Real-Time Virtual Learning Environments

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ABSTRACT

Virtual Learning Environments (VLEs) have gained momentum in both industry and education as both segments have increased their use of technology to deliver training and education. This research represents a pilot study conducted to compare a complex information technology course taught in a real-time (synchronous) hybrid eLearning environment with one taught in a traditional classroom setting. The aim of the research is to provide additional insights into the effectiveness of synchronous hybrid VLEs and to compare their use with hybrid VLEs and traditional classrooms. Three courses were examined in the study and the results indicate the promise of synchronous hybrid eLearning for complex courses.

INTRODUCTION

Advances in technology have made real-time VLEs more affordable and as the capabilities of them have expanded (Seng & Al-Hawamdeh, 2001), so has the popularity in both the educational arena and corporate world (Alavi, Marakas, & Yoo, 2002; Dagada & Jakovljevic, 2004). VLEs are defined as "computer-based environments that are relatively open systems which allow interactions and encounters with other participants and providing access to a wide range of resources" (Piccoli, et al., 2001, p. 402; Wilson, 1996).

VLEs can be characterized by six dimensions which distinguish them from traditional classrooms and computer aided instruction: time, place, space, technology, interaction, and control (Piccoli, Ahmad, & Ives, 2001). The instruction delivery when defining the six dimensions in Piccoli, et al (2001) is asynchronous delivery. The definition for two of the dimensions, time and control, in synchronous (real-time) virtual learning environment is different from asynchronous virtual learning environment. Research still remains to uncover the effectiveness of these environments and also to determine their impact on the learning experience of the student (Alavi & Leidner, 2001; Alavi *et al.*, 2002; Hodges, 2005; Seng & Al-Hawamdeh, 2001).

BACKGROUND

The work on technology mediated learning (TML) has been the focus of researchers for some time and it has been noted that research still lags behind practice. Overall, there is a need to gain a deeper understanding into the effectiveness of the use of technologies for online learning (Alavi & Leidner, 2001; Alavi et al., 2002). One area that has recently come to light is the use of hybrid approaches to teaching online courses. A hybrid approach to learning with TML involves providing content in a variety of formats with a mixture of online and in-class instruction.

There have been a number of studies examining hybrid approaches to teaching. In an examination of the differences between pure versus hybrid approaches to teaching using the case method it was found that students' online discussions may enhance learning in case methods when taught using a hybrid approach (Webb, Gill, & Poe, 2005). When live versus hybrid formats were compared in sections of a business communication class, an improvement in writing skills was found in students who participated in the hybrid course, particularly for those whom English is a second language (Sauers & Walker, 2004). McCray (2000) found courses which combine online learning with the traditional classroom can help students to become more engaged in rich classroom interactions by appealing to different learning styles through variety in content delivery. A study examining the differences in learning outcomes for students training in basic information technology skills in a traditional classroom versus those in a virtual one found no major variation in the performance of students in the two environments; there were however, differences reported in computer self-efficacy (Piccoli et al., 2001). Research in this area also highlights the importance of the influence of self regulation (ability to control actions and decisions) and control of the learning environment (Hodges, 2005; Piccoli et al., 2001).

With the advances made in VLEs this study aims to answer the research question: Are VLEs ready for teaching complex subjects? A synchronous hybrid eLearning environment is one where portions of the interaction among the participants takes place virtually in real-time and the format for the course is a mixture of online and in-class instruction.

HYPOTHESES

Time flexibility and learner control are found to be benefits of VLEs (Piccoli et al., 2001), however synchronous VLEs fix the time of delivery, eliminating this advantage. In asynchronous VLEs, the learner has a greater degree of control during the time of instruction; learner control in synchronous VLEs takes on a different form. In synchronous VLEs, the responsibility for learning control is retained by the instructor and the burden of time management is removed from the student. In this type of environment, synchronous interaction maintains the familiar face-to-face classroom environment. The following is therefore hypothesized:

H1: Students in synchronous hybrid eLearning environments will report higher levels of computer self-efficacy than their counterparts in traditional learning environments.

H2: Students in traditional learning environments will report higher levels of satisfaction than students in virtual learning environments.

Piccoli et al., (2001) found that the level of student satisfaction in a VLE for difficult (or unfamiliar) topics like Microsoft Access dropped when compared to familiar topics like Microsoft Word and Microsoft Excel. Brown and Liedholm (2002) found that the students in the virtual course did not perform as well as the students in the live classroom settings and that differences between students in the live and hybrid sections, versus those in the virtual section, were shown to increase with the complexity of the subject matter.

A Systems Analysis and Design course is considered more complex when compared to the Project Management and IT Resource Management courses. Students in non-complex courses are therefore expected to be more satisfied than those in complex courses; this leads to the following hypotheses:

H3: Students in synchronous VLEs with non-complex courses will report higher levels of satisfaction than students in synchronous VLEs with complex courses.

RESEARCH DESIGN

The VLE framework (Piccoli et al., 2001) shown in Figure 1 was used as the theoretical background for the study.

This study was conducted in a large public four-year AACSB-accredited university.

Figure 1. Dimensions and antecedents of VLE effectiveness (Adopted from Piccoli et al., 2001)

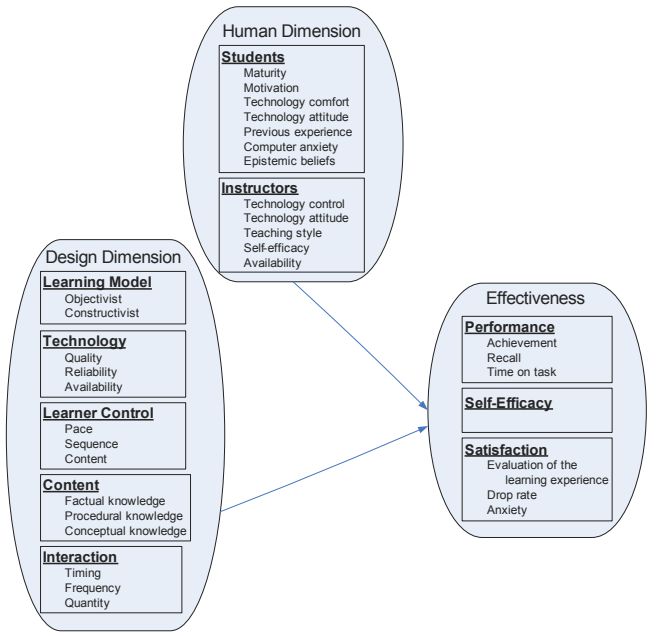

Figure 1: Dimensions and Antecedents of VLE Effectiveness (adopted from Piccoli et al., 2001)

Three courses were examined: first undergraduate System Analysis and Design course using Marratech[1]; second, undergraduate IT Resource Management course using Camtasia Studio[2]; and finally a graduate Project Management course using Marratech. All three classes were supported by a learning management system from WebCT[3].

The requirements for the Systems Analysis and Design course were a term project, a take-home midterm and final exam. Students in the IT Resource Management course were evaluated through case study analyses, oral presentations, career portfolios and term-research papers. Students in the Project Management course were evaluated based on six individual assignments and a simulation project; no exams were administered for the course

RESULTS

Data for the pilot study were collected through and online survey. Sixty three students participating in three courses completed the survey. Thirty percent of the students (19) were graduate students and 70% (44) undergraduates. Forty-four participants were male and 13 female, 6 participants did not provide information about their age. Participants' ages ranged from nineteen to over fifty years.

All respondents indicated that they had computer and internet access from home. Computer experience for participants was reported as 73% professional users; 17% frequent users and 2% reported being somewhat experienced; 3 respondents skipped this question. Eighty nine percent of respondents said they enjoyed working with computers and only 2% indicated that they felt threatened by computers. The majority of the respondents rated their software knowledge as high. On a scale of one to ten, with ten being the highest, respondents rated themselves high for self-efficacy (over 70% of the participants). Satisfaction with the overall class experience was measured on a 5-point Likert scale with 5 being very satisfying; over ninety percent of the respondents from each course reported their satisfaction a 4 or 5.

DISCUSSION

For the purpose of this study students were classified as traditional classroom students or synchronous hybrid eLearning students. The traditional classroom students were those students that attended all in-class sessions (44 students). The synchronous hybrid eLearning students were those students that attended some of the classes in the synchronous hybrid eLearning format (18 students). One student did not provide information.

Each respondent was asked a set of 10 questions on self-efficacy (Piccoli et al., 2001). T-tests were used to determine whether there were significant differences between eLearners and traditional classroom learners. Self-efficacy ratings between the two groups were not found to be significantly different.

The first hypothesis (H1) stated that students who tend to choose the VLE have a higher level of computer self-efficacy. This hypothesis however was not supported by the data, which indicates that the two groups have similar levels of self-efficacy. Further analysis of the data indicates that factors other than self-efficacy determined the students desire to participate in the synchronous hybrid eLearning. Satisfaction responses for the two research groups (synchronous hybrid eLearning and traditional classroom) did not show differences in satisfaction. For both groups, most respondents reported satisfaction with the class as either "somewhat satisfying" or "very satisfying".

The second hypothesis (H2) stated that students in the traditional classroom setting would report higher levels of satisfaction when the subject matter is complex. This hypothesis however, was not supported by the data. The Chi-Square test indicates that these two groups are not significantly different (χ^2=2.714, p=.438).

Responses from the two classes with options for synchronous hybrid eLearning (System Analysis and Design and Project Management) were used to assess the VLE impact on complex courses. The classes for IT Resource Management course were all in-class session so were therefore excluded from this analysis. The System Analysis and Design class required significant collaboration between group members. Students were required to develop complex diagrams and models which required significant interaction between the instructor and team members. In contrast, the Project Management course was lecture based with individual assignments; there were no group projects required for this course.

Responses for satisfaction for the complex (Systems Analysis and Design) and non-complex (Project Management) courses showed that the majority of participants found the courses "somewhat satisfying" (33% for the System Analysis and Design course and 22% for Project Management course) or "very satisfying" (56% and 67% respectively).

The third hypothesis (H3) states that students in a non-complex course will show higher levels of satisfaction than those in a complex course. The survey results do not show support for H3. The Chi-Square test shows no significant difference in satisfaction level between the complex course and non-complex course one (χ^2=2.291, p=.514).

LIMITATIONS OF THE STUDY

The sample size for the synchronous hybrid eLearning group in this pilot study was small and is therefore limited. The collection of additional data to further validate the findings of the study provide a natural extension of the study. The results of this study may also be limited to the specific courses and university examined in this study and may not be generalizable to other environments.

FUTURE RESEARCH

Research still needs to be undertaken for research and practice to gain a clearer understanding of the learning outcomes of synchronous hybrid and asynchronous hybrid eLearning versus traditional classroom environments. Future research on this study includes collecting additional data to increase the sample size to further ground the findings of the pilot study.

CONCLUSION

Synchronous hybrid virtual learning environments were examined in this pilot study. This pilot provides preliminary evidence to support the fact that synchronous hybrid VLEs are ready for teaching complex courses. Prior research using asynchronous VLE found differences in how VLEs support complex and less complex courses, indicating that students who take complex courses in VLEs are less satisfied. Many of the difficulties reported by students in an asynchronous VLE i.e., difficulty managing the high degree of control, feelings of isolation, etc. may be addressed by synchronous VLEs. It is believed that the difference in the

results from this study and prior research emanate from the differences between synchronous and asynchronous VLEs.

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ENDNOTES

[1] http://www.marratech.com The Marratech system has video, audio, chat, whiteboard, web-browsing, recording and playback features, which provide tools that enable the instructor and students to have real-time interaction.

[2] Camtasia Studio is a product specially designed for recording and publishing presentations and video on the Web and mobile devices.

[3] WebCT is a learning management system that supports online learning environments. URL: http://webct.com/