ON THE OUTSIDE TEACHING IN: USING INTERNET VIDEOCONFERENCING TO INSTRUCT AN INTRODUCTORY SOCIOLOGY COURSE FROM A REMOTE LOCATION*

This study uses a quasi-experiment to evaluate the effectiveness of Internet videoconferencing technology. The instructor used a laptop, webcam, high-speed DSL connection, and Polycom™ Viewstation to teach a course unit of introductory sociology from a remote location to an experimental group of students in a large multimedia classroom. The same instructor taught a control group of introductory sociology students without videoconferencing. The groups were compared using exam scores, attendance, classroom observations, and student evaluations. The use of Internet videoconferencing did not affect exam scores or attendance. However, it substantially lowered student evaluation scores. In comparison to classroom-based instruction and due to problems with and limitations of the technology, students experienced greater difficulty communicating with the instructor, felt more separated, and were less engaged in the course. Therefore, they perceived the instructor's teaching to be less effective, and evaluations reflected lower scores, thereby "punishing" the instructor. Symbolic interactionism is used to interpret the results. This research is compared and contrasted with a previous study conducted by one of the authors (Koeber 2005), also published in Teaching Sociology, *which yielded opposite results. In Koeber's study the instructor was rewarded with favorable student evaluations for the use of new technology that enhanced engagement. We conclude that when instructors choose whether or not to use Internet videoconferencing, they must weigh the potential benefits associated with bridging distance gaps versus potential costs associated with reduction in quantity and quality of symbolic interaction that may cause students to disengage.*

CHARLES KOEBER
Wichita State University

DAVID W. WRIGHT
Wichita State University

STUDIES SHOW THAT social science faculty and instructors introduce new electronic information technologies to their courses with increasing frequency (Bills and Stanley 2001). Outside the classroom, they incorporate Internet-based resources and virtual forms of learning (Dietz 2002; Valentine 2001). These include course websites, electronic discussion groups, and online distance learning through Web-based applications. Within classrooms, instructors computerize the presentation of material by using multimedia presentations (Pippert and Moore 1999), "clickers" (Hatch, Jenson, and Moore 2005), and other applications. Additionally, students often expect to use and learn with new technology as they complete their college educations (Benson et al. 2002). In this study, we report results of a quasi-experiment in which Internet video-

*This research was funded in part by a technology grant from Wichita State University, its Fairmount College of Liberal Arts and Sciences, and Department of Sociology. The authors thank Robert Phillips and Indika McCampbell for providing technical support, and Amber Hull and Heather Barlow for assisting with technology and data collection. Please address all correspondence to Charles Koeber, Department of Sociology, 1845 Fairmount, Wichita, KS 67260-0025; e-mail: chuck.koeber@wichita.edu.

Editor's note: The reviewers were, in alphabetical order, Jay Howard, David Jaffee, and Idee Winfield.

conferencing technology was used to teach a large section of introductory sociology students. We gauge the extent to which this new technology can be used effectively in a large sociology classroom.

Over the past two decades, many articles about the use of information technology have appeared in *Teaching Sociology*. Although some of these have taken a negative view (e.g., Magnuson-Martinson 1995; Persell 1992), more have reported favorably. Researchers report on many different information technologies used both inside and outside of classrooms. However, much of this literature repeats a salient theme: When information technology is used successfully, it almost always does so by enhancing, in one way or another, some form of student engagement. According to Laird and Kuh (2005), most studies in higher education tend to view information technology as its own form of engagement. However, as these authors correctly point out, information technology can and should be related to other forms of student engagement. They argue that "there appears to be a strong positive relationship between using information technology for educational purposes and involvement in effective educational practices such as active and collaborative learning and student-faculty interaction" (Laird and Kuh 2005:211). If not explicitly, in terms of using the language of student engagement, at least implicitly, many articles in *Teaching Sociology* have indeed taken this position.

For instance, some studies report on how information technology simplifies courses, making it easier for students to engage with various facets of their courses. King (1994) concluded that discussions through computers increased students' exposure to material, participation, communication between peers, and instructor feedback. Gigliotti et al. (1994), in a study of computerized testing, found that, although students scored slightly lower on computerized tests than on conventional exams, they appreciated the flexibility and ease of use. Koeber (2005) reported that the use of a course website increased student rapport with the instructor by virtue of providing additional means for students to both give and receive feedback

More common are studies that echo findings of Brooks (1997) and Jaffee (1997), who found that information technology can be used to remove students from teacher-dominated classrooms and create a more inclusive virtual learning community. According to Dietz (2002), virtual learning communities can help students become further invested in their education. To this end, Valentine (2001) found that electronic discussion groups helped to meet the challenges of teaching sensitive material contained within human sexuality courses. Scarboro (2004) used electronic bulletin boards to stimulate collaboration among students and improve learning in a theory course. Little, Titarenko, and Bergelson (2005) enrolled students from several different countries to create an international distance learning course. Using the Internet, these students communicated with each other to increase their cross-cultural understanding. Persell (2004) reported that focused Web-based discussions increased students' engagement with each other and increased the complexity of their thinking about issues relating to race and education. Wright and Lawson (2005) found that students who participated in online group-learning activities performed better on exams, quizzes, and term papers. Van Gundy et al. (2006) indicated that online discussion forums helped to build self-esteem among undergraduate statistics students by virtue of making the course more collaborative, interactive, and student centered.

Summarily, many researchers advocate the implementation of new instructional technology within sociology courses because it can, in some manner, enhance student engagement. Information technology creates opportunities to engage, not just with the information technology itself but with the course, often by enabling learning to be more active and collaborative.

In this study, we examine a new form of information technology, Internet videocon-

ferencing, and discuss its effects on student engagement. At the outset, it is important to note fundamental differences between Internet videoconferencing and other types of new instructional technologies. Unlike some other technologies, Internet videoconferencing does not require that students interact or collaborate outside of the classroom, as does, for example, an electronic discussion group. Nor does it require an innovative form of electronic interaction inside of the classroom, as do, for example, "clickers." Rather, its main benefit is to make possible conventional communication via the Internet when it is not possible for both students and instructors to be in the same classroom. In other words, by its nature, Internet videoconferencing often serves as a second-best substitute for lecture and discussion that cannot physically take place in a classroom. Therefore, it is perhaps not reasonable to expect that Internet videoconferencing will affect student engagement in ways similar to other instructional technologies.

However, with this important caveat stated, we will argue that, as with other instructional technologies, the relationship between Internet videoconferencing and student engagement will be of central concern to teachers faced with the choice of whether or not to use it. Whenever an electronic medium is placed between instructors and/or a group of students, there are always important questions pertaining to if, whether, and to what extent those on both sides will engage with the technology, each other, and their courses. In this study it is not the potential of the technology to enhance the engagement of students that warrants our concern but, rather, the opposite:the risk that it will disengage students. It is likely that Internet videoconferencing will become more available as technological improvements increase its viability and decrease its cost, as colleges and universities seek innovative ways to cope with increasing enrollments and decreasing classroom space, and as it is incorporated into distance learning courses. Therefore, it is important that teachers be aware of how the use of this technology may affect their courses and students.

THEORY: THE INTRODUCTION OF TECHNOLOGY AS A SOCIAL PROCESS: ACT, GESTURE, SIGNIFICANT SYMBOL

In sociology, symbolic interactionism is an especially well-suited theoretical perspective from which to view the relationship between information technology and student engagement. In this article, we revisit the symbolic interactionist theoretical interpretation of one of the authors, Koeber (2005), who used a quasi-experiment similar to that of the present study to analyze effects of multimedia presentations and course websites on academic performance and student perceptions of teaching.

Theoretically, Koeber used the symbolic interactionism of George Mead to interpret his results. He explained how, in Mead's terms, the introduction of new information technology is a social process of experience and behavior. According to Mead, the *act* is the basic unit from which all other symbolic interaction emerges, and the act consists of four stages. The *gesture* is the basic mechanism in social acts and processes. Unlike an act, gestures are stimuli that elicit action from their recipients (Mead 1956:14). According to Mead, *nonsignificant gestures* require no conscious thought on the part of the recipient before reaction; they are seemingly instinctive. Combatants in boxing or fencing matches who unthinkingly reacted to the movement of their opponents were examples of nonsignificant gestures used by Mead (Ritzer 1992). Information technology may also elicit a nonsignificant gesture, as when, for example, users quickly and habitually react in a variety of ways to stimuli that occurs on their cell phones and PCs.

Koeber argued that the results of his quasi-experiment suggested that, as a nonsignificant gesture, information technology elicited a type of "spillover effect" among those in the experimental group, whereby the favorable impression called forth by the

use of information technology "spilled over" to all responses on standardized teaching evaluations, even those ostensibly not related to the use of information technology. Students in the experimental group were likely to answer more favorably than those in the control group to *all* questions. For example, they rated the instructor's grading quality higher, even though the exams and grading system had not changed, and exam scores in the experimental group were virtually identical to those in the control group.

For Mead, gestures become significant when both the sender and the recipient attach identical meaning to them. When this occurs, the gesture is referred to as a *significant symbol*. For Mead, the significant symbol is necessary for communication. Unlike the nonsignificant gesture, the action of the recipient does not occur unconsciously or instinctively. It requires the recipient to process and interpret information and consciously determine a path of action.

The results of Koeber's (2005) research indicated that the introduction of instructional technology constituted not only a nonsignificant gesture but also a powerful significant symbol that elicited students' conscious responses and actions that were necessary for them to become familiar with and use the information technology. Through these responses and actions, students in the experimental group came to perceive the course and instructor differently from those in the control group. Koeber argued that the introduction of information technology, as a significant symbol, increased the level of symbolic interaction between instructor and student via the website and was reflected in higher evaluation scores, especially in measured dimensions of rapport and grading quality, where course websites enabled students to communicate with the instructor and be more actively involved with the course.

In this study, we use a research design very similar to that of Koeber (2005) to measure effects of a new and different form of information technology, Internet videoconferencing. The data was collected in the same university setting, with the same instructor teaching introductory sociology courses. The research employs a similar quasi-experimental design and uses several of the same outcome measures, including scores from similar exams and the same student evaluation instrument. We also extend the symbolic interactionist theory proposed by Koeber to interpret results and to discuss the way that students may or may not engage when new technology is used in classrooms. In short we wanted to gauge how the empirical findings and theoretical generalizations of Koeber's 2005 study would compare when using a different form of information technology in an introductory sociology classroom.

METHODOLOGY

Research Design

Satellite videoconferencing has been used successfully for many years to connect instructors and students situated in different locations. However, *Internet* videoconferencing has been in existence for only a few years. The main difference between the two types of videoconferencing is that the former requires a satellite feed, which usually requires courses to be delivered and received from a conferencing room in a specially equipped facility. The advantage of Internet videoconferencing is that potentially it can be broadcast between any two locations equipped with a high-speed Internet connection by using a laptop computer with a web camera and other small and portable equipment. Therefore, Internet videoconferencing is considerably less expensive and less restrictive than satellite videoconferencing.

This technology holds abundant potential. Not only could it be used to more easily and less expensively reproduce forms of distance learning that have been traditionally used with satellite conferencing, but it opens the door for other uses. Equipped with a laptop and a webcam, instructors could continue to hold their classes on cam-

pus even when away on research trips and conferences. Students could receive courses from instructors with physical disabilities who have difficulty teaching on campus. Large introductory sociology courses could receive information from people located in far away places. Instructors could teach to students located in two different classrooms when one classroom is not sufficiently large. We wanted to find out more about how this new technology could be used in the teaching of sociology.

To test the effectiveness of Internet videoconference teaching, we used a quasi-experiment, which took place during spring semester 2005 at Wichita State University, a medium-sized state university in the Midwest. Before the experiment, we assembled a project team that consisted of two principal investigators (both sociologists), two technical support specialists, and two sociology graduate teaching assistants. The team extensively prepared and tested the equipment during three planning meetings and three pilot sessions. The instructor used equipment that consisted of a laptop computer, a peripheral *Polycom™ Viavideo* web camera, and software. Using a high-speed DSL Internet connection, the instructor broadcasted lectures from a remote location (his home). A *Polycom™ Viewstation* was used to receive the audio and video signal and relay it to the multimedia classroom video projector and audio amplifier, where it was then seen and heard by students. The *Viewstation* also contained a web camera, which was controlled remotely by the instructor. From his location, the instructor was able to use his computer to pan, tilt, and zoom the camera to view students in the classroom. The *Viewstation* used picture-in-picture technology to transmit an image of the classroom to both the instructor and the students. In this manner, students saw not only a larger image of the instructor but also a smaller image of themselves, as they appeared to the professor, in the corner of the screen.

The instructor and team completed three pilot sessions with a small number of student volunteers. The instructor then taught the final course unit of his two introductory sociology sections, within a quasi-experimental format, to an experimental and control group of students, which consisted of two sections of introductory sociology. Both sections met in similar large multimedia classrooms (capacity of 150). Both sections met on Monday, Wednesday, and Friday—the control group met from 9:30 to 10:20 a.m., and the experimental group met from 11:30 a.m. to 12:20 p.m.—and maintained the same daily schedules. In both sections, the instructor used Kendall's 5th edition of *Sociology in Our Times* (2004), an introductory sociology text. The format of the class was lecture/discussion.

In the control group, the instructor used *PowerPoint* presentations to present key concepts, ideas, theories, statistics, questions for discussion, and directions for small group exercises. In the experimental group, the instructor was not able to project the *PowerPoint* presentations onto the screen as he had done previously. However, both experimental and control groups possessed a course packet, which contained copies of the *PowerPoint* presentations. The experimental group watched the instructor on the screen while following along in their course packet. The students completed five exams, each consisting of 40 multiple-choice questions. They also completed ten online quizzes, which were based on reading from Matson's *Spirit of Sociology* (2004).

The instructor tracked attendance regularly and randomly assigned credit for five classes throughout the semester, with two additional extra-credit attendances. The overall course grade consisted of exam scores (80 percent of total grade), quiz scores (16 percent), and attendance (4 percent).

Prior to the final course unit in which the quasi-experiment took place, both sections had used computer technology in the instructor's classroom. Both sections took place in multimedia classrooms. The instructor used the computer application *Blackboard* to construct and use a website

for the course. Students used this website to view announcements and other information about the course, check assignments, view their grades, e-mail the instructor, and access and complete online quizzes.

Because these were university courses, it was impossible to randomly assign or match students to experimental and control groups. Therefore, to examine the equivalency of the groups, we used t-testing to look for differences between experimental and control groups relative to several variables (see Table 1). These variables, limited to those we could obtain from the course roster and from student records, included the following: age; number of enrolled cumulative hours; grade point average; ACT score; overall course grade; sex; race/ethnicity; class standing; student statuses, including whether or not a new, first generation, or transfer student; whether or not on academic probation; number of enrolled hours; and whether or not repeating the course. The results of the t-tests indicated that groups were comparable, since no statistically significant differences among any of the variables were present between the groups.

Source of Data and Data Analysis

Triangulation improves the validity of the research. Therefore, this study employed multiple sources of data to ascertain the effectiveness of videoconference teaching. During the experiment, to ascertain differences in student-teacher interaction, a graduate teaching assistant was sent to record observations of both experimental and control groups before and during the videoconference teaching unit. These observations included general observations of how students reacted to the presentation of material and also specifically designated types of behaviors that could be quantified, such as the number of two-way interactions that took place during a class period between instructor and students.

Near the conclusion of each semester, the university administered Student Perceptions of Teaching Effectiveness (SPTE) evaluation forms, each containing 27 Likert-scale questions that attempted to measure four dimensions of perceptions of teaching effectiveness: (1) course design, (2) rapport with students, (3) grading quality, and (4) course value (see Appendix). At the end of the semester, the instructor was provided with

Table 1. Means, Standard Deviations, and T-Tests[1] of Demographic Variables

Demographic Characteristic	Total	Experimental (n=60)	Control (n=59)
Mean Age (Standard Deviation)	21.9 (5.7)	21.9 (6.1)	22.0 (5.3)
Percent Female	66.0% (0.48)	68.0% (0.47)	63.0% (0.49)
Percent Caucasian	65.6% (0.48)	70.0% (0.46)	61.0% (0.49)
Percent Nonresident	8.4% (0.28)	5.0% (0.22)	11.9% (0.33)
Percent Juniors and Seniors	15.1% (0.36)	11.7% (0.32)	18.6% (0.39)
Percent New Student	9.0% (0.29)	7.0% (0.25)	12.0% (0.33)
Percent First-Generation Student	39.0% (0.49)	42.0% (0.50)	37.0% (0.49)
Percent Transfer Student	40.0% (0.49)	38.0% (0.49)	42.0% (0.50)
Percent Academic Probation	11.0% (0.31)	8.0% (0.28)	14.0% (0.35)
Mean Enrolled Hours	13.3 (2.7)	13.6% (2.7)	13.0 (2.7)
Mean Cumulative Hours	27.1 (26.1)	26.2 (20.6)	28.1 (30.9)
†Mean GPA (Four-Point Scale)	2.91 (0.85)	3.06 (0.68)	2.76 (0.98)
††Mean ACT Score	22.3 (4.53	22.9 (4.33)	21.6 (4.70)
Percent Repeating Course	7.0% (0.25)	7.0% (0.25)	7.0% (0.96)
Final Class Grade (Four-Point Scale)	2.98 (1.09)	2.9 (1.21)	3.07 (0.96)

[1]T-tests of the means indicated no statistically significant differences at $p<.05$ between experimental and control groups

†GPA is not reported for international students and students from states with GPA formulas not identical to the 4.0 scale used by the state in which the university addressed by this research is located.

††ACT exam scores were not required for admittance to Wichita State University.

SPTE results that statistically summarized the scores of each course section. These statistical summaries were listed as a percentile, which indicated how the course and instructor compared to all other social science courses and instructors evaluated at the university on each of the dimensions during a current ten-year cycle. To measure student perceptions of teaching effectiveness, the variables in this study were constructed from summary measures of the first four dimensions of the SPTE evaluation and from the mean score of all four dimensions combined, which together constituted the SPTE Perceived Quality Index.

Prior to the final course unit in April of 2005, the university administered SPTE evaluation questionnaires, which were used to evaluate the course to that date. To compare student perceptions of the experimental unit with the previous four units of the course, as well as to compare experimental with control group, the SPTE instrument was again administered at the conclusion of the videoconference unit (May of 2005). During this SPTE evaluation, students in both experimental and control groups were specifically instructed to complete the evaluations *as they pertained to the final unit of the course only*. The experimental group was also given an additional questionnaire, similar to those used in the pilot sessions, which specifically pertained to the use of videoconferencing technology. To gauge possible effects on attendance, the instructor tracked daily attendance throughout the entire course, before and during the video conference unit. Finally, to gauge effects on academic performance, student exam grades were compared. Exam five contained forty content-related multiple choice questions on material presented during the video conference unit only. Scores from exam five were compared between experimental and control group. Within the experimental group, exam five scores also were compared to previous exam scores from course units that were taught conventionally, without Internet videoconferencing.

Technical Issues

The team encountered several technical problems throughout the study. The first set of minor challenges was associated with setting up equipment, installing software, and properly configuring settings. These were easily overcome by the technologists on the team. However, another set of more serious problems were posed by fluctuations and limitations of Internet bandwidth and the heightened demands placed upon the Internet connection by the videoconferencing technology; large quantities of audio and video that are transmitted during an Internet video conference can create problems that one does not typically experience during more ordinary use of the Internet. For instance, the Internet connection was not reliable and unexpectedly dropped several times. Often the instructor and class experienced a delay in the transmission of audio and video, which resulted in difficulty for the instructor to see and hear students, and vice versa.

RESULTS

Effects on Students: Attendance

No statistically significant differences were found *between* the experimental and control groups in either time period or in the course as a whole (see Table 2). There were no statistically significant differences in atten-

Table 2. Mean Attendance and T-Tests of Mean Attendance

Group	Entire Course	Before Treatment	During Treatment	Significance
Experimental Group	77.9%	79.0%	70.9%	*
Control Group	76.7%	79.1%	61.4%	**
Significance	(none)	(none)	(none)	

*=p<.01, **=p<.001

dance for the two classes during the entire course. This suggests that videoconferencing did not affect attendance. However, during the unit in which the experiment took place, attendance in *both* groups declined substantially, perhaps because students were fatigued as the semester came to a close or because they were preparing for other exams and completing final projects in other courses at the end of the semester. Between both groups, the differences in attendance for the two time periods were statistically significant. However, given that there were no differences between the groups, it is likely that some other factor(s) besides the experimental stimulus contributed to the drop in attendance within the experimental group.

Effects on Students: Exam Scores

There was no statistically significant difference in exam scores between the control and experimental groups (see Table 3). Both groups scored an average of within one-half percentage point on their exams. Also, there was no difference in either group between their mean exam score over material presented during the experimental course unit and the mean of all exams. These results suggest that Internet videoconferencing did not affect exam scores.

Effects on Students: Teaching Evaluation Scores

Although exam scores did not significantly differ, the same cannot be said for student perceptions of teaching effectiveness (see Table 4). Overall, teaching evaluation scores for the experimental group substantially declined from pre- to post-test and were much lower than those of the control group in all measured categories of perceived teaching effectiveness, including course design, rapport with students, grading quality, and course value. In examining the combined results of these categories, the perceived quality index (PQI) results indicated that the experimental group declined by over 53 percentage points among the experimental group, while the index score remained virtually identical (within one percentage point) for the control group. These results suggest that Internet videoconferencing had a substantial effect on students' perceptions of teaching effectiveness, causing them to decline precipitously.

Effects on Students: Classroom Interaction

Like perceptions of teaching effectiveness, the number of student interactions during class periods also showed more decline in the experimental group than the control group (see Table 5). Although the experimental group showed a greater number of interactions before the videoconference unit, it became less interactive than the control group once the videoconferencing unit began. Interactions declined during the unit in both groups, which we hypothesize was reflective of the increased amount of traditional lecturing vis-à-vis discussion and participation used by the instructor in the final course unit. However, this decline was much more pronounced in the experimental group, again suggesting that Internet videoconferencing caused students to be less will-

Table 3. T-Tests of Mean Exam Scores, Pre– Versus Post-Treatment, and between Experimental and Control Groups

Group	Exam 1	Exam 2	Exam 3	Exam 4	Exams (1-4)	Exam 5	Total
Experimental	81.4%	84.4%	80.5%	86.6%	81.1%	80.5%	79.8%
Control	82.7%	79.3%	83.2%	87.7%	80.7%	81.8%	81.0%
Significance		*					

[1] T-tests of the means indicated no statistically significant differences at $p<.05$ between exam 5 and the mean of exams 1-4 (pre-treatment) among both experimental and control groups.
*=$p<.001$

Table 4. Student Perceptions of Teaching Evaluation Pre– and Post-Treatment Scores for Experimental and Control Groups and T-Test of Means[1]

Experimental Group and Time Period	Course Design	Rapport with Students	Grading Quality	Course Value	PQI
Experimental Pre-Treatment	92.3%	68.3%	71.7%	76.4%	78.9%
Experimental Post-Treatment	35.8%	14.4%	45.0%	26.7%	25.7%
Experimental Pre-/Post-Treatment Difference	-56.5%	-53.9%	-26.7%	-48.7%	-53.2%
Control Group and Time Period					
Control Pre-Treatment	62.0%	41.9%	54.9%	43.9%	49.6%
Control Post-Treatment	68.7%	38.0%	66.4%	30.5%	48.8%
Control Pre-/Post-Treatment Difference	+6.7%	-3.9%	+11.5%	-13.4%	-0.8%

[1]Shown as percentage comparison to all other measured social science classes.
T-tests of means indicate that all scores between experimental and control groups are significantly significant at $p<.01$.

Table 5. Mean Number of Student Teacher Interactions, and T-Test of Means, Pre– and Post–Treatments[1]

Group	Mean Interactions before Treatment	Mean Interactions during Treatment	Difference	Significance
Experimental	44.1	13.7	-30.4	*
Control	29.1	21	-8.1	

*=$p<.001$
[1]Cannot do a t-test between groups, n is 2

ing to interact with the instructor, and vice versa.

Results of Evaluation Questionnaires

Unlike perceptions of teaching effectiveness indicators, which tended to be more negative, the results of evaluation questionnaires, which directly addressed the use of the technology among those in the experimental group, tended to be less negative (see Table 6). On a scale of 1 to 5, students rated both audio and video quality at approximately 4. As indicated by other data, students were more negative about their ability to communicate with the instructor, rating it at approximately 2.5 out of 5. They rated the amount and quality of information as well as the amount learned about the same as when the instructor was in the classroom. When asked about a hypothetical situation in which they strongly desired to take a *specific* course or take a course from a *specific instructor*, but it was only offered in the Internet videoconference format, over half responded that they would take that course. Finally, the students indicated that the overall quality of the videoconference was suitable for occasional use, as opposed

Table 6. Results of Internet Videoconference Evaluation Survey, Means and Standard Deviations

Survey Questions	Mean (Standard Deviation)
Quality of Audio 5=high	4.10 (0.66)
Quality of Video 5=high	4.12 (0.71)
Able to Communicate with Instructor 5=high	2.51 (0.93)
Amount of Information 3=more	1.71 (0.56)
Quality of Information 3=more	1.68 (0.47)
Amount Learned 3=more	1.59 (0.55)
Professor Away, Still Take Course 1=yes	.48 (0.51)
Rate Overall Videoconference 4=high	2.05 (0.59)

to daily use or not using it at all.

DISCUSSION

As stated, in the present study, we maintained a very similar research design to that which Koeber described in his 2005 research: A quasi-experiment was used in which exam scores, standardized teaching evaluations, and technology evaluation questionnaires were used as measures. Similar to our findings, he found that the use of new information technology did not affect course grades. However, unlike our findings, students' responses to standardized teaching evaluations were considerably more favorable in the experimental group; ours indicated that teaching evaluation scores declined dramatically. Why this difference?

Koeber argued that information technology can enhance symbolic interaction and cause students to perceive their course more favorably, regardless of their academic performance. We extend and qualify this theoretical interpretation and offer a very important caveat: If technology *does not* constitute a medium by which symbolic interaction can effectively take place, students may fail to perceive it favorably, regardless of academic performance. In Mead's language, this failure occurs when an instructor's teaching and students' responses fail to be transformed from nonsignificant gestures to significant symbols. In this study, the failure of this transformative process can be attributed to the diminished perceptions of teaching effectiveness among students.

Several reasons for this failure existed. First, lack of physical presence created a feeling of separation and distance among the students. Second, the limitations posed by the technology to the instructor's vision and hearing posed formidable barriers to teacher-student interaction. These limitations created difficulty for the instructor in communicating symbols of spoken language as well as sending and receiving physical gestures. In fact, the instructor was very surprised at the level of difficulty associated with Internet videoconference teaching. The instructor, usually animated and movement-oriented in the classroom, found that while using the web camera he was forced to restrict his movements in order to conserve bandwidth—too much movement would distort his image and voice. The instructor was forced to sit relatively still near the webcam. The image that appeared to the students was of his head and shoulders only. Therefore, hand gestures had to be performed in front of his shoulders and face. To make eye contact with students, the instructor was also forced to learn how to speak into the camera, as opposed to watching the image of the students in the classroom on his computer monitor. The instructor also found that video images of the students were not sufficiently close and detailed to enable him to see and respond to

their subtle cues as they reacted and responded to the lecture. These cues, easily recognized in the classroom, included smiling, laughing, being alert, sleeping, acknowledging understanding, and looking confused. It was also difficult for the instructor to facilitate discussion and answer questions because the technology inhibited two-way communication between the instructor and students. Thus, unlike the previous study in which students became more engaged in the course, with Internet videoconferencing, they became less engaged. Similar findings have been described in the distance learning literature with regard to teaching interactive satellite teleconference courses (see e.g., Howard 2002).

This study also demonstrates that, unlike the results of Koeber (2005), information technology, as a *nonsignificant gesture*, does not necessarily evoke a positive reaction from students. Rather than being generally impressed with the course because of the instructor's use of new sophisticated information technology, students became generally unimpressed with the course because the technology failed to function according to expectations. As in Koeber's 2005 study, impressions of the course that were affected by the technology seemed to spill over to areas seemingly unrelated to the technology, such as grading quality. However, in this study the spillover was constituted by negative, rather than positive, perceptions and declines in all measured dimensions of perceived teaching effectiveness. Thus, instructors should not mistakenly believe that using new information technology will automatically result in more favorable student perceptions of their teaching in general; instructors using new technology can also experience the opposite effect.

CONCLUSION: IMPLICATIONS FOR PRACTICE

On one hand, the results of this study suggest that the future of teaching with Internet videoconferencing is promising. With training, technical support, and classroom assistance from graduate teaching assistants, the instructor was able to successfully broadcast a two-week unit of his course from his home into a multimedia classroom. Students indicated no substantial decrease in the amount or quality of the material and did not experience a negative effect on their exams. And, in spite of reservations about the instructor's teaching effectiveness when using the technology, they were receptive to the idea of using videoconferencing occasionally. Given the newness of the technology, these results should be viewed with cautious optimism.

On the other hand, the results also suggest that, at present, Internet video conferencing should be used very selectively and with caution. In this study, considerable time (most of a semester) and effort was spent configuring hardware and software, training the instructor and graduate assistants, piloting the technology, and resolving technical issues. Therefore, teachers should not attempt to use this technology on a "whim," for example, in cases where they would normally arrange for teaching assistants to show video documentaries when absent for a class period. However, if instructors do foresee an absence from campus and have time, training, and support, then this technology could be useful in allowing the course to continue without loss of the instructor and the material that is normally taught.

In addition to technical challenges associated with preparing and using the technology, instructors must consider how it may affect students. As stated, this technology is not necessarily designed to increase student engagement in ways similar to other innovative technologies; its benefit is to bridge distances. However, if the quantity and quality of symbolic interaction during the exchange is not minimally sufficient to engage students, then the benefits of broadcasting to students who could not be physically present in the classroom may be significantly diminished or even negated. In this study, problems with and limitations of

the technology resulted in a reduction of student engagement. Although enhancing student engagement may not be the primary reason for using this technology, diminishing student engagement might be the main reason for not using this technology.

One potential limitation of the design of this quasi-experiment is that the technology may have appeared to students that it was being used as a substitute for classroom teaching; students knew that there was no reason, other than for purposes of the study, for the teacher to be located at the remote location rather than in the classroom. This may partially explain the mixed results of the study. Students were able to receive the pertinent information and were open to occasional use of the technology but felt the instructor was much more effective within the classroom. Perhaps if they saw more value to this arrangement, their perceptions of teaching effectiveness would be elevated. For example, if a professor was on a research trip and could speak to the students from the site about the research, students may find that of more value. They might perceive this as an increase in the quality and quantity of symbolic interaction enabled by the technology that otherwise they could not receive. Perhaps using Internet videoconferencing to show a guest speaker or lecturer who is not able to travel great distances to their classroom would also be seen as valuable in this fashion.

Alternatively, given the range of technical problems and limitations documented in this study, students may have disengaged no matter the educational context in which an electronic exchange of mediocre quality took place. Lacking ability to sufficiently see, hear, understand, and interact with the speaker, students may have "tuned out" no matter who that person was and where they were located. Because we can only speculate about whether or not our results would vary by educational context, we recommend additional research with the use of this technology in other settings.

To maximize the effectiveness of teaching with Internet videoconferencing, we suggest that instructors receive sufficient hours of training and experience with this medium. Issues of bandwidth must be given primary consideration. Bandwidth, particularly upload speeds, will vary substantially, depending on location of the connection, Internet traffic, Internet provider, and other factors. Instructors should test and be familiar with their remote locations before going forward with their Internet videoconference sessions. Within the classroom, those providing technical assistance must be prepared not only to set up and take down the equipment but also to react and respond to transmission and connection problems.

The most important implication for practice that we can glean from our findings is that instructors will want to carefully weigh whether the added value of the technology will compensate for the relative diminution of symbolic interaction that occurs when teachers or guest speakers communicate with their students through Internet videoconferencing as opposed to being physically present in the classroom. Perhaps in the near future, Internet videoconferencing will be a more viable technology that can be used easily to help instructors effectively teach and interact with their classes, no matter where they are in the world. However, at this point in time, the use of Internet videoconferencing should be carefully planned, adequately supported, and called forth by genuine need.

Appendix. Student Perceptions of Teaching Effectiveness (SPTE) Scale Summary

I. The SPTE Perceived Quality Index consists of the following dimensions and corresponding question items:

Dimension 1: Course Design

Item Description

a. The instructor's presentation was well prepared.
b. Overall, the instructor was well organized.

c. The instructor's knowledge appeared high.
d. The instructor was usually in control of the class.
e. The instructor's ability to answer question was excellent.
f. The instructor conveyed clearly key concepts.
g. The method of presentation was appropriate.
h. The instructor's presentation style aided learning.

Dimension 2: Rapport with Students
Item Description
a. The student felt free to ask questions.
b. The instructor came across as a person and teacher.
c. The instructor treated the students respectfully.
d. The instructor responded fully to questions.
e. The instructor was concerned about the student's progress.
f. The instructor was aware if students had difficulties.
g. The instructor's ability to answer questions was excellent.
h. The instructor gave students adequate feedback.

Dimension 3: Grading Quality
Item Description
a. The number of evaluations used for grading was sufficient.
b. The instructor used appropriate evaluations for grading.
c. The method of assigning grades was clear.
d. Exam content matched the class presentation.
e. The expected grade matched performance.

Dimension 4: Course Value
Item Description
a. The student found the course valuable.
b. The student expects retention of material to be high.
c. The course stimulated the student's interest.
d. The student's knowledge of the subject increased.
e. The student usually went to class eagerly.
f. The student would recommend this course.

REFERENCES

Benson, Denzel E., Tracy E. Ore, Wava Haney, Caroline Hodges Persell, Aileen Schulte, James Steele, and Idee Winfield. 2002. "Digital Technologies and the Scholarship of Teaching and Learning in Sociology." *Teaching Sociology* 30(2):140–57.

Bills, David and Anthony Q. Stanley. 2001. "Social Science Computer Labs as Sites for Teaching and Learning: Challenges and Solutions in Their Design and Maintenance." *Teaching Sociology* 29(2):153–62.

Brooks, Michael J. 1997. "Beyond Teaching and Learning Paradigms: Trekking in the Virtual University." *Teaching Sociology* 27(1):1–14.

Dietz, Tracy L. 2002. "Predictors of Success in Large Enrollment Introductory Courses: An Examination of the Impact of Learning Communities and Virtual Learning Resources on Student Success in an Introductory Level Sociology Course." *Teaching Sociology* 30(1):80–8.

Gigliotti, Richard J., R. Frank Falk, Virginia Smerglia, and Nancey Neiswander. 1994. *Teaching Sociology* 22(1):32-40.

Hatch, Jay, Murray Jensen, and Randy Moore. 2005. "Manna from Heaven or 'Clickers' from Hell: Experiences with an Electronic Response System." *Journal of College Science Teaching* 34(7):36–40.

Hesse-Biber, Sharlene and Melissa Kesler Gilbert. 1994. "Closing the Technological Gender Gap: Feminist Pedagogy in the Computer-Assisted Classroom." *Teaching Sociology* 22(1):19–31.

Howard, Jay R. 2002. "Do College Students Participate More in Discussion in Traditional Delivery Courses or Interactive Telecourses? A Preliminary Comparison." *The Journal of Higher Education* 73 (Part 6):764-80.

Jaffee, David. 1997. "Asynchronous Learning: Technology and Pedagogical Strategy in a Distance Learning Course." *Teaching Sociology* 25(4):262–77.

Kendall, Diana. 2004. *Sociology in Our Times*. 5th ed. Belmont, CA: Wadsworth.

King, Kim. 1994."Leading Classroom Discussions: Using Computers for a New Approach." *Teaching Sociology* 22(2):174–82.

Koeber, Charles. 2005. "Introducing Multimedia Presentations and a Course Website to an Introductory Sociology Course: How Technology Affects Student Perceptions of Teaching Effectiveness." *Teaching Sociology* 33(3):285–300.

Laird, Thomas F. and George D. Ku. 2005. "Student Experiences with Information Technology and Their Relationship to Other Aspects of Student Engagement." *Research in Higher Education* 46(2):211–32.

Little, Craig B., Larissa Titarenko, and Mira Bergelson. 2005."Creating a Successful International Distance-Learning Classroom." *Teaching Sociology* 33(4):355–70.

Magnuson-Martinson, Scott. 1995. "Classroom Computerization: Ambivalent Attitudes and Ambiguous Outcomes." *Teaching Sociology* 23(1):1–7.

Matson, Ron. 2005. *The Spirit of Sociology: A Reader*. Boston, MA: Allyn and Bacon Press.

Mead, George Herbert. 1956. "Mind." Pp. 118-96 in *The Social Psychology of George Herbert Mead*, edited by Anselm Strauss. Chicago, IL: University of Chicago Press.

Persell, Caroline H. 1992. "Bringing PCs into Introductory Sociology Courses: First Steps, Missteps, and Future Prospects." *Teaching Sociology* 20(2):91-103.

_____. 2004. "Using Focused Web-Based Discussion to Enhance Student Engagement and Deep Understanding." *Teaching Sociology* 32(2):61–78.

Pippert, Timothy D. and Helen A. Moore. 1999. "Multiple Perspectives on Multimedia in the Large Lecture." *Teaching Sociology* 27(2):92–109.

Ritzer, George. 1992. *Contemporary Sociological Theory*. 3rd ed. New York: McGraw-Hill.

Scarboro, Allen. 2005. "Bringing Theory Closer to Home Through Active Learning and Online Discussion." *Teaching Sociology* 32(1):22-31.

Valentine, Catherine. 2001. "Electronic Sex Talk: The Uses and Dynamics of Computer-Mediated Discussion Groups in a Team-Taught Human Sexuality Class." *Teaching Sociology* 29(1):48–61.

Van Gundy, Karen, Beth Morton, Hope Q. Liu, and Jennifer Kliner. 2006. "Effects of Web-Based Instruction on Math Anxiety, the Sense of Master, and Self-Esteem: A Quasi- Experimental Study of Undergraduate Statistics Students." *Teaching Sociology* 34(4):370–88.

Wang, Yu-Mei. 2002. "When Technology Meets Beliefs: Preservice Teachers' Perception of the Teacher's Role in the Classroom with Computers." *Journal of Research on Technology in Education* 35(1):150–61.

Wright, Eric R. and Anthony H. Lawson. 2005. "Computer Mediated Communication and Student Learning in Large Introductory Sociology Classes." *Teaching Sociology* 33(2):122–35.

Charles Koeber is an associate professor of sociology and associate dean of the College of Liberal Arts and Sciences at Wichita State University. In addition to introductory sociology, he teaches courses on the sociology of work, sociology of globalization, and sociology of consumer life. Dr. Koeber's research focuses on the challenges of working in the new economy. He is co-editor of the book *The Critical Study of Work: Labor, Technology, and Global Production* and has published articles on corporate restructuring and job loss.

David W. Wright is a professor of sociology and statistical project analyst for institutional research at Wichita State University. He primarily teaches graduate-level statistics and data management. Dr. Wright's research focuses on employment and earnings related issues and has published numerous articles on employer-provided benefits.