

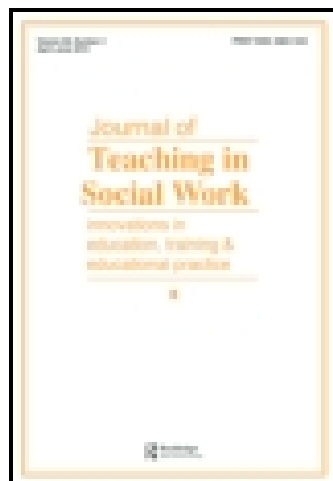
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Teaching Research Online

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Teaching Research Online: A Process Evaluation

David Royse

ABSTRACT. The rapid growth and popular acceptance of the World Wide Web has made it possible for social work educators to provide distance learning opportunities through this media. This article reports on a research methods course taught over the Internet to an off-campus MSW program in the spring of 1997. The pilot test of the computer-based instruction is evaluated with both quantitative and qualitative data. It was concluded that students learned about as much research content as those in the traditional class although there was no decrease in their math anxiety. The author's experiences are shared for those educators interested in implementing this technology. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <http://www.haworthpressinc.com>]*

KEYWORDS. Internet, distance learning, teaching, research, online

Although there is a rapidly increasing body of social work literature on the use of video and interactive television for instruction (Blakely, 1992; Coe & Elliott, 1997; Conklin & Osterndorf, 1995; Day & Blue, 1997; Rooney & Bibus, 1995; Thyer, Polk, & Gaudin, 1997), and growing interest in the resources available for social workers and students on the World Wide Web (Estes, 1997; Finn, 1995, 1997; Holden, Robenberg & Weissman, 1996), very little literature can be found about teaching social work courses by computer.

At the same time, numerous descriptive reports of computer ap-

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plications can be easily located and range from simulation of problem-solving in case management (Gray, 1994) to therapeutic games for adolescents and youthful offenders (Clarke & Schoech, 1994; Resnick, 1994). Many educators have seen the vast potential of computers and used them to enrich and assist their instruction. Kulik and Kulik (1987) reviewed almost 200 studies examining computer use in elementary schools, high schools, colleges, and nontraditional postsecondary institutions and concluded that computer-based instruction generally produces positive results.

The development and wide-spread acceptance of the Internet has made it possible to teach students in distant locations almost as easily as turning on a computer, but without the scheduling problems and limitations imposed by dependence upon satellites and compressed video. Already as many as 300 colleges and universities offer online courses and Duke, Ohio University, and Purdue have recently launched Internet based M.B.A. programs (Hamilton & Miller, 1997). The University of Phoenix, which claims to be the nation's second largest private school, provides three Bachelor of Science and five degrees at the Master's level all online (<http://www.uophx.edu/>).

Teaching social work courses over the Internet offers several advantages over interactive television (ITV). For instance, a student can participate in an online course at any hour of the day or night, thus providing greater accessibility for students who work or who need to be home with small children or elders, or who find it difficult to travel because of distance or physical handicaps. Unlike traditional classroom instruction, students linking with the Internet can set their own pace and interact with prepared material as often as they choose. This type of instruction also encourages students to explore the rich abundance of information available from the World Wide Web.

Creed (1996) claims even more advantages of electronic communication for instruction: elimination of the "vagaries of handwriting and penmanship," enhanced ability to archive and retrieve students' work, potential for enhanced student interaction outside of class, and this media may "level the playing field" so that shy students may feel comfortable raising questions and interacting more with the instructor. Finally, feedback on assignments or tests is a private communication—students can't read notes or comments from the instructor to others.

Despite these advantages, the larger issue is whether online instruc-

tion is effective pedagogy. That is, do social work students learn as much or more than they would in a traditional classroom? And besides the advantages, what difficulties and obstacles to learning are encountered? The field has largely ignored questions about the effectiveness of computers with social work students and little advice is available to educators who want to use this medium in their BSW or MSW programs (Flynn, 1994).

BACKGROUND

For the last 19 years, the University of Kentucky has conducted an off-campus MSW program at a regional university roughly 85 miles from Lexington. To cut down on the amount of time that faculty spent driving, in the fall semester of 1996 the Dean began encouraging faculty to make more use of interactive television. He was enthusiastic when the author proposed teaching, as a pilot test, a research methods course over the Internet.

The author attended a brief workshop on Hyper Text Machine Language (HTML) and, with some additional technical support, established a website for the research course. The design was simple: From the homepage students were linked to instructions for 13 assignments and to the instructor's commentary on each of the chapters in their text. Some of the assignments were incorporated into interactive forms so that students merely typed in the appropriate information (e.g., responses to "state your hypothesis or research question here") and by clicking on the *Submit* button, were able to electronically mail it to the instructor. Other assignments did not use interactive forms (e.g., students were required to develop a single subject design, to locate a rapid assessment instrument and critically review it).

The commentaries included extra examples and illustrations, a review of key points in the readings as well as questions for students to ponder. An additional feature of the homepage was a "News" link where information of interest to students was posted—such as a listing of the e-mail addresses for the class, and helpful hints about computer glitches.

The syllabus clearly stated that the course would be similar to an independent study in that students would be working on their own, but with the availability to call or e-mail the instructor whenever questions or difficulties arose. The syllabus further instructed students to plan on

reading a chapter a week during the 15 week semester and completing an assignment connected with that reading. The instructor's plan was to meet with the class on three occasions: the initial orientation, at mid-term, and at the final exam. However, several members of the class asked that the instructor return a second week, and he did because two members had missed the first meeting. Later in the semester the class requested that the instructor conduct review sessions prior to their exams. Thus, the instructor actually made six trips to the off-campus location.

In November of 1996, potential students in the off-campus program were mailed a letter informing them that they could choose between taking their research methods class by interactive television or via the Internet. The letter further informed them that they did not need to be "computer literate"—that they would be taught all the necessary basic skills and could use computers at the university if they did not own one. Fourteen students signed up for the Internet section and seven for the ITV section.

METHODS AND PROCEDURE

Research Design

Using a quasi-experimental nonequivalent control group design, the 14 students in this study were compared with MSW students enrolled in two traditional research methods classes ($n = 42$) taught by the author in the fall semester of 1996. Both quantitative and qualitative data were gathered. The seven students in the ITV section did not receive instruction from the author and did not participate in this study.

Outcome Measures

Two outcome measures were employed. A 24-item version of the Mathematics Rating Scale (MARS-R) was used to determine the level of students' math anxiety on the first and last meetings of the class. The MARS-R has a coefficient alpha reliability estimated at .98 and correlates .97 with a longer version of the scale (Plake & Parker, 1982). Construct validity for that version has been demonstrated in

three studies in which scores on the MARS showed expected decreases in math anxiety following behavior therapy (Richardson & Suinn, 1972). More recently, Royse and Rompf (1992) reported that social work undergraduates were more math anxious on the MARS-R than a cross-section of other undergraduates.

To assess the amount of learning they acquired about research methods, the author administered the same objective-type final exam to both online and regular lecture course students. This exam has been continuously refined and revised over the last five years and for the purpose of this study was found to have an internal consistency of .79 ($n = 58$). According to Nunnally (1978), this level of reliability is adequate for basic research. Of the 58 items on the final exam, 34 items were multiple choice, nine were true-false, 8 were short answer, and 7 were matching. Incorrect responses were coded as zeros and correct answers as 4s which gave the exam a theoretical range of 0 to 232.

It was hypothesized that students enrolled in the online course would not differ significantly from those on the main campus in their test scores and posttest math anxiety.

RESULTS

All of the 14 students who enrolled in the Internet course either had a computer at home or used one at work. On a ten-point scale, they rated their knowledge of computers on the midpoint between "not knowledgeable" and "very knowledgeable." Four students were already subscribing to an online service at the beginning of the spring semester and as a group they seldom sent e-mail or searched the World Wide Web for resources. The amount of time they reported spending on a computer for any purpose in an average week ranged from 1 to 25 hours with a median of 7 hours. Only one student was not employed full-time.

Math Anxiety

At the first meeting of the class, the 14 Internet students had slightly lower pretest math anxiety scores (mean = 62.5) than the comparison group (mean = 64.7) but this was not a statistically significant difference ($t = .29$, 58 df, $p = .77$). Although the math anxiety scores for the Internet students raised slightly at posttest (mean = 65.6), it was not

significant ($t = 1.09$, 13 df, $p = .29$). However, students in the traditionally taught course showed a significant reduction (mean = 60.25) in their math anxiety at posttest ($t = 2.35$, 39 df, $p = .02$).

Final Exam

The comparison group of MSW students who were taught research methods by the conventional lecture approach had a mean score of 196.98 (SD = 19.65) on the final exam which is to say they got 84.9% correct. The 14 Internet students had a mean score of 184 (SD = 28.5) which is the same as 79.3% correct. However, the average scores obtained in the two classes were not statistically significant ($t = 1.59$, 17.1 df, $p = .13$).

Logs

The course syllabus required students to keep a record of their experiences with the Internet class and to make entries every time they logged on to the web site or worked on a related assignment. Students were asked to date their entries, to indicate the amount of time spent on the course exclusive of reading the text, and to address two general topics each time: areas of new learning and any problems or frustrations. Logs constituted 15% of a student's overall grade.

Even though there was a great deal of individual variation, students on the whole tended to write sparsely about their experiences in learning research via computer. One student turned in only eight logs. The most prolific had 43 entries; however, some of these were one-liners (e.g., "attempted to e-mail classmates"). The median for the class was 15 logs. The average word count for a typical log was 138 words-or about six sentences. Students were not conscientious in noting the amount of time each week they devoted to the research course. Four of the 14 students recorded hours in fewer than half of their logs. Based on what they reported, students spent on average 32.6 hours during the semester on course related activities excluding reading the text. On the low end, one student recorded 12.66 hours. The highest number of hours reported was 75.8 hours.

Qualitative Analysis

All the logs written by students in the Internet class were read and categorized into five major theme-oriented groupings. These were:

new learning, frustrations, suggestions for improving the course, student criticisms, and positive comments regarding the course.

Several students reported that the greatest benefit of the class was in learning about the World Wide Web and the various electronic databases available to them. Students called learning about the Internet “invaluable,” “exciting,” and “fascinating.” The following comments are illustrative of their new learning:

Amazing that you can type in a subject and a world of information comes to you! I found journal articles on alcoholism in the elderly, 366 to be exact.

While surfing the net, I found a college friend I'd lost contact with.

Went into WWW to get information on the Federal Communications Commission for Policy Class.

I found a lot on the Web. I also learned how all of those people who are addicted to the Web get that way. I found a great deal of information that interested me. Thank you!

There were also comments that demonstrated students were able to see the applicability of material learned from the course:

I used my knowledge from this (assignment) in helping my supervisor complete our annual outcome measures for Community Chest.

I have also learned to recognize bias in the tools of assessment and documents that my agency uses every day with our clients.

As I read about preparing and analyzing data, I thought how that could become a valuable tool for me . . .

Student Frustrations

All but one student reported experiencing technological problems of some kind. Often these were not serious problems, but more of the nuisance variety—such as not being able to connect with the online service between 7:00 and 7:30 p.m. because of heavy traffic. Besides these complaints, there were unwanted disconnections (which sometimes required re-entering homework assignments), printers that wouldn't print (and also internet accessible computers in a library not connected with printers), general problems in sending or receiving

e-mail (one student said it once took 45 minutes for the server to send her e-mail), a computer virus, and monitors that quit working. And there was at least one computer that wouldn't allow a student to send any new e-mail until the old messages had been deleted. While petty problems for the most part, they still were vexing for those experiencing them. One student wrote:

Spent an hour at the lab trying to get new printouts of class notes and assignments. Finally worked with the lab helper. He couldn't get them to print and when he said to me, "It doesn't work, I don't know what is wrong but I can't get it to print either," I almost broke down and cried right there in the lab, I was so frustrated by this time.

Several students also complained about the amount of time that they spent on assignments. One student wrote, "Since I last logged (one week earlier) I have spent about 2-3 hours on this class alone. Even though that does not seem like a lot of time, it is when you're taking two other classes and working full-time."

Student Suggestions for Improving the Course

Although a newsgroup was actually available for their use, three students recommended that a chatroom/listserv be created for students to communicate with other students. Two students thought there ought to be assignment deadlines to prevent procrastination. Two students wanted their exams back so that they could see what questions they missed. One student thought it might be helpful to have a "buddy system" where students could be paired to work together. Three students had suggestions concerning the relative weight of exams, assignments, and logs.

Student Criticisms

Five of the 14 students made evaluative comments revealing dissatisfaction with the course. The major complaint was that they missed having the traditional teacher, classroom structure.

I have an overall frustration with this class. I feel like I was short-changed . . . it was an independent study class if anything.

I'm not sure if I got much out of this class. I didn't realize it was an independent study. If I knew it was, I wouldn't have signed up for it. I'd rather have weekly classes where I was *taught* the material.

. . . this has been a difficult class for me, not because the material was not laid out, but because I needed the classroom contact. I really think I could have achieved and learned much more in one of your face-to-face classes.

I have no major recommendations about how you could improve the course. (But) I will think twice before I sign up for another computer course.

I hope that I do not have to take many more classes in this fashion . . . I just really prefer to have a traditional class room setting with a human being in front of me.

Positive Comments

Five students also were generally favorable about the course. Examples of the positive evaluative comments were:

. . . (although) taking this course has been a very challenging and slightly painful experience for me . . . I truly appreciate this class because I feel that this is what learning is all about.

I thought this class was a good experience for me even though I could have at times used the extra motivation that perhaps being in class would have provided.

I like the concept (of the class) . . .

I really like the way this whole thing is going . . . this is turning out to be a good learning experience.

Four students did not make any overall evaluative comments—though one of these did say she “truly believed” the assignments helped to develop an understanding of the concepts.

Instructor's Frustrations

A mistake I made was not setting deadlines for the completion of the various assignments. My assumption was that graduate students who chose this course over the ITV section would be conscientious

enough to stay current with their readings and assignments. However, this was not the case. Two weeks after the initial class meeting only three students had completed their first assignment. It took three more weeks for the last of the first assignments to arrive. And, it was a simple assignment, requiring only that students state a hypothesis, operationalize a dependent variable, and list three independent variables on an interactive form. Consequently, I mailed a letter to the students expressing concern that many of them were falling behind. This letter had no noticeable effect. A second letter urging them to “catch up” was mailed approximately six weeks later.

Students clearly admitted to problems with procrastination in their logs. Ten of the 14 students directly discussed their lack of self-discipline. Examples are:

I worry about the procrastinator in me . . . too much freedom can be dangerous for some of us!

To be honest, I haven't done any work on this class in a while. This type of self-study encourages procrastination.

Another frustration was that students didn't call when they needed help and though some corresponded by e-mail, this communication was less frequent than desired. For instance, almost four weeks into the course, after diligently reading all incoming assignments and responding back by e-mail within a day or two, a student reported that she has given me the wrong e-mail address and had not received anything from me. I'd never received any indication that the e-mail was not being delivered. Why did she wait four weeks? About 10 days later another student asked, “Are you responding to each person's assignments?” Evidently, it had not occurred to the second student that I would be responding back by e-mail and she had not gone to the trouble to check. It also suggested that students were not communicating with each other by e-mail although addresses were available from the course homepage.

DISCUSSION

Computer-based instruction requires students to learn specific content as well as to become more computer literate. From both perspectives, the course was a success. Students learned how to send and

receive e-mail, how to search for resources on the Internet, and in some cases, how to use their word processors. By the end of the semester only two students had not developed a facility with e-mail. One did not own a computer, the other did. And although the Internet class did not score as highly as had been hoped on the final exam, there is no basis for saying that they learned significantly less than the comparison group.

Additionally, the Internet course worked as planned without any major repairs or adjustments. There was no catastrophe (e.g., the crash of the website) which affected all the students at one time. Even though the course material was heavy on text and light on graphics and visual imagery, no students experienced that as a problem. However, students and instructor alike had our patience tried from time to time because of problems with computers, software, or printers. These difficulties were usually temporary failures of machine or technology.

Students were creative in making adaptations. Once they got past the interactive homework forms, several discovered that instead of logging onto the computer every time they wanted to work on an assignment, they could just print everything out and use the U.S. Postal Service instead of e-mail. This adaptation decreased the instructor's ability to communicate with students by posting news on the homepage or sending e-mail to them, and prevented the instructor from making last minute revisions to assignments—something that was occasionally necessary. For example, a few students returned electronic forms without identifying themselves. Circumventing the Internet aspects of the course and not becoming skilled with e-mail procedures also kept students from communicating with each other—which undoubtedly contributed to feelings of isolation and added to their frustration level.

Another creative adaptation was that a few students e-mailed assignments, then, either because they had given it more thought or talked with another student, sent a second e-mail to clarify or expand upon their homework. Even though I attempted to grade all assignments within 24 hours to discourage this, sometimes I'd have two or more submissions from the same student.

Because students did not faithfully record in their logs the amount of time they spent on the Internet course exclusive of reading the text, not a lot of confidence can be placed in the number of hours they reported. The mean of 32.6 hours is 27% fewer hours than would have

been required just attending a lecture-type class (3 hour class 15 weeks = 45 hours). And, more importantly, that includes the time it took them to complete all their assignments. Whether because of job and family responsibilities, lack of interest, computer illiteracy or plain inertia, most students did not appear to invest as heavily of their time as might be expected. But on the other hand, Kulik and Kulik (1987) noted in their meta-analysis that students learn from computer-based education in less instructional time. They found an average reduction of 32% in 28 investigations.

Math anxiety scores didn't decrease with the Internet students as they did in the control group. For some people, the computer intrudes into the academic process (Flynn, 1994)-possibly heightening instead of reducing overall anxiety. Perhaps the supposed anxiety-reducing benefit of being able to work at one's own pace was negated by not having a live instructor in the class to calm and reassure anxious students. However, a limitation of this study is that the group of 14 students is a small number and may not represent well the total population of MSW students.

Teaching courses through the Internet is still in its infancy. Educators considering this media need to recognize at least two problems: (1) at the moment, there is no good way to test students in remote locations without having someone else verify their identity or driving there yourself. (2) Although there is a time savings associated with having the course content being stored in the computer and ready for the next class, the instructor's subjective impression is that teaching through this media is actually much more labor intensive. Because of the lack of personal contact, you can't simply hand back a paper with a smile on your face and say, "I don't think you understood; please do this assignment over again."

In order to be perceived as constructive criticism, critical remarks have to be presented within a supportive context. To point out where students went astray and what they needed to correct, a simple word or two won't suffice. It seemed at times like I was writing a personal letter to each student in response to each assignment. There may be other ways to solve this problem-for example, requiring students to get peer reviews for certain exercises, requiring fewer assignments, or making use of assignments that can be machine-scored.

Teaching over the Internet is not without some drawbacks. The chief one is that instructors don't get to know their students except

through reading their hastily typed assignments—which can sometimes give erroneous impressions. While in my lecture classes I always take the first session to learn where students work, their research interests, or what brought them to social work; I didn't do that with this class because time was spent on familiarizing them with Netscape. Nonetheless, it is highly recommended that instructors make the time to get to know their students—and I will do that very thing in all future Internet classes. I will also structure the class a little differently—setting a deadline for the completion of each assignment.

In sum, this pilot test didn't reveal instruction over the Internet to pose insurmountable problems, or to be all that much of a radical departure from teaching face-to-face with students in a regular classroom. The problems were a little different, (e.g., no talkative or sleepy students or noisy halls to contend with), but also familiar (e.g., students who fell behind in their work). In terms of pedagogy, it seemed to be about as effective as the traditional lecture approach. Computer-based instruction will be further refined and is likely to be adopted widely by social work educators because of the many advantages it offers. Indeed, one student unknowingly discovered a previously unrecognized pedagogical argument for it: “. . . in order to do well in this class, I will actually have to read all of the chapters assigned. This may seem obvious, but . . . in the past, I have merely listened in class, taken notes, and very occasionally skimmed a chapter that has troubled me.” Students actually having to read their material, what progress!

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