

## Chapter 2

# Applied Areas of Three Dimensional Virtual Worlds in Learning and Teaching: A Review of Higher Education

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### ABSTRACT

*Three Dimensional Virtual Worlds (3DVW) have been substantially adopted in educational and pedagogical fields worldwide. The current study conducted a systematic literature review of the published research relevant to the application of 3DVWs in higher education. A literature search was performed in eight high-ranking databases, and following scrutiny according to inclusion criteria, 164 papers were selected for review. The systematic literature review process was summarized, reviews undertaken by the authors, and results about the applicability of 3DVWs in higher education were extracted. A wide variety of application areas for the 3DVWs in higher education were found, and were classified into five main categories. Various 3DVW platforms and virtual environments used for educational goals were also identified. The results revealed Second Life as the most popular 3DVW platform in higher education. This study also found that by using 3DVW technology a wide range of virtual environments and virtual tools have been designed and applied in teaching and learning for higher education.*

### INTRODUCTION

A Three-Dimensional Virtual World (3DVW) is a computer-based, simulated and graphical environment, usually accessible on the World Wide Web, that is intended for users to inhabit and interact using personalized graphical and animated self-representations, known as avatars (Boulos, Hetherington, & Wheeler, 2007). Virtual worlds are online spaces where individuals can interact with three-dimensional

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## ***Applied Areas of Three Dimensional Virtual Worlds***

representations of physical locations or phenomena. The simulated environment could appear similar to the real world (with real rules, real-time actions, interactions and communications) or depict a fantasy virtual world. Recently, Internet-based 3DVW have thrived and hold promise to significantly impact the way people communicate and interact with each other.

Inside 3DVWs, people can manipulate elements and experience telepresence. Increasingly, researchers, organizations and educational communities are recognizing these environments as legitimate communication media which can be used as an effective media in teaching and learning. Users of these environments not only have the opportunity to interact with each other in a sociocultural and delightful activities but also can follow virtual wealth through activities such as selling and buying lands as well as creating and trading virtual goods using virtual currencies (Ba, Ke, Stallaert, & Zhang, 2010).

Currently, one of the most popular and active 3DVWs is Second Life (SL), which is an eminent platform that was developed by Linden Lab in 2003. It has an in-world marketplace where users can trade virtual goods for Linden Dollars, which are then convertible currency to US Dollars. To illustrate, according to a report provided by Linden Lab in 2013, over the past decade, almost 36 million accounts have been created in SL and 3.6 billion US dollars spent on virtual possessions inside the wide range of virtual lands. In the ten years since Second Life began, the total time people have spent on this platform is equivalent to almost 217,266 years. Based on the mentioned report, Second Life is visited by more than one million individuals monthly, and almost 400,000 new registrations are completed every month. Approximately 1.2 million daily transactions are conducted for virtual possessions in Second Life, 2.1 million virtual possessions made by users are for sale, and Second Life's landmass now is about 700 square miles (Linden Lab, 2013).

The purpose of this chapter is to 1) identify the main activities in the application of 3DVWs in higher education. 2) highlight various 3D virtual world platforms that researchers have used in learning and teaching. 3) categorize various virtual environments designed for educational purposes. Therefore, the current chapter attempts to answer the following three research questions:

1. For what purposes have 3DVWs been used in higher education?
2. What types of 3DVW platforms have been used by researchers in higher education?
3. What kinds of virtual environments have been created for educational activities using 3DVWs?

## **BACKGROUND**

3DVWs have been broadly adopted to favor socialization and education. These worlds offer the possibility of simulating the real world as it is, or designing unique fantasy worlds. By interacting with these platforms, people can actively experience simulated realities, which can aid in understanding various concepts and support independent viewpoints for users as they accomplish specific tasks. Users can easily share the virtual environment for performing highly synchronous collaborative tasks, manipulating the same virtual objects (De Lucia, Francese, Passero, & Tortora, 2009).

Numerous advances in information technology are transfiguring teaching and learning styles, especially in higher education. During the past decade, educators from a variety of backgrounds have started using the online 3DVWs to support their teaching and learning activities. 3DVWs support a higher level of interactivity and richness for interaction, collaboration and communication than traditional media (Ghapanchi & Ghanbarzadeh, 2014). They also have the potential to create engaging and meaningful

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