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Exploring students' learning styles in relation to their acceptance and attitudes towards using Second Life in education: A case study in Hong Kong

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ABSTRACT

The purpose of this study was to investigate students' learning styles in relation to their acceptance and attitudes towards using Second Life (SL) as a supporting tool for learning in higher education. A total of 32 undergraduate students taking a course called 'Digital Imaging' participated in the study. The participants were first asked to design their own graphics using a range of digital imaging techniques. They were then asked to share the artwork with peers in SL for discussion and conduct a formal presentation as a professional designer on their design in SL. The Index of Learning Styles (ILS) developed by Felder and Soloman (1994) and the Views about SL questionnaire (VSLQ) designed by the author were used to measure participants' learning styles as well as their acceptance and attitudes towards SL, respectively. Quantitative results derived from the questionnaires were validated by qualitative data collected from a follow-up interview with a sample of participants. Major findings from the study indicate that active learners mostly valued the ease of use and usefulness of SL whereas verbal students were mostly satisfied with the communication and identity features in SL. Besides, the study also identified some practical problems with the use of SL in education including insufficient teaching and learning time, limited mode of communication with instructor and inadequate equipment for running SL.

1. Introduction

With the rapid development of three-dimensional (3-D) rendering techniques and internetworking capabilities, more and more people can easily use their computers to go online and experience 3-D entertainment. A good example of 3-D entertainment is playing massively multiplayer online role-playing game (MMORPG) in the virtual world where players assume an avatar and interact directly with each other in order to achieve the highest score. Nowadays, it is common to find that adolescents are deeply engaged with the virtual world for entertainment, leading to its growing popularity and commercial success.

A virtual world, regardless of its purposes, is often referred to as an online 3-D environment which supports multiple users in communicating with each other and interacting with virtual objects in a persistent and synchronous fashion (Bell, 2008). In the virtual world, it is technically feasible for us to explore a different world beyond our own personal real-life experience, to express ourselves through photo-realistic avatars, and to maintain social connections with other people across different geographical boundaries (Fetscherin & Lattemann, 2008). The emergence and characteristics of virtual world technologies offer the prospects of promoting student learning and engagement if the technologies are properly applied within educational contexts (Warburton, 2009).

The potential for virtual world technologies to enhance the quality of teaching and learning has increasingly been recognized by educational researchers. In recent years, there has been a growing body of studies examining the impact of virtual worlds on student learning and achievement across different subject areas such as marketing (Halvorson, Ewing, & Windisch, 2011), ethics (Houser, Thoma, Coppock, Mazer, & Midkiff, 2011), essay writing (Jamaludin, Chee, & Ho, 2009) and healthcare (Rogers, 2011). Findings of these studies generally support the notion that virtual world technologies can be used as a pedagogical tool to provide students with a more active, immersive and engaging learning experience than traditional class could ever offer.

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Despite the great potential of virtual world technologies, Halvorson et al. (2011) cautioned that some students did not really benefit from or were not able to engage with virtual worlds because the instructional approaches used in those worlds do not match students' preferred learning styles. The same problem was also identified in other technology-enhanced learning environments such as mobile learning system (Hsieh, Jang, Hwang, & Chen, 2011) and online discussion forum (Shaw, 2012). Until now, however, there has been very limited research identifying which learning styles are best accommodated by virtual world based education. In this light, the main purposes of this study were (1) to explore students' learning styles in relation to their acceptance and attitudes towards the use of a virtual world called Second Life to support learning in formal education, particularly in an undergraduate course called Digital Imaging, and (2) to empirically identify the potential benefits and drawbacks with the use of Second Life in higher education from students' learning experiences associated with the Digital Imaging course. It is necessary to note that in this study SL was considered as a technology which may help students to study and participate in university courses like Digital Imaging, so the use of SL was served as a means to facilitate learning in a course rather than as a learning objective. Findings of this study can help design instructional strategies to promote students' learning through an effective use of SL.

2. Related research

2.1. Learning styles

Learning styles refer to individuals' approaches or preferences in receiving, processing and understanding new information (Felder & Silverman, 1988; Jonassen & Grabowski, 1993). Drawing on Jung's theory of psychological types (Jung, 1971) and Kolb's experiential learning model (Kolb, 1984). Felder and Silverman (1988) developed a model to define the nature of learning style for undergraduate students. The model has been cited often in the literature as a key conceptualization of learning style. According to the Felder-Silverman model and its subsequent updates (Felder & Spurlin, 2005), an individual's learning style is determined by four major dimensions with each having two bipolar categories. The dimensions include: (i) *perception*: the information type one prefers to perceive, which can be sensory (e.g., sights, sounds and physical sensations) or intuitive (e.g., memories and thoughts), (ii) *input*: the type of sensory information one can effectively perceive, which can be visual (e.g., pictures and demonstrations) or verbal (e.g., written and spoken texts), (iii) *processing*: the way one prefers to process information, which can be active (e.g., through engagement in physical activities) or reflective (e.g., through introspection), and (iv) *understanding*: the way one progresses towards understanding, which can be *sequential* (e.g., in gradual steps) or *global* (e.g., in big jumps). Over the last decade, research has converged to show that understanding students' learning styles holds great promise for individualizing instruction to better meet their educational needs and enrich their learning experiences, especially in computer-based learning environments (Akbulut & Cardak, 2012; Hwang, Sung, Hung, Huang, & Tsai, 2012; Magoulas, Papanikolaou, & Grigoriadou, 2003).

Based on the Felder-Silverman learning style model (Felder & Silverman, 1988; Felder & Spurlin, 2005), there are different types of learners (e.g., *active/reflective, sensing/intuitive, visual/verbal* and *sequential/global*) who can benefit most from some particular learning approaches. In terms of perception, for example, *sensing* learners prefer to learn facts and concrete data. They tend to be patient with details and good at doing practical work. In contrast, *intuitive* learners prefer to learn abstract concepts as well as to discover possibilities and relationships, so they tend to be relatively more innovative. With respect to input, *visual* learners appear to remember best what they see in graphical/video representation (e.g. pictures, diagrams and demonstrations) whereas *verbal* learners seem to get more out of written or spoken words. In relation to processing, *active* learners prefer to try something out first and then see how it works but *reflective* learners tend to think about and reflect on it first. With reference to understanding, *sequential* learners are more comfortable with learning in linear and logical steps while *global* learners can sometimes learn better in random and large leaps. As noted by a recent content analysis of literature on designing adaptive educational hypermedia with consideration of users' learning styles (Akbulut & Cardak, 2012), there has been a substantial body of research indicating that students are more satisfied with a hypermedia learning system and have more positive attitudes towards using the system for learning if it can be adapted to match their preferred learning ways.

2.2. Second Life in education

Launched by Linden Lab in 2003, Second Life (SL) is an online, three-dimensional virtual world that enables multiple users to interact and communicate with each other as avatars. By April 2013, over 33 million user accounts were registered on SL and were in good standing (Linden Research, 2013). Due to its huge user base and variety of in-world activities, SL has remained popular and competitive over the years despite the existence of other virtual worlds such as Active Worlds, There and Twinity (Wang & Braman, 2009). It has also drawn considerable attention from researchers in the field of technology-enhanced learning because of its educational potential as a pedagogical tool (Inman, Wright, & Hartman, 2010). Current research findings have shown that SL has the capability to promote students' learning motivation and engagement (Wehner, Gump, & Downey, 2011), to facilitate synchronous lectures and collaborative learning with multimedia resources in a virtual campus (De Lucia, Francese, Passero, & Tortora, 2009), as well as to increase students' sense of co-presence and immersion in an online environment (Warburton, 2009).

The applicability of SL to education can be seen in a range of learning contexts, such as fostering students' argumentative and critical thinking skills in essay writing by means of role-playing activities (Jamaludin et al., 2009), providing a computer-based simulation platform to equip healthcare students with simulated clinical experience (Rogers, 2011), delivering online courses about marketing in an immersive and interactive approach to students across different locations (Halvorson et al., 2011), and facilitating experiential learning to integrate theories and concepts of ethics through interactions and observations in virtual field trips (Houser et al., 2011). Warburton (2009) suggested that SL can meet the needs of both formal and informal education owing to its affordances to support rich interaction, visualization and contextualization, authentic content and culture, identity play, immersion, simulation, community presence and content production.

Educators, however, have also highlighted some drawbacks associated with SL. One problematic issue relates to its demanding system requirements. SL normally requires a 1.5 GHz computer processor, 1 GB of memory, a powerful graphics card and a Cable or DSL Internet connection (Linden Research, 2012). If computers and network services do not satisfy the system requirements, technical problems like