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David W. Miller

Mississippi State University, dwm1@coblian.msstate.edu

L. Kent Marett

Mississippi State University, kmarett@coblian.msstate.edu

Wm. David Salisbury

Ohio University, davealisbury@mail.com

Rodney A. Pearson

Mississippi State University, rpearson@coblian.msstate.edu

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The Limits Of Information: Measuring Differences Between Local and Distance Group Attitudes Toward Distance Learning

David W. Miller, Mississippi State University, (dwm1@cobilan.msstate.edu)

L. Kent Marett, Mississippi State University (kmarett@cobilan.msstate.edu)

Wm. David Salisbury, Ohio University (davesalisbury@mail.com)

Rodney A. Pearson, Mississippi State University (rpearson@cobilan.msstate.edu)

Abstract

Because of the imperative of attaining advanced education in the emerging global service economy, and the difficulties involved in traveling to distant classrooms, universities are investing heavily in interactive video and other types of distance learning. While we admit the necessity to investigate these modes of instructional delivery, we also call for a fair but critical investigation of what these technologies take away from the classroom experience. We performed a quasi-experimental study to investigate just that. Students in a local and distance class taught simultaneously by one instructor were asked for their perceptions about the experience. In the main, the perceptions of students in the Distance setting were generally less favorable than their Local setting counterparts. Implications of our findings are discussed.

Introduction

Higher education is an imperative in the emerging global service economy. A post-graduate degree is a necessity for advancement in most industries. However, in our fast paced society, the time required to actually travel to a distant classroom can be an impediment to attaining a university education. Organizations likewise, are trying to find ways to deliver training to employees more efficiently, and as a consequence, technology is having a profound effect on how instruction is delivered. Advances in communications technology enable the delivery of classes to remote locations. Interactive video technology has become, and will continue to be, a primary medium for education (Phillips, 1998). A prominent implementation of this technology, distance learning, involves groups of students at local and remote sites combined by audio and video teleconferencing (Freitas, Myers, and Avtgis, 1998).

Various elements that can influence the distance learning experience have been researched. Student attitudes and perceptions have been shown to directly affect the learning experience (Clow, 1999; Webster and Hackley, 1997; Spooner, Jordan, Algozzine and Spooner, 1999; Mills, 1998). The corresponding attitudes of the course instructor also influence the distance learning climate (Comeaux, 1995). Both the instructor's expertise with the technology (Webster and Hackley, 1997) and ability to overcome interactive problems (Berger, 1999)

have been found to be important factors as well. Even supplemental materials created by the instructor have been shown to affect student perceptions of courses taught via distance learning (Inman and Kerwin, 1999).

While much of classroom instruction emphasizes disseminating factual knowledge to students in such a way that they retain a major portion of what has been taught, other important goals of university teaching are developing students' critical thinking and problem solving skills and motivating them towards continued learning in the subject after the class is completed (McKeachie, 1986). The university instructor should deliver course content in such a way that all of these goals are met. While the retention of factual knowledge may not be strongly affected by the mode of educational delivery (McKeachie, 1986), development of critical thinking and problem solving skills, as well as motivation to further study, are indeed affected by teaching methods and class size. These types of goals are better facilitated in smaller class sizes with higher student-instructor and student-student interaction (McKeachie, 1986; Alavi, Wheeler, and Valacich, 1995), hence that which mediates such interaction may influence learning and perceptual course outcomes. As Brown and Duguid (2000:1) suggest, the modular, information-oriented teaching environment that focuses mainly on information delivery has its limits because a focus on information itself is limited, in that such a focus pushes aside "...all the fuzzy stuff that lies around the edges - context, background, history, common knowledge, social resources."

We believe it is just this focus on information alone that is potentially damaging to these "softer" goals of education. Given that instructor-student and student-student interaction is important in achieving the "softer" goals of the classroom experience, it would stand to reason that anything that intervenes between the instructor and the student (and between the students as well) would tend to inhibit the achievement of these goals. In particular, computer-mediated communication may limit the feelings of belonging to the class. Studies in other contexts have demonstrated this to be the case (cf. Salisbury et al., 1997, 1999). As a consequence, the more "social" outcomes that occur in a distance learning setting bear closer scrutiny.

This paper studies the effects of the distance learning environment on student perceptions of, and attitudes

towards the distance learning experience. We captured student attitudes and perceptions of the course, the instructor, and the extent to which the student belonged. Students from both the "distance" and "local" sections of a MBA Information Systems class that was delivered simultaneously to both sets of students were asked to provide their assessment of the experience. In the balance of this paper we describe the setting, respondents, measures and outcomes. Implications for the distance method of instruction are discussed. We do not intend this effort to be an indictment of the distance learning mode of education, however, we do wish to encourage a more critical perspective that focuses on what is lost in this delivery mode.

Social Classroom Outcomes

While the information that a student learns in the classroom experience is important, there are also social outcomes that we believe should be considered as important, because these can lead to other important classroom goals such as the development of critical thinking skills (cf. McKeachie, 1986). We believe that the social aspect of the course is critical for the students to learn not just the informational content of the course, but the concepts that they can apply to novel situations after the course is completed. To achieve these "softer" goals of the classroom experience, students should (among other things) be involved in the course and participate actively. Further, the instructor should actively engage the students, and be reasonably available to address their questions about the course and material both inside and outside the classroom environment (Hall, 1995).

As a consequence of our presuppositions about the classroom environment, we were interested in answering the following general question; "To what extent does a mediated (either by distance, by technology or both) form of classroom instruction affect students' perceptions and attitudes about the course?"

In terms of its influence on so-called "social" outcomes, it has been demonstrated that mediated communication tends to reduce the social information that is available in face-to-face groups to form perceptions that lead to group norms (Salisbury et al., 1997; 1999). While the information may be delivered to students in a video instruction mode or by using the World Wide Web, much of the learning that takes place in a classroom environment is not limited simply to information (cf. Brown and Duguid, 2000; Talbott, 1995). As a consequence, it is likely that students that experience a distance- and/or technology-mediated form of instruction will be less satisfied and less connected to the entire process. It is also possible that these things may negatively influence the achievement of the non-informational goals of the classroom experience, such as the development of critical thinking and problem solving

skills, and the motivation to engage in continued learning (cf. McKeachie, 1986).

Hypotheses

Our basic premise in this study is that students who participate in a class environment that is mediated by technology and distance will have generally less favorable perceptions about the class environment than their colleagues without such mediation. We measured the following constructs using items found in the Appendix. Full information about the scales and items that were used are also found in the Appendix.

- *Belonging* – Sense of a close or intimate relationship with their classmates and the instructor.
- *Morale* – Sense of enthusiasm and dedication to the class.
- *Involvement in the Class* – perception of their general sense of inclusion in the class.
- *Participation in the Class* – sense of being related to the larger whole of the class discussion.
- *Instructor Accessibility* – impressions of how readily accessible the instructor is outside of class.
- *Instructor Engagement* – sense of the instructor's efforts to occupy all students in the class discussion.
- *Satisfaction with the Class* – Feelings of contentment with what has occurred in the class experience.
- *Overall Evaluation* – overall evaluations about the class experience.

We propose that the scores for each of these constructs will be significantly higher among the students in the *Local*, face-to-face setting as opposed to the *Distance* setting (both settings are described below).

Methodology

This study emerged when a unique opportunity presented itself. One of the authors of the paper was assigned to teach an MBA Information Systems course during an 8-week period to two groups of students simultaneously, making an ideal situation for a quasi-experimental study (Cook and Campbell, 1979). One group of students was located at the main campus of a major Southeastern U.S. university (i.e., the *Local* group) while the other group was concurrently taking the course at a remote campus of the same university located approximately 100 miles away (i.e., the *Distance* group). The distance classroom environment was enabled by real-time two-way video conferencing, featuring the use of "press-to-talk" microphones and 32-inch diagonal television monitors. To students in the local setting, the instructor (who was in the room), the instructor

presentation slides, and the distance students were visible at all times. On the other hand, only one of the three (instructor, students, presentation slides) could be seen at any time by students in the distance room. The instructor managed the local site, while the distance site needed a facilitator to manage the technology in such instances as when student presentations were made from the distance site. The information content and style of teaching was the same in both settings, as the same person delivered the course simultaneously to both settings. Each location could see any of three video views; the instructor (presenter, at the distance site), the students at the opposite site, or the computer presentation from the opposite site. Interactive audio was provided, in that students from both campuses could "key in" to activate a microphone at any time to ask a question.

As mentioned above, the respondents were students in an Introduction to Management Information Systems

course offered in the MBA program at the university. There were a total of twenty-eight participants (N = 28) with fifteen at the Local site and thirteen at the Distance site. The survey was administered near the end of the course term, which meant that even students who were experiencing this mode of learning for the first time would have had several weeks of experience with this particular distance classroom environment before assessing it. The subject demographics are summarized in Table 1. Among other things, Table 1 shows that students at the Local site were somewhat younger and had fewer years of work experience. A higher percentage of the Local students attend school full-time, while having a predominately higher percentage of Business undergraduate degrees. Statistical analysis of the means revealed no significant differences between the groups on the basis of gender, grade point average, GMAT scores, or perceived experience with distance learning.

Table 1. Summary of Subject Demographics

Variable	Distance		Local	
	Mean	S.D.	Mean	S.D.
Age	32.46	11.05	27.27	6.56
Work Experience (years)	11.88	12.45	5.26	5.91
Grade Point Average ^a	3.49	0.39	3.39	0.35
GMAT Score ^a	510	30.0	495	67.4
Self-rated experience with distance learning ^b	2.69	2.06	2.73	1.94
First time in distance learning environment?	53.8%		53.3%	
Gender	M=8	F=5	M=12	F=3

^a For those responding

^b Seven-point scale with the following anchors (extremely low to extremely high)

Aside from the demographics, the survey instrument solicited subject responses with respect to the 8 constructs of interest, capturing their attitudes and perceptions about the classroom experience. Completion of the questionnaire was voluntary. However, the survey was administered during regularly scheduled class time. No special incentives were offered for participation in the survey. Because the questionnaire asked subjects to provide responses about the instructor that could be construed as evaluative, the respondents were assured that all relevant findings would be withheld from the instructor until final grades had been posted, and that their responses would be anonymous.

Findings

For our analysis, we examined the mean differences between the groups located at each site. A two-sample *t*-test assuming unequal variances was performed to compare mean differences on each construct between subjects at the Local and Distance sites. Because we hypothesized the direction of the mean differences, we employed a one-tailed *t* test. The construct value for each case is a sum of the item scores for each subject for that construct. The mean for each treatment was then derived

from this aggregated score. All data analysis was performed using the Data Analysis function of Microsoft Excel 97.

We first address significant mean differences found at a 95% confidence level ($\alpha = .05$). Significance was achieved at this level for *satisfaction with the class*, *belonging*, *participation in the class*, and the *overall evaluation* (findings are presented in Table 2). In each case the differences were in the hypothesized direction and were statistically significant. That is, students at the Local site expressed higher satisfaction, a stronger sense of belonging to the class, greater participation and more favorable overall evaluations of the class than did the students in the Distance setting.

While this is more speculative, we also found significant mean differences at a 90% confidence level ($\alpha = .10$) for the following: *morale* and *involvement in the class*. That is, students at the Local site perceived they were more highly involved in the class and expressed greater morale about being a member of the class than did the students in the Distance setting. The less conservative ($\alpha = .10$) confidence level was deemed acceptable to draw upon for statistical inference in light of the small sample size.

No significant mean differences were found for instructor accessibility and instructor engagement at any generally accepted level of significance, although the non-significant findings could be the result of a statistical artifact stemming from the small sample size.

Discussion And Conclusions

One goal of teaching is to have students learn and retain factual knowledge of the course material. Other, perhaps more important, goals of teaching are to develop skills in critical thinking and problem solving as well as motivate students to continue learning in the subject once

the class term is over. One would assume these other goals to be all that much more important in Masters Degree courses. Learning factual knowledge in a subject is little affected by teaching methods or class size (McKeachie, 1986). Developing skills in critical thinking and problem solving and motivation, however, are affected by teaching methods and class size (see McKeachie, 1986 for a summary of the these studies). Smaller classes that invoke high amounts of interaction and discussion have been shown to be more effective in this regard.

Table 2. Summary of Findings

Construct	Distance		Local		Mean difference. Local – Distance
	Mean	S.D.	Mean	S.D.	
Satisfaction with the Class	11.08	1.13	15.00	2.90	3.92**
Belonging	13.38	5.78	16.87	3.46	3.49**
Morale	13.85	5.54	16.60	3.38	2.75*
Involvement in the Class	15.15	7.22	19.07	5.28	3.92*
Participation in the Class	13.54	3.48	16.13	4.17	2.59**
Overall Evaluation	31.38	11.18	37.60	6.84	6.22**
Instructor Accessibility	22.15	4.98	22.00	5.53	-0.15
Instructor	18.08	1.32	19.87	2.88	1.79

* significant at $\alpha = .10$

** significant at $\alpha = .05$

The strongest findings in our study indicate that Distance students experience reduced feelings of belonging to the class, lower degrees of satisfaction with the class, less favorable evaluations of the class, and perceive that they participate less in the class than do Local students. This would indicate that the level of interaction between the students and their instructor (and each other) is reduced in the Distance setting. As discussed above, reduction of such interaction may have negative consequences for the development of critical thinking and problem solving skills, as well as motivation to continue learning in the subject once the class is complete, although this is speculative. Clearly more research into this is warranted.

One interesting finding is the fact that, contrary to our expectations, students in the Distance setting perceived slightly *higher* instructor accessibility, although the difference was non-significant. We believe that this resulted from a combination of student expectations and instructor procedures. Students in the Distance setting would likely have not expected to access their instructor except through e-mail and during the class session. On the other hand, students in the Local setting would expect to find the instructor available in his office, even during non-office hour periods. If a student in the Local setting went to the instructor's office and found him absent, the perception would be that he is not accessible. The Distance students would likely have no such expectations. Further, the instructor in question is well known among

his students and colleagues for answering e-mail rapidly, which probably would mean the instructor would be perceived as being very accessible by the Distance students. That the instructor also required all assignments to be submitted via e-mail, and returned all marks via e-mail may have had some bearing on this finding as well.

Another interesting finding is the non-significance with respect to *instructor engagement*. While non-significant finding may only be a statistical artifact of the small sample size, these results may be indicative of students' feelings of the instructor's effects on the distance learning experience. *Instructor engagement*, more than any other construct we studied, may reflect students' attitudes specific to the instructor. Since no difference was indicated between the groups, there appears to be no contributing effect from attitudes regarding the instructor to the less favorable findings in the Distance setting with respect to the other constructs. Therefore, the differences are apparently attributable to the Distance learning environment and technologies. Observation of the instructor as the class was taught indicated that he made several efforts to engage students in both settings (e.g. "Are there any questions from the television audience?"). This kind of effort seemed to pay off in *instructor engagement* scores that were equivalent in the Local and Distance settings.

A possible technical solution to the problem of less perceived involvement, participation and belonging in the distance setting might be to increase the available

bandwidth. The current distance setting results in only *one* of the elements (i.e. instructor, overheads, or Local students) being visible to the distance students at any one time. Increasing the bandwidth would make all three of these elements available, which should enhance the Distance students' ability to interact with their instructor and their classmates in the Local setting.

Given its cost and reach advantages, distance education is a model that should be looked at for instructional delivery. The technology mediated distance learning classroom is able to bring class content to a remote location that may otherwise not receive such instruction. However, the technology may also be associated with a feeling of "disconnectedness" from the instruction that results in a less than ideal classroom environment for students in the Distance setting. Technological capabilities enable the economic reality of having to provide instruction to remote locations. However, the goal of technology development should be to make the technological interaction as seamless and unobtrusive as is possible in hopes of closing the gap between the two classroom environments.

Economic and practical realities dictate that use of distance learning will only increase. When the primary goal of the instruction is factual knowledge retention, distance learning is a viable alternative to bringing the instructor to the student or the students to the instructor. Distance learning is particularly likely to show excellent returns in this regard in organizational settings. Organizational training can be provided to remote locations efficiently through distance learning with little degradation of effectiveness. In the university teaching environment, where the goals include development of critical thinking and problem solving skills and motivation towards further learning, the returns are less certain. The distance learning environment may be less effective in reaching these goals. Future research should explore the effect of distance learning on these goals. For example, one clear avenue of study in this area is the interaction between the various types of course material that could be offered, and the delivery mode. Another important area would be to develop valid and reliable measures of content retention and academic performance, to be investigated in addition to the social outcomes we have addressed here. Finally, the technology employed in this study did not offer such features as chat rooms, common whiteboards, shareable applications or direct student-to-student video. These technologies may facilitate a higher degree of interaction between the students, enabling those at the distance site to feel a greater sense of presence, involvement and cohesion with the course and instructor. Again, we do *not* wish this paper to be taken as a blanket indictment of distance learning. However, we hope that we will encourage a critical and fair assessment of both its advantages and disadvantages.

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Appendix

Overall Satisfaction with the Class adapted from Salisbury, Gopal and Chin (1995)

($\alpha=.83$, scale type and relevant anchors in italics)

1-Overall, I am satisfied with what has occurred in this class.

(10-point Likert, *definitely yes - definitely no*)

2-Overall, to what extent are you satisfied with what has occurred with this class?

(5-point Likert, *not at all, to a little extent, to some extent, to a great extent, to a very great extent*)

3-Overall, how satisfied or dissatisfied are you with what has occurred in this class?

(5-point Likert, *very dissatisfied, somewhat dissatisfied, neither, somewhat satisfied, very satisfied*)

Cohesion, adapted from Chin, Salisbury, Pearson and Stollak (1999)

(scale type and relevant anchors in italics)

Belonging ($\alpha=.96$)

1-I feel that I belong to this class.

2-I see myself as part of this class.

3-I feel that I am a member of this class.

(7-point Likert, *strongly disagree, quite, slightly, neither, slightly, quite, strongly agree*)

Morale ($\alpha=.96$)

1-I am happy to be part of this class.

2-I am enthusiastic about this class.

3-I am content to be part of this class.

Item Morale 3 is modified as to the verbiage, due to the original's evaluative tone (i.e. "This class is one of the best anywhere").

Involvement with the Class ($\alpha=.98$)

Semantic differential scale with the following four sets of anchors on a 7-point Likert scale.

1-Weak/Strong

2-Insignificant/Significant

3-Small/Large

4-Low/High

Participation in the Class Discussion, adapted from Green and Taber (1980) ($\alpha=.82$, scale type and relevant anchors in italics)

1-I make comments during class discussions.

2-I describe my own experiences during the class discussions.

3-I ask others in the class for their thoughts and opinions about the class material.

4-I show attention and interest in the class discussion.

5-To what extent do you participate in the class discussion?

(All items, 5-point Likert with the following anchors; *not at all, to a little extent, to some extent, to a great extent, to a very great extent*).

Overall Evaluation of the Class ($\alpha=.97$)

Semantic differential scale with the following four sets of anchors on a 7-point Likert scale.

- 1-*Extremely Unpleasant/Extremely Pleasant*
- 2-*Extremely Bad/Extremely Good*
- 3-*Extremely Dislikable/Extremely Likable*
- 4-*Extremely Harmful/Extremely Beneficial*
- 5-*Extremely Worthless/Extremely Valuable*
- 6-*Extremely Foolish/Extremely Wise*
- 7-*Extremely Negative/Extremely Positive*

Instructor Accessibility, created for the study ($\alpha=.89$, scale type and relevant anchors in italics)

- 1- I feel that I can readily get access to the course instructor outside of class.
 - 2- The course instructor is easy for me to access outside of class.
 - 3- I **DO NOT** think that I can get access to the course instructor out of class*.
 - 4- I would have difficulty gaining access to the instructor outside of class*.
- (All items 7-point Likert; strongly disagree, quite, slightly, neither, slightly, quite, strongly agree).*
Items 3 and 4 were reverse-coded for the analysis.

Instructor Engagement (selected items adapted from Facilitator Scale developed by Bostrom, Anson and Wynne, 1995)

($\alpha=.86$ for selected items, scale type and relevant anchors in italics)

- 1- Helped to encourage rapport and a positive tone.
 - 2- Helped to keep class members interested and motivated.
 - 3- Helped to encourage non-participating members to contribute.
 - 4- The instructor really listened to each person in the class.
 - 5- Paid attention, and constructively responded, to the class's needs for assistance.
- (All items, 5-point Likert with the following anchors; not at all, to a very little extent, to a little extent, to some extent, to a great extent).*