

## **Desktop Videoconferencing: an Effective Tool for Communication and Instructional Supervision?**

John Kessell  
Greg Miller  
Iowa State University

### **Abstract**

The purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors in agricultural education. The study was guided by two research questions and three hypotheses and used two quasi-experimental research designs along with focus group interviews to test the hypotheses. Results indicated that desktop videoconferencing was an acceptable tool for communication and instructional supervision, but a lack of adequate technology resources in the secondary schools was determined to be a serious barrier to routine use. It was recommended that more reliable technology tools be sought to enhance communication and instructional supervision. High-speed interactive audio and video networks that use phone lines or fiber optic networks may provide a reliable option.

### **Introduction**

Many authorities in the field of education feel strongly that student teaching is the most important part of any teacher education program (Richardson-Koehler, 1988; Zaborik, 1988). The student teaching experience is a time when the preservice teacher can actually perform the day-to-day tasks that are the responsibility of a teacher. This hands-on real-world experience is supported by Dewey's (1938) proposition that learning is not automatically transferable to conditions unlike those in which the learning took place.

A successful student teaching experience requires the student teacher, cooperating teacher, and university supervisor to work as a team (Hoover, O'shea & Carroll, 1988). Developing and maintaining communications among the parties is of great importance. The physical distance that separates the student teacher and the university supervisor may result in pedagogical difficulties, especially in the area of communication. Moore and Kearsley (1996) called this pedagogical distance that is created by physical separation "transactional distance." Moore and Kearsley noted that we overcome this transactional distance with instructional design and interaction procedures.

Desktop videoconferencing might be a useful tool to reduce the transactional distance between student teachers and their university supervisors. Relatedly, computer conferencing appears to have the potential to improve the level of student teachers' reflective thinking about their teaching performance and to assist in developing new methods of teaching (Harrington, 1992).

Research on various components of videoconferencing has become more advanced as interest in distance education continues to rise (Mason, 1995; Rapaport, 1991). Research on desktop videoconferencing has been conducted to assess its feasibility and to evaluate the quality

and effectiveness of communication. Edmonds (1996) found that desktop videoconferencing could be successfully used to improve the quality of interaction between students and teachers and could improve the quality of learning. Veen et al. (1996) observed that students felt free to speak about feelings, attitudes, and social problems that they were facing during their student teaching experience while engaged in videoconferences. Warren et al. (1996) noted that videoconferencing offered opportunities for individual student teachers to share their experiences with others and to receive responses and communicate more frequently with their university supervisor.

Previous research involving desktop videoconferencing has been conducted on relatively small populations. More data are needed to adequately evaluate the usefulness of desktop videoconferencing technology (Dudt & Garrett, 1998; Veen et al., 1996). Can desktop videoconferencing be a useful tool for enhancing communication and instructional supervision of student teachers in agricultural education?

### Purpose and Objectives

The primary purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors. The objectives of this study were to:

1. Describe demographic characteristics of the student teachers, cooperating teachers, and university supervisors involved in this study.
2. Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

The hypotheses of this study were as follows:

1. Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.
2. There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.
3. Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who received only on-site supervision.

### Procedures

The population consisted of 17 student teachers, 17 cooperating teachers, and 5 university supervisors in agricultural education at one land-grant university in the spring

semester of 1999. An additional university supervisor conducted two on-site supervisory visits. The sixth supervisor became involved after disagreements arose between the student teacher and the original supervisor. The sixth university supervisor was not added to the population of this study. The treatment group was purposefully selected based on the availability of sufficient computer equipment in the student teaching centers. The treatment group (n=9) received two on-site university supervisor visits and two desktop videoconferencing visits with their supervisor. Participants in the treatment group videotaped two lessons and sent them to their university supervisor. The tapes were reviewed by the university supervisor and discussed during the desktop videoconferences. The control group (n=8) received the traditional three on-site university supervisor visits and experienced no videoconferencing.

The study was classified as quasi-experimental. The nonequivalent control group design was used to compare attitudes toward desktop videoconferencing. The static group comparison design was used to compare the level of reflective thinking between treatment and control groups and to determine whether the treatment affected student teaching grades. To address the threats to internal validity commonly associated with these designs, demographic data were gathered from all participants and used to determine whether persons in the treatment and control groups were similar (Campbell and Stanley, 1963).

A Likert-type scale was used to measure participants' attitudes toward desktop videoconferencing and was given as a pre- and posttest. Another Likert-type instrument was used to measure the level of reflective thinking achieved by the student teacher and was administered only as a posttest. The instrument designed for attitudinal assessment was patterned after one used to study attitudes toward an interactive communications network (Miller, 1997). The instrument to evaluate the student teacher's level of reflective thinking was created by Germain Taggart and obtained from the book Promoting Reflective Thinking in Teachers: 44 Action Strategies (Taggart & Wilson, 1998).

According to Taggart and Wilson (1998) reflective thinking on the technical (lower) level occurs mainly from referencing past personal experiences to meet outcomes. Reflection focuses on behaviors, content, and skill when designing lessons. Reflective thinking on the contextual (mid) level looks at alternative practices for problem solving based on knowledge gained. Contextual reflective thinkers are concerned with student needs and with the analysis, clarification, and validation of principles when designing lessons. Reflective thinking on the dialectical (highest) level addresses not only student needs but also student moral, ethical, or socio-political issues. The dialectical reflector works toward attaining disciplined inquiry, individual autonomy, and self-understanding in the designing of lessons.

A panel of seven graduate students and three faculty members in Agricultural Education determined that the attitude instrument possessed content and face validity. The panel members were not otherwise involved in the study. The attitude instrument was then pilot tested with 11 students enrolled in a junior-level Foundations of Agricultural Education course, seven graduate students, and three faculty members in Agricultural Education. Cronbach's alpha was used to assess the internal consistency of the attitude instrument. The resulting coefficient was .84.

Construct validity for the reflective thinking instrument was based upon the instrument's correspondence to a reflective thinking model that was created to explain three levels of

reflective thinking. A reliability analysis was performed on the reflective thinking instrument using data provided by the student teachers that were studied. The Cronbach's alpha coefficient was .78.

All data were analyzed with the SPSS for windows personal computer program. Frequencies, percentages, means, standard deviations, and appropriate correlational statistics were used for descriptions. The rules of thumb established by Ary, Jacobs and Razavieh (1996) were used to interpret relationships between variables. The chi-square and t-test statistics were used to test the hypotheses.

Students participated in a focus group interview at the end of their student teaching semester. The focus group interviews were facilitated by a person who was not otherwise involved in the study or with the student teaching program. Kruger (1994, p. 3) states that "the focus group allows for group interaction and greater insight into why certain opinions are held." The purpose of the focus group was to create a triangulation of data to see if the qualitative data were consistent with the quantitative data. The treatment group was asked questions regarding their experiences with and opinions of desktop videoconferencing. The control group was asked whether they believed that desktop videoconferencing provided communications advantages and if they would have liked to use desktop videoconferencing while student teaching. Two students were unable to participate in the focus group interviews because they were out of state performing student teaching activities during the time that the questions were administered.

## Results

*Objective One: Describe demographic characteristics of the student teachers, cooperating teachers and university supervisors involved in this study.*

Of the nine student teachers in the treatment group, five (55.6%) were male, and four (44.4%) were female. Members of the treatment group were on average 22.7 years of age with a standard deviation of 1.4. Their mean GPA was 3.33 with a standard deviation of .38. Regarding the control group, five (62.5%) were male, and three (37.5%) were female. Members of the control group were on average 24.5 years old with a standard deviation of 5.4. Their mean GPA was 3.27 with a standard deviation of .41. There were no statistically significant associations between student teacher group and the demographic characteristics reported here.

All of the cooperating teachers in the treatment group were male. This group averaged 17.4 years of teaching experience with a standard deviation of 7.9. Only 22.2% of teachers in this group had participated in a workshop on supervising student teachers. Seven out of eight cooperating teachers in the control group were male. Teachers in this group had on average taught for 14 years with a standard deviation of 5.9. Three (37.5%) of the teachers in the control group had participated in a workshop on supervising student teachers. There were no statistically significant associations between cooperating teacher group and the demographic characteristics reported here.

All five university supervisors were male. The university supervisors ranged in age from 32 to 63 years with a mean of 42 and a standard deviation of 13. The average number of years of experience teaching secondary agriculture education was 5.2 with a standard deviation of 2.1.

The average number of years teaching postsecondary agricultural education was 11.8 with a standard deviation of 13.

*Objective Two: Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.*

At the time of the pretest, the majority (66.6%) of student teachers in the treatment group either disagreed or were undecided that the use of desktop videoconferencing could enhance communication and instructional supervision. The remaining 33.3% agreed that desktop videoconferencing could be used as a tool to enhance communication and instructional supervision. Half (50%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The remaining 50% agreed with the use of the tool to enhance communication and instructional supervision. The average score for the treatment group was 3.03 with a standard deviation of .80. The average score of the control group was 3.46 with a standard deviation of .65 (Table 1).

At the time of the posttest, the majority (75%) of the student teachers in the treatment group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. In contrast, less than half (42.9%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The average score for the treatment group was 2.97 with a standard deviation of .70. The average score of the control group was 3.12 with a standard deviation of .94 (Table 1).

A coding error on the pretest made it impossible to distinguish the treatment and control groups for the cooperating teachers. Pretest scores from cooperating teachers showed that the majority (88.6%) were in favor of desktop videoconferencing being used as a tool to enhance communication and instructional supervision. The remaining 13.4% of teachers either disagreed or were undecided about the use of the tool to enhance communication and instructional supervision. The average pretest score was 3.83 with a standard deviation of .68. Regarding the posttest, most (85.7%) of the cooperating teachers in the treatment group agreed or strongly agreed that desktop videoconferencing could be used to enhance communication and instructional supervision whereas 75% of those in the control group expressed the same level of agreement. The mean score for the treatment group was 3.95 with a standard deviation of .59. The mean score for the control group was 3.56 with a standard deviation of 1.11 (Table 1).

Four out of the five university supervisors participated in desktop videoconferencing. Because of the small sample size, university supervisors were not divided between treatment and control groups. Pretest scores for university supervisors showed that 20% (n=1) of the university supervisors were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision. The remaining 80% (n=4) agreed that desktop videoconferencing could be a useful tool to enhance communication and instructional supervision. Posttest scores placed university supervisors' level of agreement into the same categories as the pretest scores. University supervisors reported slightly lower mean attitude scores on the posttest.

Table 1. Attitudes toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

Attitude	Student Teachers								Cooperating Teachers						University Supervisors			
	Pretest				Posttest						Posttest				Pretest		Posttest	
	Treatment		Control		Treatment		Control		Pretest		Treatment		Control		Pretest		Posttest	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Strongly Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	12.5	0	0.0	0	0.0
Disagree	2	22.2	1	12.5	2	25.0	2	28.6	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0
Undecided	4	44.4	3	37.5	4	50.0	1	14.3	1	6.7	1	14.3	1	12.5	1	20.0	1	20.0
Agree	3	33.3	4	50.0	2	25.0	4	57.1	11	75.3	5	71.4	6	75	4	80.0	4	80.0
Strongly Agree	0	0.0	0	0.0	0	0.0	0	0.0	2	13.3	1	14.3	0	0.0	0	0.0	0	0.0
Mean <sup>a</sup>	3.03		3.46		2.97		3.12		3.83		3.95		3.56		3.80		3.69	
Standard Deviation	.80		.65		.70		.94		.68		.59		1.11		.25		.49	

<sup>a</sup> 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

## Focus Group Interview Results

### **Treatment**

Seven out of the nine students in the treatment group successfully installed the Quickcam cameras and Microsoft NetMeeting. Three of the cameras had to be installed outside of the agricultural education classroom. One camera was installed in the school library, one in a connecting classroom designated for computer aided drafting, and one was installed at the student teacher's home. Students found many difficulties with the installation of NetMeeting because of the lack of training and the fact that many schools locked classroom computers from various chat and electronic mail programs. Many of the schools' computer technicians had to unlock the block on the computers before the installations could be accepted.

Seven out of the eight participants in the focus group were satisfied with two on-site university supervisory visits. Student teachers did note that they would feel more comfortable with three on-site visits instead of two on-site visits and two videoconferencing visits. Students gave the following comments:

"I would like to say that I got more out of personal visits than I did trying to do a videoconference."

"Personal visits were better than videoconferencing, either mine didn't work or the one here on campus didn't work."

"The technological difficulties and the time it took to play with the cameras and trying to get them to work really created more problems than it was worth."

Students in the treatment group were asked if desktop videoconferencing should be used in the future for other student teachers. Student teachers in the treatment group gave the following comments:

"Yes, it should be used but all of the bugs need to be worked out."

"I feel that the technology has a long way to come before it can be beneficial to us."

"If you can get the technology to work and the compatibility problems fixed, then it would be a useful tool."

"If you make it accessible with more schools and computers and if you have some patience it works out."

"Yes I do believe that it would be beneficial, without doing it we are never going to advance."

Students were asked about the strengths and weaknesses of videoconferencing. Many of the students noted that they wanted to be asked instead of told to participate in the videoconferencing. Additionally, some felt that university supervisors were trying to escape an

on-site supervisory visit. Other weaknesses concerned the technology problems. Many of the schools had slow and overloaded servers. Concerning the strengths of videoconferencing the following comments were made:

“It had its strengths of allowing us to communicate back and forth. We could share ideas and experiences that others might have had while student teaching.”

“It keeps you connected...learning to use that type of technology is good.”

“I think it should be integrated and obviously this is a starting point.”

Student teachers were asked if they had conferences with other student teachers during the twelve-week period. Five of the eight participants in the interview said that they participated in conferences with each other during the twelve-week student teaching experience. Student teachers were asked if they had any additional comments about desktop videoconferencing. More responses concerning the technological difficulties and the equipment problems emerged. One student said that he had great success with the videoconferencing.

“Videoconferencing was good enough to replace a visit with my university supervisor, two visits were plenty for me. I think the strengths outweigh the weaknesses. My university supervisor and I did some sharing of files and did some things on the Internet together, so I enjoyed it personally.”

Other students did not feel this type of impact with desktop videoconferencing, but the majority agreed that it should be used with future student teachers if the technological difficulties could be worked out. Students also pointed out that better training with the equipment is needed as well as more planning before student teachers go to their student teaching centers.

## **Control**

The first question for the control group related to whether or not they thought that the student teachers in the treatment group had better communications with fellow student teachers and university supervisors. Three out of the six participants felt that the treatment group had somewhat of an advantage. The remaining three participants did not see any advantage. The following comments arose.

“Yeah, I think that they probably did...I think that it would have been a highly useful tool to talk with the other students...I think that they had an advantage to get things communicated.”

“In some aspects...they would have a chance to send their messages faster or right on the spot and not have to think about it and dwell on it.”

“I don’t think that there were any big advantages having it...to me it seems like it takes a lot more time trying to get on to the system...so I don’t think there was an advantage.”

Students were asked next if they would have liked to have used desktop videoconferencing during their student teaching experience. All six of the participants said no. Students reflected on timing conflicts, and all stated that they did not have the time while student teaching for desktop videoconferencing. Student teachers also mentioned the need for better training on the equipment. All student teachers in the control group heard about the problems and frustrations that students in the treatment group experienced.

### **University supervisor interviews**

Interviews after the student teaching period with university supervisors showed that four out of five of the supervisors felt that two desktop videoconferences could successfully replace one on-site supervisory visit. Most (n=4) university supervisors did point out that at least two on-site supervisory visits were needed during the student teaching experience. One visit during the first period of student teaching and the second near the end of the student teaching experience were considered to be a necessity. University supervisors felt that all visits should not occur through desktop videoconferencing.

University supervisors described conversations through videoconferencing visits as being very similar to conversations that took place during on-site visits. Topics that were discussed over desktop videoconferencing included reflection on the lesson that was viewed by the university supervisors from a videotape sent by the student teachers, current agricultural education job opportunities, state teacher licensing procedures, FFA activities, and various student teaching assignments. University supervisors did note that they missed interaction between the student teacher and his or her students by only watching the videotape rather than being at the site in person.

Videotape quality varied with each student teacher in the treatment group. Some cooperating teachers operated the camera, resulting in a good-quality video. Other videos were made from a stationary position in the classroom. As a result the entire classroom and some classroom interaction was not recorded. Sound quality was often low because the microphone was too far away from the person speaking.

*Hypothesis One: Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.*

Student teachers and university supervisors were less positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing. Cooperating teachers who experienced desktop videoconferencing were slightly more positive than those who did not (Table 1). The difference was not great enough, however, to be statistically significant ( $t = -.83, 13df, p > .05$ ).

Hypothesis one was not supported by the data.

*Hypothesis Two: There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.*

Table 2 shows the grades achieved by the student teachers. Most student teachers (94.1%, n=16) earned an A. One (5.9%) student teacher earned an A-. A chi-square analysis was used to determine if treatment and control groups' grades differed significantly. The results show no significant difference in grades between the treatment and control groups. Hypothesis two was supported by the data.

Table 2. Student teaching grades.

Grade	Treatment		Control	
	f	%	f	%
A-	0	0.0	1	12.5
A	9	100.0	7	87.5

Note.  $\phi = .265, p > .05$

*Hypothesis Three: Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who only received on-site supervision.*

Table 3 compares the reflective thinking levels achieved by student teachers in the treatment and control groups. Reflective thinking levels were interpreted as follows: <75 = Technical level; 75 to 104 = Contextual level; 105 to 120 = Dialectical level. Students who received desktop videoconferencing as a tool for supervision (n=8) reported a mean of 104.3 with a SD of 9.25. Students who did not receive desktop videoconferencing (n=7) reported a mean of 105.7 with a SD of 4.31. Although treatment and control group scores were in different categories, the difference between their reflective thinking levels was not of statistical or practical significance. Hypothesis three was not supported by the data.

Table 3. Student teachers' reflective thinking levels

Group	Technical		Contextual		Dialectical		M	SD
	f	%	f	%	f	%		
Treatment	0	0.0	4	50.0	4	50.0	104.3	9.25
Control	0	0.0	3	42.8	4	57.2	105.7	4.31

Note:  $t = .383, p > .05$

## Conclusions

- \$ Desktop videoconferencing is an acceptable tool for communication and instructional supervision.
- \$ A lack of adequate technology resources in secondary agricultural education programs is a serious barrier to using desktop videoconferencing with all student teachers.
- \$ Overall, students teachers were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.
- \$ Professors and cooperating teachers, including cooperating teachers who were not in the treatment group, held positive attitudes toward desktop videoconferencing as a tool to enhance communication and instructional supervision.
- \$ Levels of reflective thinking and grades achieved were neither positively nor negatively affected by the desktop videoconferencing treatment.

## Recommendations

- \$ Findings of this study should be shared with university supervisors of agricultural instruction to serve as a benchmark of potential pros and cons of desktop videoconferencing as a tool to enhance communication and instructional supervision during the student teaching experience.
- \$ More investigation is needed to evaluate computer equipment, server capabilities, and connection speed at secondary sites so videoconferencing hardware and software can be installed properly.
- \$ More reliable technology tools should be sought to enhance communication and instructional supervision. High-speed interactive audio and video networks that use phone lines or fiber optic networks may provide a reliable option.
- \$ This study should be replicated to analyze the capabilities of desktop videoconferencing in other states and to evaluate attitudes towards the technology from other student teaching populations in other teaching majors.

## References

Ary, D., Jacobs, L., & Razavieh, A. (1996). Introduction to research in education (5th ed.). Ft.Worth, TX: Harcourt Brace College Publishers.

Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. Dallas, TX: Houghton Mifflin Company.

Dewey, J. (1938). Experience and education. New York: Collier Books.

Dudt, K., & Garrett, K. (1998, March). Using video conferencing to supervise student teachers. Paper presented at the SITE 98: Society for information technology & teacher education international conference, Washington, D.C.

Edmonds, R. (1996). Distance teaching with vision. Paper presented at the Australian society for educational technology, Melbourne, Australia.

Harrington, H. (1992). Fostering critical reflection through technology: Preparing prospective teachers for a changing society. Journal of Information Technology for Teacher Education, 6(1), 67-82.

Hoover, N. L., O'shea, L. J., & Carroll, R. G. (1988). The supervisor-intern relationship and effective interpersonal communication skills. Journal of Teacher Education, 39(2), 22-27.

Kruger, R. (1994). Focus Groups: A practical guide for applied research (2nd ed.). Thousand Oaks, CA: Sage.

Mason, R. (1995). Using communications media in open and flexible learning. London: Institute of Educational Technology, Open University.

Miller, G. (1997). Agricultural Education at a Distance: Attitudes and perceptions of secondary teachers. Journal of Agricultural Education, 38(1), 54-60.

Moore, M. & Kearsley, G. (1996). Distance education: A systems view. New York, NY: Wadsworth Publishing Company.

Rapaport, M. (1991). Computer mediated communications. New York: Wiley.

Richardson-Koehler, V. (1988). Barriers to effective supervision of student teaching: A field study. Journal of Teacher Education, 39(2), 28-35.

Taggart, G., & Wilson, A. (1998). Promoting reflective thinking in teachers: 44 action strategies. Thousand Oaks, CA: Corwin Press Inc.

Veen, Wim, & Others. (1996, September). Partnership and cooperation at two levels: Tele-guidance in teacher education. Paper presented at the Annual conference of the association for teacher education Europe, Scotland, United Kingdom.

Warren, Ron., & Others. (1996). Building communication environments in distance education. Paper presented at the Annual meeting of the speech communication association, 82nd, San Diego, CA.

Zaborik, J. A. (1988). The observing-conferencing role of university supervisors. Journal of Teacher Education, 39(2), 9-16.