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ABSTRACT

Over the past several years, the growth of Web-based courses in the higher education sector has been explosive. E-learning based on a Web-based course provides the distributed learning environments that involve the active interactions between suppliers and users, and exchanges of information exclusively through the Internet. Most of the existing empirical research in e-learning is based on the positivist paradigm that aims to quantify social reality. Qualitative methods are particularly good at gaining insight into the processes and events that lead up to the observed variation in e-learning context. In this study, we attempt to apply a mixed methods approach in order to explore how college student manage their learning activities in Web-based courses. A better understanding of college student's e-learning, through the mixed method, will facilitate the successful design and implementation of Web-based courses.

Keywords

E-learning, Web-based Course, Blackboard, Mixed Method

INTRODUCTION

The advancement in information and communication technologies (ICTs) has enabled people to rely on computer-mediated communication, collaboration, and coordination. This is particularly true in the field of education. E-learning is emerging as a form of distance learning that is enabled by the advanced ICTs. While generally referred to as computer-mediated instruction, the terms "e-learning" has become popular and is commonly being used to refer to the distributed learning environment in which network technologies are used to deliver the instructional material and to facilitate the interactions between students and instructors.

Higher education is one major area in which e-learning has been thriving. Actually, higher education institutes are among the first movers of e-learning. Over the past several years, the growth of Web-based courses at universities around the world has been explosive. Nowadays, tens of thousands of college students are enrolled in Web-based courses, ranging from computer sciences to operations management, from undergraduate levels to doctoral levels.

Most of the existing empirical research in e-learning is based on the positivist paradigm that aims to quantify social reality, subjecting it to experimental controls and hypothesis testing (Lee, 1991). Considering the user's learning process in the Web-based course context, an interpretive paradigm can be well used to facilitate deeper probing into the subtleties of e-learning. In IS research, existing literature has shown that each research method can complement one another. For instance, Petter and Gallivan (2004) reviewed three IS mixed method studies (Kaplan and Duchon, 1988; Markus,1994; Trauth and Jessup, 2000) and showed benefits of employing quantitative and qualitative methods. Lee (1991) also argued that positivist and interpretive approaches should be viewed as mutually supportive, rather than exclusive.

In this study, we attempt to apply a mixed method approach to an e-learning case study showing how college students manage their learning activities in Web-based courses. We will analyze the same case – a Web-based course – using both positivist and interpretive methods. The objective of conducting this multi-method analysis is to contrast the results of positivist and interpretive analyses of college student's activities in a Web-based course in order to gain a comprehensive and deeper understanding of what is happening in a college student's e-learning.

THEORETICAL FOUNDATIONS

Existing e-learning studies

In this study, we adopt Mayadas' definition of e-learning as the distributed learning environments that involve asynchronous interactions and the exchange of information exclusively through the Internet with no face-to-face interaction or conventional physical classroom arrangements (Mayadas, 1997). Asynchronous interactions refer to as the interactions taking place anytime, rather than at the same time (Coppola, Hiltz and Rotter, 2002). Such asynchronous interactions are enabled by various Internet technologies, such as email, discussion boards, online reference libraries, and multimedia presentations.

Many articles and books (e.g. Tiffin and Rajasingham, 1995; Hiltz and Wellman, 1997; Boisvert, 2000) have revealed the advantages of e-learning, ranging from the self-paced learning process to flexibility, convenience and cost-effectiveness. Nevertheless, e-learning has been faced with skepticism. Criticisms include the lack of communication among the students as well as between the students and the instructor (Henri and Kaye 1993), the need for better student accountability (Eastmond, 1995) and the need for motivating students' interest (Dokter, Smith and Dirkx, 2002).

In order to achieve objective judgments, many empirical studies have been conducted in order to quantify these advantages and disadvantages in e-learning. Mostly based on student evaluations, these studies (e.g. Owston 2000; Piccoli, Ahmad and Ives, 2001) show either no significant difference in learning outcomes nor significant advantages of Web-based learning over traditional face-to-face learning. However, there is limited empirical research in opening the "black box," i.e. in examining how students manage their own learning activities in a particular e-learning context. A deep and comprehensive understanding of college student's e-learning activity is necessary for the further e-learning research, so we attempt to address this issue through a rigorous empirical study. Specifically, our research question for this study is:

How do college students manage their learning activities in a Web-based course environment? What factors are facilitating and inhibiting the effectiveness and efficiency of learning in the "virtual" classroom?

Two approaches to e-learning study

A review of some e-learning evaluation studies (Owston 2000; Piccoli et al., 2001) indicates their emphasis on quantitative methods: evaluating the learning effectiveness based on students' self-reported satisfaction and self-efficacy, as well as students' grades and test performance. The quantitative approach may not adequately assess e-learning within particular learning contexts to afford in-depth insights for developing and implementing successful Web-based courses.

Another approach is suggested by the use of a qualitative approach. There have been examples of qualitative research within the Web-based learning literature. Dokter et al. (2002) used a case study to better understand students' experiences in a problem-based learning environment. The results indicated that students perceive the problems and the problem solving process to be based on real-life experiences. The nature of students' learning experiences in Web-based courses – uniqueness and unpredictability – also call for a qualitative research approach. Web-based learning is centered on the student, resulting in individualized and divergent learning processes, in which the instructor serves mainly as a facilitator. In the Web-based learning environment, qualitative research is useful to obtain deep understanding of student experiences by explicitly addressing both the context and the uniqueness of individual learning.

THE CONTEXT: A WEB-BASED COURSE

The Web-based course is offered by the management department of a large public university in a midwestern city. This course, "E-commerce Operations Management", is an e-commerce course that focuses on the functional area of operation managements. Targeted to doctoral students, this course aims at providing students with an understanding and knowledge of the management of critical success factors that lead to a successful e-commerce operation. As a Web-based course, it permits students who have Internet access to complete all requirements of this course in any location in the world. No campus-specific requirements are necessary to complete this course.

Blackboard system

This course is supported by the Web software "Blackboard," which provides the functionality required to manage Web-based courses. The functions of Blackboard for students in this course include announcements, online assessments, course information, communication tools (email addresses, discussion board and virtual classroom), and other tools.

Textbook

The required textbook for this course is "E-commerce Operations Management." Students can purchase this book directly from the publisher's Web site, or through local university bookstores. The topics covered in this course are structured into ten chapters and an epilogue.

Course requirements and required communication

In order to complete the course, a student has to do the following requirements: 1) Take 3 online tests (25 multiple-choice questions per test). 2) Write 2 article reports. 3) Write a term paper. At minimum students must submit their article reports, term paper, and the three exams to the instructor using Blackboard communication functions. The instructor is available as students ask for help on the subject. Students can submit questions to the instructor 24-hours a day by email, rather than just during office hours.

RESEARCH METHODOLOGY

In the present case study, the bounded system (Stake, 1995) is a Web-based graduate-level course. This case study is composed of both quantitative and qualitative methods. In this section, we present the research methodology for both approaches.

Quantitative approach to the case study

A salient advantage of e-learning, in this case a Web-based course, is the flexibility for students to manage their own learning pace (Boisvert, 2000). On the other hand, the lack of communication among the students, as well as between the students and the instructor, has been claimed as the one major disadvantage of e-learning (Henri and Kaye, 1993). Therefore, our primary goal in the quantitative approach to the case study is to measure the level of flexibility and the extent of communication. The whole class enrolled in the Web-based course will be treated as one case.

The data sources for the quantitative part are mainly the computer log saved by the Blackboard system. The log will be able to provide detailed information about students' activities when they are working on the course website. In addition to the computer log, email interviews will be used to collect data about the off-line study activities and communications.

Qualitative approach to the case study

A qualitative approach to the case study is appropriate to gain some insights on how students manage their own learning in Web-based learning settings. In view of the uniqueness and unpredictability of individual student's learning experiences in the Web-based course, an embedded case study design (Yin, 1994) will be applied. The main unit is the course as a whole; the subunits are individual students. In the case of Web-based learning, examining individual student's learning processes is crucial to understand the student-centered learning.

At the beginning of the semester, six graduate students will be selected based on purposeful sampling to ensure the heterogeneity of subjects' background. Creswell (1998) suggests employing "maximum variation" as a strategy in a case study to represent diverse cases to fully display multiple perspectives about the cases. In this study, the six sub-cases facilitate capturing the uniqueness of Web-based learning as much as possible, while a quantitative approach mainly identifies important common patterns among all students. Three rounds of semi-structured interviews with each selected student will be conducted. The first-round interviews will take place in the first week of the semester. The second-round interviews will be conducted in the eighth week of the semester. The third-round interviews will take place in the week immediately after the final week of the semester. The semi-structured interview will be aimed at i) asking students' general evaluation of the Web-based course in terms of effectiveness and efficiency, ii) discovering student's intention to take more Web-based course in the future.

Other data sources for the qualitative approach include observations (online announcements, discussion board, chat room discussion, etc.) and computer log of the online activities by these subjects.

ANALYSIS OF E-LEARNING ACTIVITIES

Based on the two research methods, the case study will provide affluent data about how college students manage their e-learning activities in a Web-based course. A quantitative approach to e-learning analysis will be used to give a holistic view on the level of flexibility and the extent of communication in the e-learning environment; the qualitative approach will be used to capture the context-based uniqueness of Web-based learning among students.

Quantitative approach to e-learning analysis

The quantitative analysis is to provide measures of the level of flexibility and the extent of communication in the Web-based course. The study schedule, the number of trials for each online test, the time of taking online tests, and the average time for off-line study per week will be used for measuring the level of flexibility. The number of posts on the discussion board, the number of course-related emails to the instructor, and the number of course-related emails to other students, the off-line interactions between a student and the instructor and among students will be used to measure the extent of communications.

Qualitative approach to e-learning analysis

The qualitative analysis is used to inductively exploring the subjects' e-learning activities and communication in context. Without a priori lens regarding the e-learning activities, we will allow the relevant information to emerge in grounded fashion. The context information, including the motivation of choosing the Web-based course, sources for the frustration, and the change of the expectations for the course, will integrate with the activity data to help us gain a deep understanding of student's e-learning activity.

CONCLUSION

As a case study employing both quantitative and qualitative approaches, this study will not be without some limitations. First, the Web-based course is targeted to graduate students, who may have different learning styles compared with those of undergraduate students. Second, the quantitative approach focuses only on the level of flexibility and the extent of communication. Third, the case study is bounded by the Web-based course, but the nature of virtual classroom may warrant other evaluations of learning activities.

Notwithstanding the potential limitations, both a quantitative approach and a qualitative approach in a single case study, we will be able to obtain some findings that cannot be available through merely looking at students' final grade of the course, or surveying students' reactions after the semester.

REFERENCES

1. Boisvert, L. (2000) Web-Based Learning, *Information Systems Management*, 17, 1, 35-40.

2. Coppola, N. W., Hiltz, S. R. and Rotter, N. G. (2002) Becoming a Virtual Professor: Pedagogical Roles and Asynchronous Learning Networks, *Journal of Management Information Systems*, 18, 4, 169-190.

3. Creswell, J. W. (1998) Qualitative Inquiry and Research Design: Choosing among Five Traditions, Sage Publications, Thousand Oaks, California.

4. Dokter, C., Smith, R. and Dirkx, J. (2002) A Case of Problem-based Online Learning, *Proceedings of 9th Annual International Distance Education Conference*, Austin, TX.

5. Eastmond, D. V. (1995) Alone but Together: Adult Distance Study through Computer Conferencing, Hampton Press, Cresskill, New Jersey.

6. Henri, F. and Kaye, A. (1993) Problems of Distance Education, In K. Harry, J. Magnus & D. Keegan (Eds.), *Distance Education: New perspectives* (pp. 25-32). Routledge, New York.

7. Hiltz, S. R. and Wellman, B. (1997) Virtual Classroom. *Communications of the ACM*, 40, 44-49.

8. Kaplan, B. and Duchon, D. (1988) Combining Qualitative and Quantitative Methods in Information Systems Research: A Case Study, *MIS Quarterly*, 12, 570-586.

9. Lee, A. S. (1991) Integrating Positivist and Interpretive Approaches to Organizational Research, *Organization Science,* 4, 342-365.

10. Markus, M. L. (1994) "Electronic Mail as the Medium of Managerial Choice," *Organization Science*, 5, 502-527.

11. Mayadas, A. F. (1997) Asynchronous Learning Networks: A Sloan Foundation Perspective, *Journal of Asynchronous Learning Networks*, 1, 1-16.

12. Owston, R. D. (2000) Evaluating Web-Based Learning Environments: Strategies and Insights. *CyberPsychology & Behavior*, 3, 79-87.

13. Petter, S. and Gallivan, M. J. (2004) Toward a Framework for Classifying and Guiding Mixed Method Research in Information Systems, *Proceedings of the 37th Hawaii International Conference on Systems Sciences*, Big Island, HI.

14. Piccoli, G., R., Ahmad, R., and Ives, B. (2001) Web-Based Virtual Learning Environments: A Research Framework and a Preliminary Assessment of Effectiveness in Basic IT Skills Training, *MIS Quarterly*, 25, 4, 401-426.

15. Stake, R. E. (1995) The Art of Case Study Research, Sage Publications, Thousand Oaks, California.

16. Tiffin, J. and Rajasingham, L. (1995) In Search of the Virtual Class: Education in an Information Society, Routledge, New York.

17. Trauth, E. M. and Jessup, L. M. (2000) Understanding Computer-Mediated Discussions: Positivist and Interpretive Analysis of Group Support System Use, *MIS Quarterly*, 24, 43-79.

18. Yin, R. K. (1994) Case Study Research: Design and Methods, Sage Publications, Thousand Oaks, California.