Chapter 35
Virtual Laboratories Development Using 3D Environments

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ABSTRACT

3D virtual worlds or metaverses are immersion environments that allow the simulation of some real environment characteristics such as sound and gravity. In this chapter we describe the development of a 3D virtual environment as well as its integration with Moodle platform using Sloodle plugin. We discuss related works dedicated to the development of virtual laboratories. We also describe the main software used and how to perform the settings required for the operation of the environment. To introduce the developed software utilization we present a laboratory built for teaching subjects based on multiple intelligences theory defined by Gardner.

INTRODUCTION

Virtual Labs as a workspace for the distance collaboration and experimentation in research or other creative activity to generate and deliver results using the information communication technology (Gomes & Bogosyan, 2009).

Rossiter and Shokouhi, (Rossiter & Shokouhi, 2012), claim that virtual laboratories can be very authentic, if well developed could constitute a component a valuable activity for the student because

they provide actions that emulate clearly the functioning of real equipment.The development of virtual laboratories is characterized as a viable alternative in the process of training and development of professionals in various fields.

Among the technologies that can be used for the development of such laboratories are virtual 3D environments, also known as 3D worlds (MV3D). The use o 3D environment technology provides the means for new communication modes that combine time and space flexibility with a unique capability for global reach.

This laboratories can be developed within 3D virtual worlds. However, such worlds are not meant to replace existing communication modes, like face-to-face meetings, video conferences or 2D Web. On the contrary, they are complementary to existing modes.

Several software can be used for the development of virtual laboratories. The present chapter focuses on the use of OpenSimulator broadly known as OpenSim, which is a 3D virtual environment simulator.

The goal of this chapter is thus to present the main technologies used during the development and management phases of a virtual environment. After studying this chapter the reader should be able to develop a virtual laboratory and to integrate them to Moodle, using Sloodle plugin. In this chapter we discuss the following topics, briefly introducing each one of them:

Virtual laboratories;

- Virtual reality;
- Theory of multiple intelligences;3D virtual worlds;
- OpenSim;
- Sloodle and its integration to Moodle platform;
- Use case example of the technology discussed.

In the example presented in this chapter we combine 3D virtual world technologies and Gardner's multiple intelligences to stimulate students through the use of some particular intelligences, remarkably those initially proposed by Gardner, namely: the logical-mathematical, linguistic, spacial, bodily-kinesthetic, interpersonal, intrapersonal, musical.

VIRTUAL LABORATORIES

Virtual labs are offered digital platforms in order to support the conducting experiments without the need for user presence in a particular location, such as in the context of real laboratories.

Amaral et al (2011), define virtual labs as a workspace for the distance collaboration and experimentation in research or other creative activity to generate and deliver results using information communication technology. A digital lab promotes access to experiments from a virtual space, compensating for the lack of interaction and the unavailability of time or resources to practical experience (Amaral et al, 2011).

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