

Chapter 1

Student Engagement and the Creation of Knowledge Within a 3D Virtual Learning Environment

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ABSTRACT

This chapter's goal is to examine the student engagement and the creation of student knowledge of undergraduate students using a 3D Virtual Learning Environment. After creating a 3D didactic constructivist virtual environment, student conversations were recorded for engagement dimensions using Hara, Bonk, and Angeli (2000) framework and Nonaka and Takeuchi (1995) knowledge creation theory. Findings revealed that five forms of student engagement amplified the learning process and that a complete knowledge spiral occurred emphasizing the four modes of knowledge conversion. Although limited in time and scope, results further suggest that a highly engaged community of learners was created.

INTRODUCTION

Tsiatsos, Andreas, and Pomportsis (2010) noted, "Elearning systems have gone through a radical change from the initial text-based environments to more stimulating multimedia systems" (p. 65). Additionally, Dalgarno (2002) argued, "Three Dimensional (3D) environments have the potential to

harness technological developments and facilitate new levels of learner-learner and learner-computer interaction" (p. 1). Due to improvements in technology and the utilization of 3D environments on a successful commercial basis (Blizzard, 2010), there has been renewed interest in the utilization of 3D environments as learning tools. 3D immersive VLEs utilize additional technology to provide an

DOI: 10.4018/978-1-4666-2670-6.ch001

immersive environment for the learner to participate. This environment allows the participant to 'touch' and manipulate items in a virtual universe. Three-Dimensional (3D) VEs come with a myriad of features; though, normally most provide three main elements: the illusion of 3D space, avatars that serve as the visual representation of users, and an interactive chat environment for users to communicate with one another (Dickey, 2005). Salzman, Dede, Loftin, and Chen (1999) made a case for the use of immersive Virtual Reality (VR) for the teaching of complex or abstract concepts: Consequently, these "three-dimensional thematic environment [was] created with the objective of providing a space where the users can interact" (Kirner, et al., 2001). Created as cyber Cafés, University classrooms, chat rooms, and the likes, these virtual places often become a place where students are afforded opportunities to post suggestions, useful resources, and technical advice (Grubb & Hines, 2000). These postings and interactions' serve as knowledge capital that may contribute to a knowledge spiral within the learning environment (Nonaka & Takeuchi, 1995; Nonaka, 1991). Many researchers have undertaken various projects to investigate aspects of virtual learning environments. Some research has focused on the technical aspects of collaboration such as providing voice with lip-sync (DiPaola & Collins, 2003), others have focused on a specific discipline such as mathematics (Elliott & Bruckman, 2002) or science (Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004), and others have examined collaboration within a virtual environment (Burton & Martin, 2010). With this increased interest in 3D environments and a desire to utilize the popularity of such environment for the education of the millennial generation (Dede, 2005), the evaluation of such environments for pedagogical purposes is appropriate. This case study was conducted to add to the body of research where a dialectic constructivist 3D VLE is used to create a learning environment that encourages student creation of knowledge. The following research questions guided this inquiry:

1. Does student engagement within a 3D VLE construct an environment for the four elements necessary for the creation of knowledge?
2. What are the perceptions of the students regarding the effectiveness of the creation of the knowledge spiral within the 3D VLE?

CONCEPTUAL FRAMEWORK

Two conceptual frameworks guided the study: student engagement and knowledge creation theory. Student engagement (Hara, Bonk, & Angeli, 2000) was used to explore how students are interacting using reasoning in a 3D virtual environment. Knowledge creation theory (Nonaka & Takeuchi, 1995; Nonaka, 1991) was employed by the researchers to identify which of the four modes of knowledge conversion were used in a virtual learning environment.

Student Engagement

Bonk, Kim, and Zeng (2006) when surveying higher education faculty who had taught online found, "Most respondents saw the potential of the Web in the coming years as a tool for virtual teaming or collaboration, critical thinking, and enhanced student engagement (p. 556). Primarily these "three-dimensional thematic environment [was] created with the objective of providing a space where the users can interact" (Kirner, et al., 2001). During Dede et al.'s (2004) River City 3D VLE project, students were placed in an environment where they must discover why the people of River City are becoming ill. During the first implementation, students made many suggestions for the improvement of the project as a result of various outcomes, one of which was for the MUVE interface's option of having two communication modes—a chat and a whisper function—was confusing to students. As a result, most of them relied on the whisper function, which interfered with group collaborative work. To correct these

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