Chapter 7.7

Constructivism in Synchronous and Asynchronous Virtual Learning Environments for a Research Methods Course

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ABSTRACT

Virtual learning is a popular teaching modality, and it has been reported in research that there is no significant difference in academic outcome as compared with face-to-face courses. Not all researchers agree with this assertion and some claim it is more difficult to teach math-oriented subjects online. Given that educational psychology theories are effective for teaching quantitative topics in the face-to-face modality, this study proposes and tests methods for virtual learning. Constructivism learning theory is applied using knowledge management principles to teach an online masters-level research methods course at an Australian university. Asynchronous and synchronous tools are used in the VLE, and contrasted in a controlled experiment. The hypothesis is student grades will be significantly higher when the constructivist instructional method is applied to the synchronous VLE.

INTRODUCTION

Virtual learning has become an important 'product' in business schools as a means to satisfy a growing demand for e-learning (Costin & Hamilton, 2009; Popovich & Neel, 2005). Key drivers for

this demand are: managers want remote access to education due to busy schedules (Strang, 2010b), international students are pursuing online degrees (Strang, 2010d), and people trust - perhaps even prefer - virtual contexts for social exchanges (Gattiker, Huang, & Schwarz, 2006). However, virtual learning in business education may not be effective.

According to an e-learning meta-analysis, many studies claim classroom pedagogy best-practices are effective when applied to online courses (Tallent-Runnels et al., 2006). A number of comparative studies concur that online teaching can be just as effective as face-to-face instruction (Ginns & Ellis, 2007; Laurillard, 2007; Strang, 2009, 2010e). Contrary to the above, other researchers complain that simply imitating direct instruction in a VLE fails to leverage the dynamic capabilities of computer aided online systems (Joint, 2003). More so, claims of effective online pedagogical strategies may be defective because they ignore confounding variables (Joy & Garcia, 2000). Furthermore, most e-learning/teaching best practice literature focuses on education, psychology or the other social science disciplines; more research is needed about online teaching effectiveness in the management science discipline (Arbaugh et al., 2009).

Unfortunately what we do not know a lot about is how to use a VLE for teaching business courses (Arbaugh, 2005), especially in math-oriented subjects (Affouf & Walsh, 2007; Cybinski & Selvanathan, 2005; Swan, 2003). More so, math is typically a difficult subject to learn and researchers have raised concerns about teaching quantitative courses online (Anderson & Jackson, 2000; Smith, Heindel, & Torres-Ayala, 2008). Smith et al. (2008) reported that the use of a VLE and software tools was much lower in the pure disciplines (natural sciences, humanities, mathematics). Furthermore, studies in the literature suggest that online quantitative courses are not as well received as their qualitative counterparts (Anstine, 2005).

It is acknowledged this introduction cited literature both supporting and refuting online teaching effectiveness. The philosophy applied to this research is that while math-oriented subjects are difficult to learn online, proven face-to-face educational psychology theories can be effective for teaching business courses in VLE's (Laurillard, 1993, 2007; Strang, 2010c), including math-

oriented courses (Evans et al., 2007; Grandzol, 2004; McLaren, 2004).

It is possible that math-oriented courses are more difficult to teach because they are cognitive in nature. Therefore, instructional methodologies that strongly focus on student interaction and collaboration may function well in social sciences but emphasizing a personal-cognitive developmental strategy may be better for quantitative topics. Notwithstanding this, some social learning/interaction would likely be helpful in math-oriented courses to better appreciate theoretical applications and limitations. Thus, it is argued a math-oriented subject could be effectively taught online by promoting constructivist learning theory in a synchronous VLE, while encouraging traditional interaction and social learning for other parts of the course.

The purpose of this experiment is to measure the academic effectiveness of a constructivist instructional methodology applied to a synchronous VLE, as compared to the traditional asynchronous discussion forum, when applied to test or control groups in the same online math-oriented business course.

LITERATURE REVIEW

Definitions

The phrase 'virtual learning' is often used synonymously with online education, distributed learning, networked learning, web-based learning, and distance learning (Weller, 2007). As applied to this study a virtual learning environment (VLE) is an educational delivery system and methodology leveraging communications technology to provide asynchronous and/or synchronous learning activities (Naidu, 2002).

A constructivist cognitive model can be developed through research, experimentation, critical thinking, and peer socialization but at the end of the process it is an individual mental model which

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