Evaluation of a Web-Based Research Course

Mary E. Bowen RN, DNS, JD, CNAA
(corresponding author)
Thomas Jefferson University
College of Health Professions, Nursing
Edison Building, Suite 1219
130 South 9th Street
Philadelphia, PA 19107
Phone:215-503-6057
Fax: 215-503-0376
Email: Mary.Bowen@jefferson.edu

Anthony J. Frisby, Ph.D.
Thomas Jefferson University
Scott Memorial Library
Walnut Street
Philadelphia, PA 19107
Phone: 215-503-4990
Email: Tony.Frisby@jefferson.edu

Biography, Information, Acknowledgments

Mary E. Bowen, RN, DNS, JD, CNAA is an Assistant Professor of Nursing and Coordinator of the Adult Health Advanced Practice Program at Thomas Jefferson University. She teaches graduate Adult Health, Research, Health Policy and Acute Care Nurse Practitioner courses. She also is a Family Nurse Practitioner, and practices in critical care nursing, and as a family nurse practitioner with vulnerable populations.

Anthony J. Frisby, Ph.D., is the Director of Education Services for Thomas Jefferson University's Division of Academic Information, Services and Research (AISR). He leads a group of senior librarians, instructional designers, programmers, and multimedia artists in development of educational materials for campus, CD, and WWW use.

Abstract

A web-based research course for graduate nursing students was developed, implemented, and evaluated for academic and satisfactions outcomes. A collaborative paradigm was utilized in designing the course to increase successful attainment of the graduate nursing program's goal of a complete online graduate nursing MSN program. This web-based research course with 24 enrolled students was compared to an identical classroom based research course with 20 enrolled students. Areas of evaluation were academic outcomes of overall numerical course grades, satisfaction with course scores, and qualitative data on satisfaction of course. Results of this descriptive exploratory study demonstrated no statistically significant differences between the academic outcomes of these two groups of students. Both groups were satisfied with the course, however there was a statistically significant difference in mean satisfaction scores for the research courses. Further investigation of environmental factors will need to be done to determine the significance of differences in satisfaction outcomes.

Key words: distance education, research, supportive learning, academic outcomes, satisfaction, computer-based learning

Distance education is a growing trend in education across the nation. Fifty one percent of surveyed American Association of Colleges of Nursing members report offering distance education courses in their schools of nursing[1]. Of these schools, 63 percent began these offerings within the previous five years. Computer-based education affords students an opportunity to participate in academic endeavors via web-based curriculum from locations remote from the bricks and mortar of academic institutions. There is a growing enthusiasm for this mode of learning, primarily due to high quality, efficient and convenient delivery methods. As health care and educational resources continue to shrink, innovative means for provision of health care information and education are looking toward technological support and delivery methods. Computer-based instruction provides consistent content presentation in multiple sessions, to multiple learners within flexible time frames, in a cost-effective manner[2]. Computer-based education is a great method of providing ongoing, lifelong learning to nurses of all specialties and levels of education. Utilizing technology in learning expands opportunities to partake in clinical and academic education.

Research courses are often some of the most complex courses in a graduate nursing curriculum, often necessitating increased hours of student and instructor interaction. This online web-based course was developed for graduate nursing students pursuing the Master of Science in Nursing (MSN) degree. The author collaborated with the instructional design staff at a major urban university with the challenges of interactivity between student and professor in mind. Development, implementation and

evaluation of this course were done through a team approach of pairing faculty with the University's Academic Information Services and Research (AISR) department.

Design and development of course

This course was the seventh in a series of core curriculum graduate nursing courses to be developed by a team consisting of course professor, instructional design education specialist, librarian and instructional design staff. The goal of the graduate nursing program was to offer a complete web-based MSN program, which includes the core curriculum, support courses, and the clinical courses for nurse practitioners and clinical nurse specialists. All MSN students have the opportunity to enroll in either the traditional classroom course or the same course offered online.

Academic Information Services and Research offers assistance to nursing faculty in the use of computers and other technology to enhance teaching. The University library and AISR have a collection of more than 193,140 books and journals, 2,075 current periodical subscriptions, and a book collection of 77,879 volumes available to students enrolled in this course through electronic library sources. Texts, reference books, and important journals are available on a 24 hour, seven-day per week basis. Through the University's JEFFLINE home page, students have access to a wealth of online databases such as CINAHL, MEDLINE, and MDConsult. All students search the Internet for information that supplements their textbooks and journal articles to guide their practice and review of the literature for this research class. Though reliance on the World Wide Web as a source of information is increasing[3], CINAHL and MEDLINE are the definitive databases for student nurses. Online research students have access to all of these

supplemental learning tools directly through the web-based delivery method of this course.

In the design and development of this class the AISR department team members were an education specialist, a librarian, an instructional design specialist, programmer, graphic artist, and secretarial support. The University nursing faculty members provided the course content, assignments, and evaluation methods and participated in the conceptual design of the course in formatting it for a web-based delivery system. This course was the seventh in a series of core curriculum graduate nursing courses that have been designed by the same University and AISR team members. Consequently, time and operational costs for development of this course were considerably less than for the first courses developed in the core curriculum.

Rose[4] states that 1,545 hours were utilized to develop the first course in a series of distance education formatted courses in a graduate nursing curriculum. Rose's[3] development team spent 300 hours in developing course content, and 469 hours of two librarian's time in developing a case study, editing, and attendance at local distance education meetings. The instructional design specialist spent 183 hours coordinating the technological aspects of the course. Additionally, a computer programmer converted course material using HTML, Java Script, and PL/SQL into the final delivery format requiring 116 hours of programming. Furthermore, a graphic artist utilized 402 hours in developing animation that brought the course material to life. Seventy-five hours of time were spent on developing database methods to facilitate login procedures and monitoring of student progression in the course.

Conversely, in the development of this seventh course in a series of graduate nursing education courses most of the developmental hours described by Rose et al[4]. have been diminished. The faculty members developing this course content spent 150 hours designing syllabus, assignments, exercises, content, and evaluation methods which are similar to the traditional classroom delivery. One librarian spent 16 hours editing and reviewing material for consistency and clarity. Much of the graphic design for this course had already been developed, therefore only 110 hours were spent by the development team members in the section of course development. A computer programmer spent 25 hours programming the course content utilizing HTML and Java Script. The instructional design specialist served as a coordinator for adapting learning tools, technological support systems, and conversion of course material which entailed 63 hours of work. A database administrator was not utilized for this course as course exercises are sent via email to faculty rather than storing this information in the course database. As a result of being the seventh in a series of developed online courses, the design and development time was diminished to 364 hours, approximately one quarter of the initial time incurred by Rose et al.'s[4] development team.

Implementation of course

The research course content contains 10 modules on the topics outlined in Table 1. The web-based graduate research course and the in classroom version of this course were identical in content. Both classes use the same syllabi, texts, and had the same evaluation methods for grading, and satisfaction with the course surveys. Both sections (online and traditional) had a threaded discussion board available for talking about course materials and questions. The online course included weekly exercises for the students to

use for self-evaluation of their understanding of the content and counted toward the participation aspect of the final grade. The non-graded critiquing assignment for online students in Module ten was simulated for the traditional classroom research course with classroom discussion and critique of both a qualitative and quantitative research article.

An on campus orientation to the distance learning course was unnecessary as the prerequisite exercises required of new distance learning students confirms these skills. The prerequisite exercises require the student to do the following: install Adobe Acrobat Reader, Real Player G2 and Macromedia Shockwave Flash; demonstrate sending email to include attachments; edit a document; subscribe to the course listserve; post a reply and unsubscribe to a list serve; and post a message to the web board. When the student demonstrates the ability to complete and pass these assigned exercises, they are considered to have the skills necessary to navigate the course. Additionally, nearly all students in this distance learning course have taken previous distance learning courses in the program. Consequently, when the students take this second online research course they are experienced users of the online education system at this university.

The students communicate interactively with each other, but asynchronously through email and the web-based discussion board. Any student or the instructor may post messages and communications to the course listserve. Additionally, the instructor has posted office hours, a telephone number for consultation, and an email address to receive electronic communication. Many of the students in the web-based course set up telephone conferences with the instructor when they need consultation beyond the capacity of email. Live office hours are another option for student/faculty conferencing.

However, many students have been as far away as 150 miles at the time of enrollment in the course, requiring telephone consultation with the professor.

The course materials are self paced, but sequenced for completion. Deadlines are set for completion of graded assignments. Our experience in distance learning has demonstrated that most students require a schedule within the course to help them stay on track and not fall behind in the progression of the course materials. Students are free to work ahead if they want to, but we have seen that this sometimes limits the interactive discussions as students rarely come back to discuss themes in a section they have finished. Completed assignments are sent to the professor as an email attachment. When students experience technical difficulties with their computers, they have the option to fax in their assignment, mail the assignments, or hand deliver the assignments to the professor. These arrangements are communicated to the students at the beginning of the course. As a result, no assignments have been late or incomplete due to the student's computer crashing, inability to convert the document to proper format, or Internet service provider problems.

Evaluation of traditional classroom research course and web-based research course

The main questions that the author wanted to explore are outlined here.

1. Do students enrolled in the web-based research course have significantly different academic outcomes than students enrolled in the identical traditional classroom research course?
2. Do students enrolled in the web-based research course have significantly different satisfaction scores than students enrolled in the traditional classroom research course?

The convenience sample of students was from two groups. The web-based research course group of students was 24 graduate nursing students enrolled in the Master's in Nursing Science degree program at an urban university. The traditional classroom research course group was composed of 20 graduate nursing students enrolled in the same urban university MSN program. Both groups of students were enrolled in the Spring 2001 semester, and were instructed by the same professor. The evaluation tool used to measure satisfaction with the course was identical for both groups and the same professor scored all academic assignments for both courses. The web-based group of students was asked to complete the satisfaction with course questionnaire at the end of the course. The respondent identities were kept anonymous to the professor of the course. The traditional classroom group of students completed their satisfaction with course instruments at the end of the course, and similarly, their identities were kept anonymous to the course professor.

The satisfaction with the course questionnaire for both groups was a 12-item, standard university survey tool designed to measure the student's general satisfaction with research course. A five point Likert-type rating scale ranging from 1) "strongly agree" to 5) "strongly disagree" was utilized to evaluate satisfaction (see Table 2). Both groups had overall mean satisfaction scores that fell between "agree" to "strongly agree" levels of satisfaction. The web-based group had a mean satisfaction score of 1.64, which was slightly lower than the classroom based group mean of 1.36. There was a statistically significant difference in satisfaction scores as demonstrated by the t test score of 3.34 (P=0.003).

A qualitative comment section of three questions requesting a narrative response was also included in the satisfaction surveys of both groups. The results are presented sequentially according to the questions asked in evaluating this course (See Table 3). Students from both groups were asked: What did they like about this course? The main responsive themes to this question were: the course was well organized, and content was clear. Other responses indicated that the professor took time to explain concepts. Independence and convenience in learning via distance format was another major satisfying theme for students; Last but not least the students like the timely feedback from the instructor, opportunity to peer review other student papers, and web board discussion. Students did not like some features of the course. These narrative responses indicated a desire to have more feedback from the instructor, different weighting and grading of course assignments, and they would have liked to have conducted an actual research study. Additionally, there were some technical problems within the processing of the course content that one student felt delayed his/her progression in the course. Solicited comments from students for improvement in the course revolved around communication and grading: a more interactive web board, posting of all students' email addresses, and adjustment in due dates for students needing more time to do assignments.

To determine academic outcomes, final course numerical grades on a 0-100 scale were compared between the web-based course group of students and the traditional classroom group of students. For the purpose of data analysis, student outcomes were defined in both groups by identical criteria: 1) grade of 74-76 = C+ , 2) grade 77-79 = B-, 3) 80-83 = B, 4) 84-86 = B+, 5) 87-89 = A-, 6) 90-100 = A. Descriptive statistics were calculated to compare the web-based group to the classroom group; additionally, the t-

test was the statistical method for comparing differences between the two group mean overall numerical academic outcomes and satisfaction scores for these courses. Table 4 contains the results related to the author's exploratory question: Do significant differences in numerical academic outcomes exist between the web-based group and the traditional classroom group of research students? In the overall results, the groups had similar numerical academic outcomes (t test = -0.211). There were no significant differences in the course grades (academic outcomes) between the web-based research course and the traditional classroom research course.

Implications

The results of this descriptive exploratory study indicated that among student participants in the web-based course and the traditional classroom course there were no significant differences between numerical academic outcomes, and both groups had positive satisfaction scores. The classroom research group did however have statistically significant higher satisfaction scores than the web-based students. Similar student performance in these courses suggest that despite remote participation in course content, lecture, and remote student/instructor interaction and student/student interaction, it is possible to achieve similar academic outcomes in a web-based distance education course.

Feelings of disconnection or isolation that may be inherent in distance education may jeopardize academic outcomes and satisfaction with distance learning courses. Lawton [5] states that support needs of the distance learner may require a problem solving and caring approach to avoid feelings of isolation from the instruction or the learning experience. Faculty of distance learning courses have found that the lack of visual and nonverbal cues complicated online interactions[6]. Written communications were reported

to be more structured than personal instructor/student interaction, with a tendency to seem impersonal. Consequently, the instructor in this web-based course provided approximately 5-10 hours of telephone consultation time per week for 24 students enrolled in the web-based course. Additionally, immediate email response to questions regarding course content, lecture content, and course assigned materials also diminished the student's feelings of isolation and inability to break down and synthesize complex concepts and applications within the course materials. This is further supported by the students' qualitative responses outlined in Table 3.

Colleague support and feedback within the traditional classroom is often anecdotally cited as a reason why students may prefer taking classroom instruction to web-based instruction. Pym's [7] study of 2,500 nurses enrolled in distance education indicate that many female students become disillusioned at the lack of family and colleague support. Instructor and colleague student contact may be an essential support mechanism for the mature female nursing student. Interactive student-to-student assignments in the web-based course requiring critique of each other's final written manuscript of their research project was designed to increase student-to-student interaction on a non-threatening basis. The qualitative data themes (see Table 3) also suggest the diminution of isolation from other students within the course as a result of the critique assignment.

Although academic outcomes are important, distance educators and researchers may wish to study the self-selection process for traditional classroom method versus the web-based instruction method. Individuals who seek distance education for instruction may be predicted by environmental variables. The Bean and Metzner model[8] predicted

that nontraditional students who are older, part-time, and/or commuter students would be greatly influenced by environmental variables in selecting educational opportunities. The family environment has been suggested to be an important factor influencing academic achievement and retention.

Detailed sample demographics were not available for each group in this study, but all students were female and the majority were employed in nursing either part-time or full-time. These demographics suggest important implications for nurse educators whose students are nontraditional types. Certain variables are perceived by the nontraditional student to be supportive and other variables as restrictive[9] . According to Nora et al.[9], a dysfunctional family environment adversely affected retention or college adjustment. Difficulty with childcare arrangements may compound role conflicts and place instrumental and financial pressure on the student or family members. Employment hours and employment responsibilities create multiple role responsibilities for students and interfere with the student role. Further investigation of environmental factors will need to be done to determine the significance of differences in satisfaction outcomes between web-based students and traditional classroom students. Additionally, future research should explore the financial, employment, and emotional issues facing parents of dependent children who are enrolled students in graduate nursing courses.

Carty and Rosenfeld's [10] research surveyed a random sample of National League for Nursing accredited diploma, associate, baccalaureate, and master programs to determine the status of computer and information technology in nursing education. The findings of this study indicate that collaboration in the development and implementation of technical facilities and organization of courses will provide an infrastructure for

successful technological instruction. The interdisciplinary team resources utilized to design and implement this course have contributed to the successful academic outcomes for students in the web-based research course. The university team offered instructional design and technological skills and experience in the design of this course that were outside the skills of the nursing faculty. Additionally, the hours provided by the librarian, instructional designer, and secretary reduced the workload of the lead faculty responsible for developing this course. This increased the nursing program's chance for goal attainment of successful implementation of a web-based graduate nursing program. The collaborative paradigm increased the opportunity for successful instruction and successful academic outcomes obtained in this exploratory study.

This exploratory study is limited by its small convenience sample. Additionally, random assignment of students to different methods of instruction would increase the ability of nurse educators to generalize these findings to other learning situations. Further inquiry into the self-selection process to either web-based or traditional classroom education through gathering more extensive demographic data would also further explain the satisfaction with course and academic outcomes for students enrolled in distance education. Nurse educators should note that successful academic and satisfaction outcomes are increased through a collaborative development paradigm, and through increased instructor support and availability. Results of this study indicate that distance education and traditional academic outcomes are not significantly different when there is sufficient preparation and development of a distance course with an eye towards an interactive supportive learning environment.

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Table 1. Course Content

Module	**Course Content**
Module 1	Introduction & Nursing Research and Theory
Module 2	Evolution of Nursing Research
Module 3	Conceptual and Organizing Frameworks and Theories in Nursing Research
Module 4	Ethics and Nursing Research
Module 5	Quantitative Analysis of Research Data-Descriptive Statistics
Module 6	Quantitative Analysis of Research Data-Inferential Statistics
Module 7	Computer Analysis
Module 8	Qualitative Analysis of Research Data
Module 9	Issues in Measurement
Module 10	Communication in the Research Process

Table 2. Satisfaction with Course Scores for Web-based and Traditional Classroom Research Course
1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree

Web-based Research Course N=15	Mean = 1.64	SD = 0.21	T test = 3.34 Probability assuming the null = 0.003; there is statistically significant difference in satisfaction scores between groups
Classroom Research Course N=16	Mean = 1.36	SD = 0.57	

Table 4. Academic Outcomes for Web-based and Traditional Classroom Research Course

Web-based Research Course N=24	Mean = 88.18	SD = 6.99	T test = .18 Probability assuming the null = 0.86; there is statistically significant difference in academic outcomes between groups
Classroom Research Course N=20	Mean = 88.68	SD = 10.89	

Table 3. Qualitative data themes for satisfaction with course survey for Web-based Research course

Narrative Question	**Themes** (most frequent themes)
What did you like about this course?	Well organized, clear content; professor took time explaining; web board discussion; independence and convenience in learning via distance format; enjoyed peer reviewing colleagues papers; timely feedback
What did you not like about this course?	Some technical problems (instructor and student); would like to conduct an actual study; wanted more feedback from instructor; weighting and grading of assignments.
How would you improve this course?	A more interactive web board for discussion; needed email addresses of fellow students; adjust due dates for students who need more time.
Additional comments the student might want to make	Loved taking the course online! Instructor responded promptly; a smooth transition between Research I course and this second course.