paper includes an overview of academic performance using gamification and visual technology and discusses how this type of technology can improve students' 3D skills. The main features of quantitative, qualitative, mixed research applied in the educational framework are described in Evaluation section.

The central thesis of the current study is based on two main ideas: 1) making use of the innovations in teaching in the university framework that involve gamification techniques to achieve higher motivation and degree of satisfaction among the students; and 2) discovering a better way of presenting and learning 3D modeling. To achieve this second goal, two techniques are used: the first is delivering the models online, where the 3D model can be uploaded and visualized on the web. In this case, the technology used will be webGL and HTML5 by Sketchfab so that 3D models can be directly uploaded on the web in a simple and effective way. The web allows one to visualize and interact with an object on a web navigator installed on a tablet (Android, iOS) or desktop computer. The second method would utilize Unity for major 3D content playsets that the students could interactively manipulate, explore and share with other students. This type of presentation is useful for directly visualizing a model and evaluating it independently of the modeling tool used. To exemplify the last methodology proposed, the following section of the study will describe a real exercise applied in a Multimedia degree on the subject of "Computer Animation" at La Salle, Ramon Llull University, a five-ECTS-credit course that is taught annually.

For the last objective, we solve some needs for gamification creating a new tool for gamifying education. This new platform, called GLABS has the objective to use Schoology (Friedman, Hwang, Trinidad & Kindler, 2007) as an Learning Management System (LMS) and change its interface to produce a G-LMS (Gamified Learning Management System). GLABS allows users implement quick game mechanics for their courses, such as badges, analytics, progress bars, lives, portfolio 3D, adventure map, avatars, and such like. These elements are essential to produce a good classroom game mechanics. Understanding the role of gamification in education means understanding under what circumstances game elements can drive a student's learning behavior so that he or she can achieve better results in the learning process.

The first section of this paper, includes an overview of good practices in education. The study of gamification for education and the

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