

## Chapter 2

# A Literature Review on the Use of Three-Dimensional Virtual Worlds in Higher Education

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### ABSTRACT

*Three-dimensional virtual worlds (3DVW) have been substantially adopted in teaching and learning worldwide. The current study conducted a literature review of the published research relevant to the application of 3DVWs in higher education. A literature search was performed on nine scientific databases, and following scrutiny according to inclusion criteria, 176 papers were selected for review. The 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 3DVWs in higher education were found and classified into five main categories. Various 3DVW platforms and virtual environments used for educational goals were also identified. This study found that a wide range of virtual environments and tools have been implemented by 3DVW technology and applied for teaching and learning in 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 et al., 2007). Virtual worlds are online spaces where individuals can interact with three-dimensional representations of physical locations or phenomena. The simulated environment could appear similar to the real world

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(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 et al., 2010).

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 virtual worlds offer the possibility of simulating the real world or designing unique fantasy worlds. By interacting with these platforms, people can actively experience simulated realities, which can aid in understanding various concepts and in supporting 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 et al., 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 virtual environments to support their teaching and learning activities. 3DVWs support a higher level of interactivity and richness for interaction, collaboration and communication than traditional media. They also have the potential to create engaging and meaningful experiences for students and learners. In recent years, there has been remarkable growth in the application of these environments for distance education and e-learning. These immersive platforms offer various tools to create sophisticated and highly interactive simulations using in-world programming, modeling and scripting tools. 3DVWs support teaching and learning in an educational context and they offer the functionality and capability to manage the various aspects of education such as lecturing, presentation, administration and assessment of coursework.

A wide variety of organizations, educational groups, and government agencies currently provide regular events, seminars, and workshops in virtual worlds. Furthermore, many educational institutions and organizations are creating virtual learning environments to deliver courses (face-to-face and online) and events that include 3DVW presentations, discussions, simulations and role-playing. Not only do 3DVWs amplify learning beyond the capabilities afforded by teleconferencing and online web presenta-

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