Chapter 1
Analysis of Users in an Immersive Environment for Teaching Science

Felipe Becker Nunes
Federal University of Rio Grande do Sul, Brazil

Manuel Constantino Zunguze
Pedagogical University, Mozambique

Kelly Hannel
Military School of Porto Alegre, Brazil

Fabiano Ferreira Antunes
Military School of Porto Alegre, Brazil

Sérgio Roberto Kieling Franco
Federal University of Rio Grande do Sul, Brazil

José Valdeni De Lima
Federal University of Rio Grande do Sul, Brazil

ABSTRACT

Virtual worlds can be considered immersive e-learning environments, whose characteristics of interactivity, immersion, and collaboration can be applied in different areas of teaching, such as in the field of sciences. In this way, this chapter presents the construction of a virtual world to aid in the teaching of sciences in which different types of learning materials and simulations were developed in the OpenSim platform. A group of sixth grade students used the immersive environment for a semester, being evaluated their learning through a pre- and posttest applied together with an analysis of their learning styles, being realized a correlation between the results obtained. Added to this, usability assessments with interviews about the environment was applied. The results demonstrated the potential of virtual worlds to contribute to the adaptation of the different learning styles in a class and their contribution to the improvement of the learning process.

DOI: 10.4018/978-1-5225-8179-6.ch001

INTRODUCTION

The expansion of hardware and software resources in the last decades allowed a wide range of initiatives in different fields of knowledge, using specific tools and software. Education is one of these areas. The creation and adaptation of different types of systems and methodologies favored the incorporation of Information and Communication Technologies into the students and teachers' lives.

In this scenario, one of the teaching methods that has been adopted as alternative is e-Learning, which, according to Clark and Mayer (2011), can be defined as instructions delivered on a digital device (such as, desktop computers, laptops, tablets or smartphones), that is intended to support learning.

Among the alternatives that are included in the educational scenario, there is the approach of immersive e-Learning environments, also known as Metaverse or Virtual Worlds (VW). Bainbridge defined it as a persistent online environments (i.e., continue to exist even after users leave it and the changes made by them are in a permanent way) generated by computer, where people can interact, whether for work or leisure, comparable to the real world (BAINBRIDGE, 2010, p. 1).

Pardo et al. (2014) pointed out that some characteristics of the VW, such as the ease of use, collaborative nature and attractiveness found in the 3D resources, which provide a new and exciting sense of immersion to users. The creation of immersive environments focused on education requires several factors to be considered, e.g., educational goals and teaching strategies well defined, based on learning theories, user-friendly design and objects able to encourage interaction and collaboration between users (HERPICH et al., 2014). This autonomy provided to students can assist in developing their own actions and investigations about the concepts approached during an education activity, based on the features present in a 3D environment.

The use of different types of multimedia resources, such as videos, slides, texts, images, questions and links, opens a wide range of possibilities to apply these resources to educational activities in the VW. The communication using chat also fosters the exchange of information between users, and the settlement of doubts.

Nelson and Erlanderson (2012) understand that in a VW, the evaluation takes two ways, the first is the quality of the software associated with the user experience and the second is the student's way of learning regarding the use of VW. Aspects related to the Human-Computer interface need to be considered in the development of VW, since it is a highly interactive environment with large amount of information and 3D objects, which need to be analyzed and constructed properly so as not to cause cognitive overload to the users.

As explained by Bouda (2012), the development of the VW should have user-centered design, and should be built in such way, that highlights the most important information first, paying attention to avoid information's that diverts the user's attention from the goal to be achieved. At this point, the evaluation of usability and collection of quantitative and qualitative information from users becomes fundamental, so that a process of continuous improvement can be adopted.

Another point to take into consideration is the analysis of the user's individual preferences and how the process will be conducted during the interaction in the VW. The individual analysis of each student is essential for the identification of their learning trajectories, reinforcing the need to identify each student's learning styles.

Felder (1993) understands learning styles as dominant preferences and characteristics that each people have to receive and process information. For Felder and Henriques (1995), the ways, in which, an individual characteristically acquires, conserves, and retrieves information is collectively termed