Chapter 15
Teaching and Learning Abstract Concepts by Means of Social Virtual Worlds

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ABSTRACT

Social Virtual Worlds are increasingly being used in education, as their flexibility can be exploited in order to create heterogeneous groups from all over the world who can collaborate synchronously in different virtual spaces. In this paper, the authors describe the potential of virtual worlds as an educative tool to teach and learn abstract concepts by means of programmable 3D objects. They describe the main experiences carried out recently in the application of these technologies in transnational educational activities that combine the Moodle learning resources and programmable 3D objects in the Second Life virtual world.

1. INTRODUCTION

The development of so-called Web 2.0 has made possible the introduction of a number of Internet applications into many users' lives, which are profoundly changing the roots of society by creating new ways of communication and cooperation. The popularity of these technologies and applications has produced a considerable progress over the last decade in the development of social networks increasingly complex.

Among them, we highlight virtual social worlds, which are simulated graphic environments in which humans, through their avatars, "cohabit" with other users (Arroyo, Serradilla, & Calvo, 2009; Lucia, Francese, Passero, & Tortora, 2009). Thanks to the social potential of virtual worlds, they are becoming a useful tool in the teaching-learning process (Mikropoulos & Natsis, 2011; Andrade, Bagri, Zaw, Roos, & Ruiz, 2010). This way, virtual environments currently enable the creation of learning activities that

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provide an interactivity degree that is often difficult to achieve in a traditional classroom, encouraging students to become protagonists of the learning process and also enjoy while they are learning.

However, most of the virtual campus and educational applications in these immersive environments have only been created to replicate real world places without providing benefits from, for instance, accessing these applications in a classical webpage (Girvan & Savage, 2010). To address this problem, several initiatives and re-search projects currently focus on the integration of virtual worlds and virtual learning environments.

One of the most important initiatives is Sloodle (Simulation Linked Object Oriented Dynamic Learning Environment) (Sloodle, 2016), a free and open source project which integrates the multi-user virtual environments of Second Life (Second Life, 2016) with the Moodle learning-management system (Moodle, 2016). This way, Sloodle provides a range of tools for supporting learning and teaching to the immersive virtual world, which are fully integrated with the Moodle web-based learning management system. These tools are currently used and tested by hundreds of thousands of educators and students worldwide.

There are also different tools and programming languages, like the Linden Scripting Language (LSL) (Rymaszewski et al., 2008) or the Scratch tool (Scratch, 2016), that make possible creating manageable 3D representations of abstract entities very difficult to learn. The objects that are created can also react to the user inputs and modify their main properties.

Our paper focuses on three key points for the creation of enhanced learning activities using immersive virtual worlds. Firstly, we promote the use of open source applications and tools for the creation of educative environments in virtual worlds, such as the tools and applications provided by means of the combination of the OpenSimulator virtual worlds (OpenSimulator, 2016) and the Moodle learning management system. Secondly, we emphasize the benefits of working in immersive environments to create visual objects that can clarify concepts that are difficult to understand due to their abstraction level. Thirdly, we show that it is possible to use these technologies for pedagogic purposes in transnational education and show a practical application of the integration and evaluation of these functionalities to carry out educative activities in the Second Life virtual world.

The remainder of the manuscript is structured as follows. Section 2 presents the potential of virtual worlds as an educative tool and describes the main experiences carried out recently in the application of these technologies to teaching and learning. In Section 3 we center on Second Life and OpenSimulator, which are one of the most extended virtual worlds. Section 4 describes our proposal to illustrate abstract concepts by means of educative virtual environments. Section 5 presents the results of the application of our proposal to create a virtual learning environment supporting synchronous and collaborative learning at the Carlos III University of Madrid (Spain) and at the University of Ulm (Germany). Finally, Section 6 presents the conclusions derived and the future work guidelines.

2. STATE OF THE ART

The benefits of virtual worlds for teaching and learning have fostered different research projects which aim is to help to use virtual environments in education (Gallego, Bueno, & Noyes, 2016). For example, the AVATAR Project (Added Value of teAching in a virtuAl woRld) (Santovena & Feliz, 2010) improves the quality of teaching and education in secondary schools through an innovative learning environment using a virtual world.