

Knowledge Creation and Student Engagement Within 3D Virtual Worlds

Brian G. Burton, Abilene Christian University, Abilene, TX, USA

Barbara Martin, University of Central Missouri, Warrensburg, MO, USA

ABSTRACT

Examined in this 3D Virtual World case study was undergraduate student engagement on a learning task and student creation of knowledge. After creating a 3D didactic constructivist virtual world, student conversations were recorded for analysis using Hara, Bonk, and Angeli's (2000) engagement framework and Nonaka and Takeuchi's (1995) knowledge creation theory. The five forms of student engagement augmented the learning process and a complete knowledge spiral was documented, emphasizing the use of the four modes of knowledge conversion. Though limited in time and scope, results further suggest that a highly engaged community of learners was created.

KEYWORDS

Knowledge Creation, Learning, Online, Student Engagement, Virtual Learning Environment, Virtual World

INTRODUCTION

Jaleel and Verghis (2015) highlighted knowledge creation process can be enriched through the use of E-learning milieus. They further noted E-learning provides a myriad of experiences and virtual environments that can be used as an essential educational pedagogy for learners and teachers. Whereas, Gunter and Kenny (2014) claimed their research validated the idea that E-learning can be more effective and engaging as face to face classes when used to support the instructional tasks within collegiate courses. Improving learning ensues within a 3D virtual world due to the interactive and simulating novel experiences (Safaei & Shafieiyou, 2013, p. 2). 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 immersive environment for the learner to participate. In fact, students can virtually practice or participant in any "tangible" experience within the digital learning environment (Vasquez, Nagendran, Welch, Marino, Hughes, Koch, & Delisio 2015) In other words, 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). Costley (2016, p.150) highlighted the significance of setting up and delivering online by focusing on design

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decisions that enhance critical thinking within the learning environment. Consequently, the advantages of online learning are not only retained but enhanced through these 3D dimensional environments that allow interactions simulating “face to face” meetings. (Shonfeld & Kritz, 2013, p. 262) These researchers further noted 3-D virtual environments allows for opportunities for learners to interact with individuals virtually around the world, increasing communications that would simply not happen in a traditional learning setting. Another vital factor of understanding online learning is the impact of virtual learning on learner outcomes which have demonstrated increases in learners’ levels of critical thinking (Heijltjes, van Gog, Leppink & Pass, 2015). These postings and interactions in a 3D virtual environment serve as knowledge capital that may contribute to a knowledge spiral within the learning environment (Nonaka & Takeuchi, 1995, Sin-Pei & Lama, 2008). Many researchers have undertaken various projects to investigate aspects of virtual worlds. Some research has focused on social learning theory (Smith, Zane, & Berge, 2009) or social presence (Costley, 2016; Safaei & Shafieiyoun, 2013). Others have focused on the technical aspects of collaboration such as providing voice with lip-sync (DiPaola & Collins, 2003), or working with students with disabilities (Vasquez, et al., 2015), or have focused on specific instructional strategies such as problem-based learning (Nicholas, & Omale, 2010) and 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 (Safaei & Shafieiyoun, 2013), 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 (Alipour, Idris, & Karimi, 2011; Nonaka & Takeuchi, 1995) was employed by the researchers to identify which of the four modes of knowledge conversion were used in virtual worlds.

Student Engagement

Bonk, Kim, and Zeng (2006) found that when surveying higher education faculty, who had taught online, the usage of the web as an instructional strategy that would increase collaboration, critical thinking, and student engagement through virtual teaming was validated. Furthermore, by providing a learning environment whereby students could interact, these three-dimensional thematic environments increased student engagement (Kirner et al., 2001). During Dede’s et al. (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 problems, Dede et al. (2004), created a new version of River City. In the new version, the redesigned chat system allowed for scaffolding and a more collaborative environment. Such projects as River City (Dede et al., 2004) or Quest Atlantis (Barab et al., 2005)

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