Technology-Mediated Synchronous Virtual Education: An Empirical Study

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ABSTRACT

Many higher education institutions have used Internet technology to develop virtual education for a new generation of college students. In this research, the authors assessed the relative effectiveness of two technology-mediated learning environments for synchronous higher education compared to a traditional face-to-face learning environment. Specifically, they assessed the effects of these three learning environments on interactivity, perceived learning, and satisfaction when different instructional strategies were used. The authors’ findings suggest that learning environments interact with instructional strategies to affect the learners’ perception of learning and satisfaction. Their findings also support the proposition that the new generation of college students prefer to interact with others using technology.

KEYWORDS

Classroom Interactivity, Media Richness, Perceived Learning, Second Life, Social Presence, Transactional Distance, Virtual World, Web Conferencing

INTRODUCTION

Virtual higher education over the Internet has attracted considerable attention in the last decade. However, with many new technologies proliferating from innovations, it is not an easy task to determine which technology has the best potential to support learning activities in virtual education. Virtual education provides convenience and flexibility to learners. Nevertheless, convenience and flexibility should not be gained at the price of quality because the core of virtual education is still centered on helping learners obtain essential knowledge and skills.

Although the use of technology-mediated virtual education has been on the rise in practice (Henrie et al., 2015), there have been very few research works that empirically study the effectiveness of virtual education versus traditional classroom-based education. It is important to study the relative effectiveness of technology-mediated learning environments so that guidelines and principles can be established for technology providers to effectively design and deploy technology-mediated learning environments for higher education over the Internet (Anderson and Dron, 2012; Hu and Hui, 2012; Parai et al., 2015). It is also vital for educators to understand the advantages and disadvantages that arise from different kinds of virtual learning environments so that an educated decision can be made about which learning environment is most appropriate for their educational needs.

The 3-D environment can provide numerous possibilities for educators who want innovative ways to teach and get learners involved (Siau et al., 2010; Nah and Eschenbrenner, 2016). We discussed in
our previous study (Chen, et al., 2012) the characteristics of students of “Generation Next” as suggested by Proserpio (2007) and how they perform in a 3D learning environment compared with a face-to-face (FtF) traditional learning environment. In this research, we extended our study to the learning performance of “Generation Next” students when they use different technologies. We compared the relative efficacy of two popular technology-mediated learning environments, web-conferencing (WC) and 3-D virtual world (VW), with a traditional FtF learning environment. We studied student satisfaction and perceived learning performances in synchronous courses in these three environments. The synchronous course setting was chosen because the study compares the performance of virtual education with traditional FtF education that is synchronous by nature.

Both WC and 3-D VW are web-based collaboration technologies that support video, audio, instant messaging communications, and slide show presentations. However, in a 3-D VW, participants are represented by avatars; while in a WC environment, participants can see each other directly. This difference provides an opportunity to study the effect of media richness in an educational context.

Studies in education research have shown that Internet-based learning environments can help promote interactions among learners, and increase student collaboration and engagement (Pella and Kazanidis, 2015; Tsai, 2001). This study investigates how learners and instructors interact with each other in different learning environments, and how interactivity influences learning performance in a technology-enabled learning environment compared with a traditional FtF learning environment.

Other than teacher-learner interaction, instructional strategies also affect learning performance. As cited in Chen et al. (2012), educational researchers (Gallen and Bold, 1989; McNeill and Wiles, 1990; Seaman and Fellenz, 1989) have classified instructional strategies in traditional classroom education into five categories: (1) direct instruction, (2) indirect instruction, (3) interactive instruction, (4) independent study, and (5) experiential learning. Two of the most important and widely used instructional strategies are direct instruction and interactive instruction. Although interaction and instructional strategy are two factors that influence learning performance in traditional classroom education, there is little research on how these two factors affect learning performance in virtual education.

Drawing on the characteristics of “Generation Next”, and theories on media richness and transactional distance, we extended our previous study (Chen et al., 2012), and developed and empirically tested hypotheses on the effectiveness of two popular instructional strategies in two popular virtual learning environments compared with a FtF learning environment. Specifically, we examined the effects of the two main instructional strategies, interactive instruction and direct instruction, on learning in each environment, and compared the results to reveal differences and similarities in terms of learning performance. These comparisons provide insights to technology providers on what they need to provide in order to support virtual higher education and further, to educators on what they need to focus on when they offer virtual higher education.

LITERATURE REVIEW

Technology for Virtual Education

WC and Virtual World

Internet-based distance education has increased dramatically over the years among higher education institutions (New Media Consortium, 2013). WC technology has been increasingly adopted by higher education institutions for their virtual education needs. It is defined as a web-based collaboration where support for video, audio, instant messaging communications, and slide show presentation is provided. It allows real-time point-to-point as well as multicast communications from one user to many other users. It provides visual and audio cues between learners and teachers.

VWs are technology-mediated environments that can be used to simulate real-world environments where users are represented by avatars and are able to navigate, act, and communicate in three-
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