Computers & Education 101 (2016) 132–149

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Understanding cloud-based VLE from the SDT and CET perspectives: Development and validation of a measurement instrument

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ARTICLE INFO

Article history:
Received 11 November 2015
Received in revised form 3 June 2016
Accepted 5 June 2016
Available online 6 June 2016

Keywords:
Interactive learning environments
Multimedia/hypermedia systems
Distributed learning environments
Improving classroom teaching

ABSTRACT

With the emergence of the cloud computing technology, virtual learning environment (VLE) may play an imperative role in promoting instructional effectiveness of ubiquitous learning. However, the existing literature on VLE has been mostly based on the acceptance of VLE from the perspective of the undergraduate students. There is a dearth in studies on the VLE instructional effectiveness from the K-12 teachers' perspective, the effects of Self Determination Theory and Channel Expansion Theory. Existing VLE instruments have not been rigorously validated and do not consider the importance of cultural differences. This research aims at creating and rigorously validating an instrument to study the cloud-based Frog VLE's instructional effectiveness in the Malaysian cultural setting. The robustness of the instrument was validated using structural equation modeling, expert panel, Q-sort, pre-test, pilot-test and fieldwork study. This research may offer a parsimonious instrument to evaluate the instructional effectiveness of the Frog VLE for subsequent studies contributing to theory building in the IS literature.

1. Introduction

Government of Malaysia has introduced the 1BestariNet (*i.e. 1SmartNet*) initiative which involves 10,000 schools nation wide with 5 million students, 4.5 million parents, 500,000 teachers and 1 platform. The Ministry of Education (MoE), Malaysia is cooperating with YTL Communications to bring high-speed wireless 4G Internets along with the cloud-based Frog VLE to all schools nationwide. With this project, FrogAsia will bring the cloud-based VLE to all Malaysian students, teachers and parents through the integration of the high-speed 4G Internet connection with the Frog VLE platform. Malaysia is the first nation in the globe to gather its whole education community together on a sole converged network tailored exclusively to meet the requirements of teaching and learning (1BestriNet, 2015).

The Frog VLE (Fig. 1) is a cloud-based virtual learning environment that resembles normal school teaching and learning environment which incorporates virtual equivalents of traditional education concepts. For example, instructors can deliver lessons virtually, conduct online teaching and tests; mark students' assignments and announce their marks, whereas learners

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http://dx.doi.org/10.1016/j.compedu.2016.06.004
0360-1315/

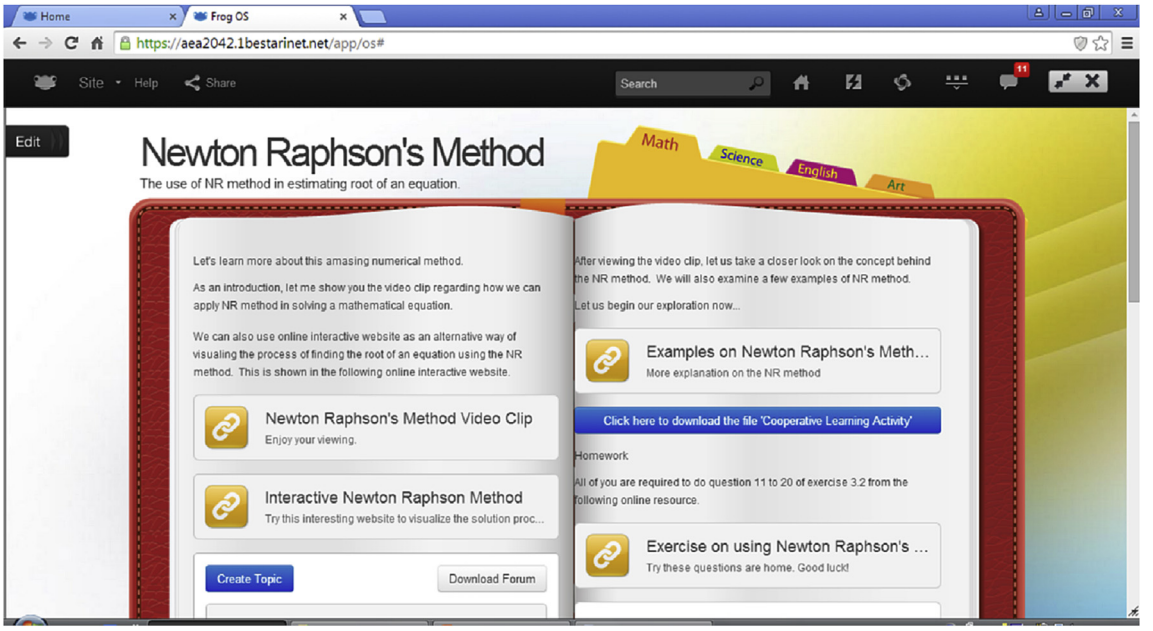

Fig. 1. The Frog VLE interface.

can participate in online learning activities, discussion forums and quizzes or hand-in assignments and check their scores through the VLE. It also allows communication between parents and the schools whilst administrators of school can manage the school calendars and make school announcements via the Internet. Frog VLE is a user-friendly platform that enables instructors and learners to seek for teaching and learning resources such as animations, images, video clips and other resources and assemble them within a filtered and safe environment without requiring any technical know-how (1BestriNet, 2015a).

Even after an era of VLEs in higher education, "many teachers are still using only a minimum of its affordances" (Rienties, Giesbers, Lygo-Baker, Ma, & Rees, 2014, p.1). Majority of teachers use VLEs as a simple repository for students to obtain materials like PowerPoint slides and reading lists (Rienties et al., 2014). Even though there is increase in use of VLEs, however, there is no widespread evidence of transformation in pedagogic practice (Kinchin, 2012). In fact, the number of studies on the reception and adoption of VLE is diminutive but growing (Van Raaij & Schepers, 2008). Examples of VLEs are Blackboard, Moodle, Sakai, Claroline and WebCT (Berns, Gonzalez-Pardo, & Camacho, 2013). Nevertheless, the conversion from conventional instruction to ICT-enhanced environments is not apparent and a lot of instructors remain diffident or reluctant to use instructional technology (Al-Senaidi, Lin, & Poirot, 2009).

Prior studies have been focusing primarily on the web-based or online learning platforms like Blackboard, Moodle, WBLS, e-LMS and etc. which uses grid computing technology that does not come with the facilities of unlimited storage space, on the cloud network access that is location- and device-independent as well as on-demand, configurable and scalable teaching and learning resource materials (Wyld, 2009) compared to the facilities available in the cloud computing technology. Cloud computing provides "an opportunity of flexibility and adaptability to use the computing resources on-demand" (Ercan, 2010, p. 939). Thorsteinsson, Page, and Niculescu (2010) opined that cloud computing may support socially oriented theories of learning and cooperative learning through collaborative methods of instruction. With the cloud-based high speed Frog VLE systems, teachers and students are able to save their work and share them with the colleagues and peers, anytime and anywhere. Due to these differences, it would be interesting to examine whether there are differences between the acceptances and instructional effectiveness of the grid computing web-based instructional systems and the cloud computing based Frog VLE system.

Even though there are several studies on online or e-learning which have examined students' intrinsic motivations (Shroff & Vogel, 2009; Sarnoff, Vogel, & Coombes, 2008, 2007; Xie, Debacker, & Ferguson, 2006) or both intrinsic and extrinsic motivations (Hartnett, George, & Dron, 2011), however the existing grid-based VLE-related researches have been focusing mainly on the students' extrinsic motivations and utilitarian factors such as TAM and ISSM (Motaghian, Hassanzadeh, & Moghadam, 2013), TAM (Sánchez & Hueros, 2010), TAM2 (Van Raaij & Schepers, 2008) or UTAUT (Sumak, Polancic, & Hericko, 2010) instead of the teachers' intrinsic motivational factors like teachers' self determination and motivations towards adoption of the VLE. Besides, none of these researches have investigated the impacts of media rich attributes of the VLE systems on its acceptance and effectiveness. Since the Frog VLE entails a rich media environment with numerous graphics, video, animation, sound, hyperlinks and other multimedia features, the impacts of these media are worth studying. Thus, it is exciting to investigate whether Self Determination Theory (SDT) and Channel Expansion Theory (CET) play significant roles in