

AN INTERACTIVE COMMUNICATION NETWORK'S POTENTIAL AS A COMMUNICATION AND STUDENT TEACHER SUPERVISION TOOL IN AGRICULTURAL EDUCATION

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Abstract

The purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors. 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 the Iowa Communications Network (ICN) was an effective tool for communication and instructional supervision. It was recommended that ICN-facilitated supervision be integrated into agriculture student teacher supervisory practice at Iowa State University. The basis of this recommendation is that ICN-facilitated supervision was judged to be equal to traditional supervision in terms of its effectiveness, it was viewed favorably by those who experienced it, and it offers potential economic benefits.

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." Transactional distance can be measured by the amount of structure and dialog present in a given educational interaction. For example, educational interactions possessing low levels of structure and high levels of dialog have low transactional distance. Moore and Kearsley theorize that transactional distance may be overcome with instructional design, interaction procedures, and selection of appropriate media.

Many of the nation's schools are beneficiaries of rapidly changing technology in telecommunications and computers. The "telephone line" is now used for high quality, full-motion video; high-speed Internet communications; data transmission,

as well as voice communications. With advances in the fields of telecommunications and computers, it has become technologically possible and economically feasible to establish live, two-way, full motion, interactive audio and video systems to connect schools together (Miller & Miller, 2000; Rudd & Telg, 1998; Swan, 1998). These systems are often called "compressed video" or "teleconferencing" (Miller & Miller, 1997).

Public and private companies and consortiums are building state-of-the-art communications systems. One public statewide system is the Iowa Communications Network (ICN). Begun in 1993, it now provides a variety of telecommunication services to more than 800 K-12 schools, higher education institutions, government agencies, and libraries. One goal of the ICN was to make educational opportunities available in the rural areas of the state that were previously available only through extensive travel. Another goal was to make it possible for people in different locations to communicate dynamically as if all parties were located in the same room -- synchronous communication (Brandsgard, 2001).

All ICN classrooms are equipped similarly and designed to work with each other. There are three cameras: one for the instructor, one for the students, and one to display documents. All classrooms have push-to-talk microphones. Most ICN classrooms can originate a broadcast and can be connected with any number of receiving sites. Teachers can schedule their classes in ICN classrooms so that instruction can be shared between schools, to "bring in" guest speakers, or to conduct meetings. At the university, prospective student teachers are taught how to use the ICN in pre-service courses and are encouraged to use the ICN during their student teaching experience.

University supervisors can observe student teachers from a distance while they teach in ICN classrooms and conduct an immediate post observation conference with them in real time. This type of interaction may be valuable in reducing the level of transactional distance between the student

teacher and the university supervisor. Thus far university supervisors in agricultural education at Iowa State University had not used the ICN as an instructional supervision tool with student teachers. While it was feasible to use the ICN in this manner, a question remained as to whether this could be done effectively. Also, would this method of supervision be looked upon favorably by student teachers, cooperating teachers, and university supervisors?

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 the ICN 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 the ICN to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by the ICN.
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 the ICN.
3. There will be no difference in the level of reflective thinking between the group receiving on-site

supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by the ICN.

Procedures

The population consisted of 19 student teachers, 20 cooperating teachers, and 5 university supervisors in agricultural education at Iowa State University in the spring semester of 2000. The treatment group was purposefully selected based on the availability of ICN in the student teaching centers. The treatment group (n=8) received two on-site university supervisory visits and one ICN visit with their supervisor. The control group (n=11) received the traditional three on-site university supervisory visits.

The study involved quantitative and qualitative components. The quantitative aspect of the study was classified as quasi-experimental. The nonequivalent control group design was used to compare attitudes toward ICN-facilitated supervision. 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 & Stanley, 1963).

Participants' attitudes toward ICN-facilitated supervision was measured with a Likert-type scale patterned after one used by Kessell and Miller (2001) to study attitudes toward the use of desktop videoconferencing as a supervision tool. The instruments were identical except that the words desktop videoconferencing were replaced by ICN. This instrument was given as a pre- and posttest. Kessell and Miller (2001) reported procedures for establishing content and face validity, and they reported an internal consistency coefficient of .84.

A Likert-type scale created by Germain Taggart and obtained from the book

Promoting Reflective Thinking in Teachers: 44 Action Strategies was used to evaluate the student teacher's level of reflective thinking (Taggart & Wilson, 1998). This instrument was administered only as a posttest. 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 who were studied by Kessell and Miller (2001). The Cronbach's alpha coefficient was .78.

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.

All quantitative data were analyzed with the SPSS for Windows Release 8.0 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. Tests of statistical significance included analysis of covariance, chi-square, and independent samples t-test. The alpha level was set *a priori* at .05

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 triangulate the quantitative data with qualitative data. The treatment group was asked questions regarding their experiences with and opinions of the ICN. Six student teachers in the treatment group were present for the focus group interview. The two students who were not present provided written answers to the interview questions. The control group was asked about their opinions of ICN and if they would have liked to use the ICN while student teaching. Nine students in the control group were present for the interviews. One additional student provided written answers while one student chose not to participate.

Results

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

Of the eight student teachers in the treatment group, three (37.5%) were male, and five (62.5%) were female. Members of the treatment group were on average 23.3 years of age with a standard deviation of 1.58. Their mean cumulative GPA at the beginning of the semester was 3.20 with a standard deviation of .52. Three (37.5%) of the student teachers in the treatment group were graduate students while the remaining 5 (62.5%) were undergraduates. Regarding the control group, six (54.5%) were male, and five (45.5%) were female. Members of the control group were on average 25.6 years of age with a standard deviation of 6.53. Their mean GPA was 2.98 with a standard deviation of .37. Only one (9.1%) member of the control group was a graduate student. The remaining 10 (90.9%) were undergraduates. There were no statistically significant associations between student teacher group and the demographic characteristics reported here.

Eight (88.9%) of the nine cooperating teachers in the treatment group were male. This group averaged 19.4 years of teaching experience with a standard deviation of 8.79. Only four (44.4%) of the teachers in this group had participated in a workshop on supervising student teachers. All eleven of the cooperating teachers in the control group were male. Teachers in this group had on average taught for 16.4 years with a standard deviation of 4.94. Ten (90.9%) of the teachers in the control group had participated in a workshop on supervising student teachers. Cooperating teachers in the control group were significantly more likely to have participated in a workshop on student teacher supervision ($\Phi = -.50, p = .02$).

All five university supervisors were male. The university supervisors had on average 5.8 years of experience teaching secondary agricultural education with a standard deviation of 2.77. In addition, university supervisors had taught at the post secondary level for an average of 17.6 years with a standard deviation of 11.44.

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

At the time of the pretest, most (80%) of student teachers in the treatment group either agreed or strongly agreed that the ICN could enhance communication and instructional supervision. Similarly, most (91%) of student teachers in the control group either agreed or strongly agreed that the ICN could enhance communication and instructional supervision. The average score for the treatment group was 4.22 with a standard deviation of .70. The average score of the control group was 3.88 with a standard deviation of .64 (Table 1).

At the time of the posttest, most (87%) of the student teachers in the treatment group either agreed or strongly agreed that the ICN could enhance communication and instructional supervision. In contrast, 73% of student teachers in the control group

agreed that the ICN could enhance communication and instructional supervision. The average score for the treatment group was 4.16 with a standard deviation of .50. The average score of the control group was 3.55 with a standard deviation of .59 (Table 1).

On the pretest, all cooperating teachers in the treatment group agreed or strongly agreed that the ICN could enhance communication and instructional supervision. In comparison, 80% of those in the control group expressed the same level of agreement. The average pretest score for the treatment group was 4.20 with a standard

deviation of .59. The average pretest score for the control group was 3.82 with a standard deviation of .45. Regarding the posttest, all of the cooperating teachers in the treatment group agreed or strongly agreed that the ICN could enhance communication and instructional supervision, whereas 89% of those in the control group expressed the same level of agreement. The mean score for the treatment group was 4.28 with a standard deviation of .47. The mean score for the control group was 3.79 with a standard deviation of .51 (Table 1).

Table 1
 Attitudes Toward the Use of the ICN as a Tool to Enhance Communication and Instructional Supervision

Attitude	Student Teachers								Cooperating Teachers								University Supervisors				
	Pretest				Posttest				Pretest				Posttest								
	Treatment		Control		Treatment		Control		Treatment		Control		Treatment		Control		Pretest		Posttest		
	f	%	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	0	0	0
Disagree	0	0	1	9	0	0	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Undecided	1	20	0	0	1	13	2	18	0	0	2	20	0	0	1	11	0	0	0	0	0
Agree	2	40	9	82	5	62	8	73	5	71	8	80	5	63	8	89	4	100	4	80	0
Strongly Agree	2	40	1	9	2	25	0	0	2	29	0	0	3	37	0	0	0	0	1	20	0
Total	5	100	11	100	8	100	11	100	7	100	10	100	8	100	9	100	4	100	5	100	0
Mean ^a	4.22		3.88		4.16		3.55		4.20		3.82		4.28		3.79		4.14		4.22		
Standard Deviation	.70		.64		.50		.59		.59		.45		.47		.51		.28		.23		

^a 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

All five university supervisors participated in ICN-facilitated supervision. Because of the small sample size, university supervisors were not divided between treatment and control groups. Regarding pretest scores, 100% of university supervisors agreed that the ICN could enhance communication and instructional supervision. Posttest scores showed that 80% agreed and 20% strongly agreed that the ICN could be used to enhance communication and instructional supervision. The pretest mean was 4.14 with a standard deviation of .28, and the posttest mean was 4.22 with a standard deviation of .23.

Focus Group Interview Results

Treatment

All eight of the student teachers in the treatment group indicated that two on-site visits and one facilitated by the ICN were sufficient. Seven of them had gained experience operating ICN technology on the university campus. They also noted that the level of equipment and support available in secondary schools was less. In addition, seven of the student teachers indicated that their students responded favorably to meeting in the ICN classroom. Only one reported "horrible" behavior. This student teacher indicated that the negative behavior was a result of students having "too many toys to play with."

Student teachers identified several strengths of ICN-facilitated supervision including: a reduction in travel required of the university supervisor, allowing the university supervisor to observe classes that could not otherwise be observed because of short notice or an unusual schedule, eliminating the distraction of having the university supervisor on-site, allowing them to integrate a variety of technology tools into their teaching, and allowing the high school students to experience the ICN.

The student teachers identified two common problems. Most student teachers experienced some minor technical problems especially with their microphone. Perhaps the greatest problem was classroom design. Most ICN rooms are designed so that students sit at tables facing the teacher

console. The tables typically are not moveable. Students have a push-to-talk microphone in front of them. The teacher console contains all of the technology and is the place where all technology is controlled by the teacher. In most cases, the teacher's microphone is connected by cable to the console and limits the teacher's movement. One student teacher commented that the microphone "made me feel like I was on a leash."

Student teachers indicated that more ICN-facilitated supervision should occur in the future. They also believed that the ICN should be used for interaction between student teachers. This interaction could include collaborative teaching and/or observation. They also indicated that the ICN could be an excellent collaboration tool for experienced agriculture teachers. One collaborative use of the ICN would be FFA career development event preparation.

Control

Student teachers in the control group were asked if they would have enjoyed using the ICN had their circumstances allowed it. Of the 9 student teachers who expressed a clear preference, 7 said yes and 2 said no. Those who said yes generally were only interested in using ICN on a limited basis and under specific conditions. Only one student teacher expressed a clearly negative opinion of ICN by stating that "I had it [ICN] for a class before, not as a teacher but as a student and I didn't think that it was very productive so I don't care to use it in my classroom." Eight student teachers reported having no prior experience operating the ICN technology while three reported having such experience.

All student teachers in the control group expressed a preference for three on-site university supervisor visits. None expressed a preference for two on-site visits and one facilitated by ICN. Some indicated that using the ICN as a supplement in some way might be acceptable, but most were indifferent.

Student teachers were asked to identify potential strengths of using the ICN. Reducing the amount of travel required of university supervisors, observing other teaching styles, and bringing in resource

persons were mentioned. The most often cited weakness was that the ICN room would not allow student teachers to move freely about the classroom. This was also a prominent concern of the treatment group. Other concerns included the idea that much of the content and the teaching methods used by secondary level agricultural educators may not be suited to the ICN classroom environment, that ICN-facilitated supervision would simply not be as good as that done face-to-face, the potential of university supervisors to use the ICN as an excuse not to visit student teachers in person, and the potential negative impact on the student teacher - university supervisor relationship.

University supervisor interviews

All five university supervisors indicated that the ICN could successfully replace an on-site supervisory visit. Preferably the second of three supervisory visits would be facilitated through the ICN. University supervisors experienced practically no difficulties in scheduling their ICN-facilitated visits and conducted them in a manner very much like the traditional on-site visit. Each university supervisor included a pre-observation discussion with the student teacher, observed them teaching, and conducted a follow-up discussion.

The university supervisors were very pleased with the quality of the video and audio. One supervisor commented that "I felt like I was in the back of the classroom...I didn't feel like I missed anything." Another university supervisor said "I can't believe that we have not already done this!" This same university supervisor speculated that other benefits might be achieved as a result of using ICN-facilitated supervision including: giving the student teacher experience teaching in a technology enhanced classroom, stimulating the cooperating teacher's interest in the technology, and exposing the high school students to the technology and to the university.

What did the university supervisors learn from the experience? Two university supervisors experienced one episode each when the student teacher was the "receive site." Both supervisors discovered that this

situation limited their perspective on the class and recommended that the student teacher's classroom be designated as the "origination site" whenever possible. As an example, one characteristic of the "receive site" is that persons must push and hold down a button on their microphone to be heard at the "origination site." On the other hand, the teacher's microphone at the "origination site" is always live. According to the university supervisors, ICN-facilitated supervision must be carefully planned. Scheduling issues must be addressed, sufficient time should be devoted to observation of teaching and to discussion, and consideration must be given to whether this method is suitable for a specific situation.

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

Student teachers in the treatment group were slightly less positive about using the ICN to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by the ICN. An analysis of covariance was conducted to determine if treatment and control groups had significantly different posttest scores after adjusting for initial group differences on the pretest. Results indicated that student teachers in the treatment group had significantly higher adjusted attitude scores on the posttest than student teachers in the control group ($F = 4.68$ (1, 13 *df*), $p = .05$).

Cooperating teachers in the treatment group were slightly more positive about using the ICN to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by the ICN. However, an analysis of covariance revealed that their adjusted posttest mean scores were not significantly different from the group of cooperating teachers who did not experience ICN-

facilitated supervision ($F = 1.22 (1, 11 df), p = .29$).

University supervisors were slightly more positive about using the ICN to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by the ICN. The difference between the pretest and posttest score was not statistically significant ($t = 1.57 (3 df), p = .22$).

The quantitative data reveal a modest level of support for hypothesis one. This is particularly true of the data provided by the student teacher group. The qualitative data suggest a higher level of support for the hypothesis.

Table 2
Student Teaching Grades

Grade	Treatment		Control	
	<i>f</i>	%	<i>f</i>	%
A	6	75.0	11	100.0
A-	1	12.5	0	0.0
B	1	12.5	0	0.0

Note. Cramer's $V = .40, p = .22$

Hypothesis two was supported by the data.

Hypothesis Three: There will be no difference in the level of reflective thinking between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by the ICN.

Table 3 compares the reflective thinking levels achieved by student teachers in the treatment and control groups. Reflective

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 the ICN.

Table 2 shows the grades achieved by the student teachers. All student teachers in the control group earned an A. Seventy-five percent of the student teachers in the treatment group earned an A, 12.5% earned an A-, and 12.5% earned a B. There was a low nonsignificant association between student teaching grade and treatment group.

thinking levels were interpreted as follows: <75 = Technical level; 75 to 104 = Contextual level; 105 to 120 = Dialectical level. Students who received a combination of on-site and ICN-facilitated supervision had a mean score of 97.3 with a *SD* of 7.96. Students who only experienced on-site supervision had a mean of 98.2 with a *SD* of 9.03.

Hypothesis three was supported by the data.

Table 3
Student Teachers' Reflective Thinking Levels

Group	Technical		Contextual		Dialectical		<i>M</i>	<i>SD</i>
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%		
Treatment	0	0.0	7	87.5	1	12.5	97.3	7.96
Control	0	0.0	9	81.8	2	18.2	98.2	9.03

Note. $t = .24, p > .05$

Conclusions

- Student teachers, cooperating teachers, and university supervisors who experienced a combination of on-site supervision and supervision facilitated by the ICN held positive views regarding the use of the ICN as a tool to facilitate communication and instructional supervision at the beginning and at the conclusion of the student teaching experience.
- Data suggest that experiences with ICN prior to and/or during this study may have contributed to more positive perceptions of its usefulness as a communications and instructional supervision tool.
- The use of ICN-facilitated supervision had no influence on the grade earned for student teaching. Historically most students in this program have earned A's for student teaching. With very limited variability in student performance, no difference was expected.
- Student teachers' reflective thinking level was not influenced by the use of ICN-facilitated supervision.
- It appears that possible "transactional distance" problems sometimes associated with distance education are not present when using the ICN. Perhaps transactional distance can be significantly reduced when using a live, two-way, full motion interactive audio/video system to facilitate direct communication between two sites.
- A combination of on-site and ICN-facilitated supervision of student teachers is acceptable supervisory practice.

Recommendations

- ICN-facilitated supervision should be integrated into the practice of agriculture student teacher supervision at Iowa State University. The basis of this recommendation is that ICN-facilitated supervision was judged to be equal to traditional supervision in terms of its effectiveness, it was viewed favorably by those who experienced it, and it offers potential economic benefits.
- Teacher educators at other institutions with communications systems similar to the ICN should consider conducting a systematic assessment of the usefulness of their system for student teacher supervision.
- Although this study did not document the costs associated with ICN-facilitated supervision in comparison to traditional supervision, the likelihood is high that economic savings can be realized through reductions in travel expenses and efficient use of time. Actual savings will depend upon the costs of ICN telecommunications fees in comparison to expenses associated with traveling to a specific student teaching center. Further research is recommended to develop a cost-benefit analysis of ICN-facilitated supervision.

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