2000

Pedagogy of Online Instruction - Can it Be as Good as Face-to-Face?

Rassule Hadidi
University of Illinois at Springfield, hadidi@uis.edu

Chung-Hsien Sung
University of Illinois at Springfield, sung.chung-hsien@uis.edu

Pedagogy of Online Instruction - - Can it Be as Good as Face-to-face?

Rassule Hadidi, Department of Management Information Systems, University of Illinois at Springfield
hadidi.rassule@uis.edu
Chung-Hsien Sung, Mathematical Sciences Program, University of Illinois at Springfield
sung.chung-hsien@uis.edu

Abstract

Availability of newer technologies such as conferencing tools and higher bandwidth that enables multimedia presentations has resulted in the offering of more online courses and degree programs. Recent statistics (Koeppel, 1999) reveal that the number and diversity of online programming by many institutions has significantly increased over the last few years. Attempts to carefully scrutinize and evaluate online instruction should also increase. The online and face-to-face pedagogy for different subject matters at different educational levels need a careful comparison. Analysis of data collected for this study reveals that at least as good as face-to-face pedagogy can be maintained in online instruction at the graduate level if certain conditions are met. This study does not support the finding (Goldberg, 1997) that students who have access to both face-to-face and online instruction achieve a higher level of performance.

Keywords: Web-based teaching, Comparison of online and face-to-face pedagogy

Introduction

Availability, accessibility, and more common acceptance of the Internet for course delivery have resulted in the development and offering of online courses and degree programs in a wide range of subjects and disciplines. This phenomenon has made higher education more easily available and accessible to working individuals with limited available travel time, and to those who live in rural areas and away from campuses.

The concept of distance education itself is not new and indeed dates back to the 1900's when it was conducted using regular mail correspondence. More recently, technologies such as radio, television, videotapes, and compressed video have been used in distance education. Indeed, distance education has evolved over the years (Abernathy, 1998; Confessore, 1999) and now includes the use of the Internet and the Web.

A major problem with the use of older technologies such as television and videotapes for distance education has been the lack of interactivity. More recently, newer tools including Web-enabled technologies have been used to enhance the quality of distance education. Group Decision Support Systems (GDSS) have been shown to improve learning (Alavi, 1994). "Virtual classrooms" and "hypermedia virtual classrooms" (Rana, et al., 1996) have also been indicated to be effective in supporting asynchronous learning (Hiltz, 1994, 1995). Hadidi (1997) and Carver, et al. (1999) suggest the use and indicate the benefits of using multimedia and hypermedia in distance education. These newer technologies are going to have a major impact on improving teaching and learning in areas such as student performance, access, communication, multimedia richness, collaboration, active and life-long learning, effectiveness, and efficiency.

Leidner and Jarvenpaa (1995) analyzed the "constructivist", "collaborative", "cognitive" and "sociocultural" learning models and concluded that overall student performance could potentially be improved by replacing or complementing regular face-to-face instruction with the use of the Web for course delivery, online discussion and conferencing tools, and e-mail. Leidner and Jarvenpaa (1995), Serwatka (1999), and Tsichritzis (1999), highlight that in using technology for course delivery, the emphasis should be placed on "transforming" rather than "automating" teaching and learning.

This transformation may be accomplished by allowing the learners to control the pace of instruction and learning. For some learners, learning emerges through interaction with other learners. For these learners, the instructor's role is to facilitate interactions among learners instead of controlling the content and the delivery process. Some learners may prefer individualized instruction. Various Web-based technologies, such as conferencing tools, support this type of learning style. The ultimate goal should be to provide quality education regardless of the type of technology used in teaching and learning and the learning style of the learners.

Numerous studies are available (Russell, 2000) which report on the assessment of the quality and satisfaction with distance learning at different levels, in various disciplines, and for different genders. A study conducted by Koch (1998) reports no significant difference for course satisfaction in distance education between male and female students. Based on their study, Schulman and Sims (1999) concluded that students who enroll in online courses are likely to be better prepared for the courses

than those who enroll in face-to-face courses. Smeaton and Keogh (1999) did not find any significant difference in learning for undergraduate courses when they used virtual lectures. Goldberg (1997) concluded that students who have access to both face-to-face and online instruction realize a higher level of achievement.

A group of Sixteen University of Illinois professors (Regalbuto et al., 1999) recently conducted a year-long study of "Teaching at an Internet Distance." The group concluded, "online teaching and learning can be done with high quality if new approaches are employed which compensate for the limitations of technology, and if professors make the effort to create and maintain the human touch of attentiveness to their students" (p. 2). To maintain good online teaching, the group affirms that a low student-to-instructor ratio is required. The group further suggests that technology should not replace professors and that professors should be the owners and have full control of the content of the online courses.

The purpose of this paper is to report on insights gained in using the Internet and the Web for course delivery over the last three years, and to analyze and compare students' evaluations of online and face-to-face course pedagogy. The performance of students in the online and face-to-face courses is also compared.

Background

During the spring 1998, spring 1999, and fall 1999 semesters, a total of four sections of two graduate level MIS courses (electronic commerce, and management information systems) were offered using two delivery modes at a campus of a major state university. One section of each course was offered using the traditional face-to-face delivery mode, and the other was offered as a fully online section delivered via the Internet. The same professor, who generally receives very good course evaluations for the traditional face-to-face courses that he offers, taught all of the sections. The professor had full control of the course content, which he had developed over a period of two semesters. The same textbook was used for both sections of each course.

The online section of each course was offered using an interactive courseware made available via the World Wide Web. The courseware contained lecture notes, PowerPoint transparencies, lecture outlines, online papers and cases, links to various related sites, self-grading randomly generated online quizzes, some audio files, and conferencing tools for synchronous and asynchronous class discussions. With the exception of the conferencing tools, which were used only in the online sections of the courses, both sections of each course had access to the interactive courseware.

For the online sections of these courses, students were required to submit their assignments electronically and/or post them on the Web. With the exception of the final exam, no print or paper-based assignments were used. E-mail, listserv, and conferencing tools were used extensively to facilitate interaction among the students, and between the students and the professor.

Enrollment in each of the sections of the courses was between sixteen to eighteen students. This relatively low enrollment allowed for a significant amount of interaction between the professor and students and among the students.

An identical and anonymous end-of-semester course evaluation was used to evaluate these courses. The purpose of the course evaluations was to assess the students' overall satisfaction with the courses. The objective was to find if there were any statistically significant differences in students' opinions about the courses' pedagogy, and between the students' performance in these courses based on the mode of course delivery.

Methodology

The instrument used was an end-of-semester course evaluation normally used in all courses offered on this campus. It is a short survey, consisting of three parts. The first part is related to the respondent's background information and demographics. The second part includes questions related to the assessment of the course. The third part contains questions related to the evaluation of the course instructor. The instrument consists of ten close-ended questions. A five-level Likert scale is used to determine the level of agreement with the stated assertions for some of the questions; "yes", "no", and "no response" are the options for the others.

The subjects in the study were the sixty-six students who took the courses. There were thirty-seven male (56%) and twenty-nine female (44%) students in these classes. There were thirty-two students in the traditional face-to-face and thirty-four students in the online sections of the courses. There were fifteen female students in the online classes and fourteen female students in the on-campus classes. There were nineteen male students in the online classes and eighteen male students in the on-campus classes.

To evaluate any possible difference between the students' performance in the online and face-to-face courses, the semester grades of the students were analyzed. The semester grades for the two online courses and the two face-to-face courses were combined. A t test was conducted to compare the average grade points for the online and face-to-face courses.

Data Analysis and Findings

For the purpose of this study, the data from the two online courses and the data from the two face-to-face courses were combined. Data analysis was done on the demographic information and to determine the level of the respondents' agreement with or perception of specific assertions. The instrument consists of the following ten questions (Q1 to Q10):

Q1) Class standing (undergraduate, graduate, and no response)

Q2) Gender (female, male, and no response)

Q3) Grade expectation for the course (A, B, C, D, etc.)

Q4) Main reason for taking the course (elective, degree requirement, and no response)

Q5) Change of interest in the subject (increased, remained about the same, decreased, and no response)
Q6) Increase of skills in critical thinking (yes, no, and no response)

Q7) Instructor's presentation is well planned and organized (yes, no, and no response)

Q8) Instructor's competency in the subject matter (five scale from exceptionally competent to incompetent)

Q9) Motivation to work at the highest level in the course (yes, no, and no response)

Q10) Overall quality of the instructor (five scale from excellent to poor)

The overall survey responses for the above questions were analyzed to determine if significant differences existed in the course evaluations based on the delivery mode. The Chi-square test of independence was used for this purpose. For all questions dealing with the evaluation of the course and the instructor, the online classes had a higher proportion of positive opinions than the face-to-face courses but none of them are significantly different. Table 1 shows the p-values, which vary from 0.1325 for question 7 to 0.9881 for question 4. More detailed results follow.

Table 1. Results of Hypotheses Testing: Online versus Face-to-face Course Evaluations

Question	2	3	4	5	6	7	8	9	10
P-Value	0.9760	0.1853	0.9881	0.4504	0.2402	0.1325	0.4173	0.2454	0.9760

For question one no statistical analysis was done based on class standing since all of the students in the classes were graduate students

For question two regarding gender, there is no significant evidence that the course evaluations depend on gender in the online and face-to-face sections of the courses. This may also indicate that the selection of online or face-to-face sections of the courses does not depend on gender.

For question three, grade expectation, there is no significant evidence to indicate that the grade expectation is different between the online and face-to-face sections of the courses. In other words, course delivery mode does not affect students' grade expectations.

For question four, main reason for taking the course, there is no significant evidence to suggest that the distribution of students taking the courses as electives or as degree requirements is different between the online and face-to-face sections of the courses.

For question five, change of interest in the subject, there was no significant evidence to suggest that the distribution of change of interest in the subject depends on the mode of course delivery.

For question six, regarding the increase of skills in critical thinking, there was no significant evidence to indicate that the mode of course delivery has any impact on students' perception of their ability in developing skills in critical thinking. In other words, the students' ability to develop skills in critical thinking in the subject areas did not depend on the mode of course delivery.

For question seven, regarding the instructor's presentation and the degree to which the course was well planned and organized, there was no significant evidence to suggest that the distribution of students' opinions depended on the mode of course delivery.

For question eight, the instructor's competency in the subject matter, there was no significant evidence to suggest that the distribution of students' opinions about the instructor's competency depended on the mode of course delivery.

For question nine, motivation of students, there was no significant evidence to indicate that a course's mode of delivery had any impact on the ability of the instructor to motivate students.

For question ten, the overall quality of the instructor, there was no significant evidence to indicate that the distribution of students' opinions about the overall quality of the instructor was affected by a course's mode of delivery.

The semester grades for the two online courses and the two face-to-face courses were combined. The average grade points were 3.5303±0.0957 (mean±standard error) and 3.4384±0.0795 for the face-to-face and online courses, respectively. A t test was conducted and the result indicated that there was no significant difference (p-value=0.8169) between the performance of students in the online and face-to-face courses. Although students in the face-to-face courses had access to most of the instructional materials available to the online students, this study does not support the finding (Goldberg 1997) that higher achievements are obtained by students if they have access to both face-to-face and online instruction.

Summary and Conclusions

Statistical analysis of the data collected for this study reveals that, under the conditions stated in the background section of this paper, the pedagogy that can be maintained in online instruction is at least as good as what can be achieved with face-to-face instruction. Based on the data, there was no significant evidence to indicate that students' evaluations of the online course pedagogy were any lower than the face-to-face pedagogy. This study also indicates that when in-class students are given access to the instructional materials available to online students in addition to face-to-face instruction, their performance may not be significantly higher than the students' in the online classes.

This study did not attempt to randomly select students for the online and face-to-face courses. The students decided on their own which course section to enroll in. Future studies should include a larger number of online and face-to-face courses. Future studies could also include a group of students who have primarily negative and a group of students who have primarily positive opinions about the use of the Internet and the Web for course delivery. These students can then be randomly assigned, if they are willing, to online and face-to-face sections of courses taught by the same professor. This approach may further help to assess and compare the pedagogy of online and face-to-face instruction, and may reveal or lead to more information about students' performance in online versus face-to-face courses.

Acknowledgements

The authors gratefully acknowledge the constructive comments of the three anonymous reviewers on an earlier version of this paper.

References

Abernathy, D.J. "The WWW of Distance Learning: Who Does What and Where?" *Training and Development* (52:9), September 1998, pp. 29-30.

Alavi, M. "Computer-Mediated Collaborative Learning: An Empirical Evaluation," *MIS Quarterly* (18:2), June 1994, pp. 159-174.

Carver, C.A., Howard, R.A., and Lane, W.D. "Enhancing Student Learning through Hypermedia Courseware and Incorporation of Student Learning Styles," *IEEE Transactions on Education* (42:1), February 1999, pp. 33-36.

Confessore, N. "The Virtual University," *The New Republic* (221:14), October 4, 1999, pp. 26-28.

Goldberg, M. W. "CALOS: First Results From an Experiment in Computer-Aided Learning for Operating Systems," *SIGCSE Bulletin,* (29:1), 1997, pp. 48-51.

Hadidi, R. " Student's Acceptance of Technology-Based Course Offerings - An Empirical Assessment," http://hsb.baylor.edu/ramsower/ais.ac.97/papers/hadidi.htm, August 1997, (Current April 29, 2000).

Hiltz, S. R. "The Virtual Classroom: Learning without Limits via Computer Networks," Norwood NJ: Ablex Publishing Corp., *Human Computer Interaction Series*, 1994.

Hiltz, S. R. "Impacts of College-level Courses via Asynchronous Learning Networks: Focus on Students," *In Proceedings of the Sloan Conference on Asynchronous Learning Networks*, October 9-10, Philadelphia, PA, 1995.

Koch, J. V. "How Women Actually Perform in Distance Education," *The Chronicle of Higher Education*, September 11, 1998, p. A60.

Koeppel, D. "Distance Learning: A Sample of Cyberschools," *New York Times*, April 4, 1999.

Leidner, D. E., and Jarvenpaa, S. L. "The Use of Information Technology to Enhance Management School Education: A Theoretical View," *MIS Quarterly* (19:3), September 1995, pp. 265-291.

Rana, A. R., Wooster, J., Whitescarver, J., and Hiltz, S. R. "From Virtual Classroom to Hypermedia Virtual Classroom," Proceedings of the Americas Conference on Information Systems, August 1996, pp. 832-834.

Regalbuto, J., et al. "Teaching at an Internet Distance: the Pedagogy of Online Teaching and Learning," The Report of a 1998-1999 University of Illinois Faculty Seminar, December 7, 1999.

Russel, T. L. "No Significant Difference Phenomenon," http://cuda.teleeducation.nb.ca/nosignificantdifference (Current April 29, 2000).

Schulman, A. H., and Sims, R. L. "Learning in an Online Format versus an In-Class Format: An Experimental Study," *T.H.E. Journal (Technological Horizons in Education)* (26:11), June 1999, pp. 54-56.

Serwatka, J.A. "Internet Distance Learning: How Do I Put My Course on the Web?" *T. H. E. Journal (Technological Horizons in Education)* (26:10), May 1999, pp. 71-74.

Smeaton, A., and Keogh, G. "An Analysis of the Use of Virtual Delivery of Undergraduate Lectures," *Computers and Education* (32:1), January 1999, pp. 83-94.

Tsichritzis, D. "Reengineering the University," *Communications of the ACM,* (42:6), June 1999, pp. 93-100.