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ABSTRACT

Four case studies in varying stages of completion are currently being conducted in the Department of Vocational and Technical Education at the University of Minnesota using live, two-way television to link multiple sites for interactive television classes. Two of the four classes, which are offered via closed-circuit television, are a vocational education class and a foreign language class at the secondary level; the other two are a professional education class for parent educators and a food preservation class for extension homemakers. Videotapes of class sessions and interviews with teachers and learners have been used to collect the data, which are being analyzed using ethnographic procedures. Two findings from the studies illustrate what is being learned about teaching and learning in this context: (1) the interactive television technology did not appear to be a significant intrusion on the flow of lessons; and (2) there was much less interaction between the students and the teachers in several remote sites with small numbers of students. Based on these four studies, planners have more insight into the number of sites that might be linked together effectively; the responsiveness of adults and adolescents to the system; and the support that teachers need to succeed in this context. Teachers using the system can reflect on patterns of classroom interaction and technology usage in the four courses studied, and adapt the teaching strategies they use in a traditional classroom to this new medium. (RP)

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Use of Two-Way Interactive Television in Education

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Adults contend with a variety of barriers to participating in formal, adult education. Barriers include limited time to take classes, location of classrooms in relation to work and home, and cost of educational services (Cross, 1980). Young people in small public high schools in sparsely populated areas also experience barriers to taking courses such as vocational education, foreign languages, and advanced mathematics and science, because these schools cannot afford to provide a large array of specialized courses. These two problems are similar in that both pose the challenge of providing learners increased access to educational programs.

Responding to this challenge, current audio and video technologies provide an alternative to delivering formal education face to face as is the custom in our society. One such combination of technologies is live, two-way, interactive television (ITV) which links multiple sites on closed-circuit television. Furthermore, learners at distant sites can see and hear the teacher and learners at the other sites, as illustrated in Figure 1. This configuration is in place in 20 locations in Minnesota (Minnesota Technology, 1986) and is being used in a few other states. Typically, video cameras and monitors are set up so that teachers can switch cameras to send views of themselves, students, or visual aids to students at remote sites by pressing buttons at the table where they stand or sit. The intent is for the technology to be so simple that it eliminates the need for a technician to manage the equipment during classes.

ITV is a major departure from the dominant school and adult education contexts. What happens when teachers and learners are separated geographically and have their interaction mediated by ITV? What can students learn in this context? Which students can succeed in this context and under what conditions? Answers to these questions will help program planners and teachers decide how to deliver educational services to learners and what adaptations in teaching might be required.

THE FOCUS OF RESEARCH

The following questions indicate the focus of research on ITV currently being conducted in the Department of Vocational and Technical Education: How do teachers and learners interact in classes which are held in an ITV context? In what ways does ITV constrain and facilitate teaching and learning?

Four case studies of interactive television classes are in varying stages of completion. Two are secondary classes: A vocational education class and a

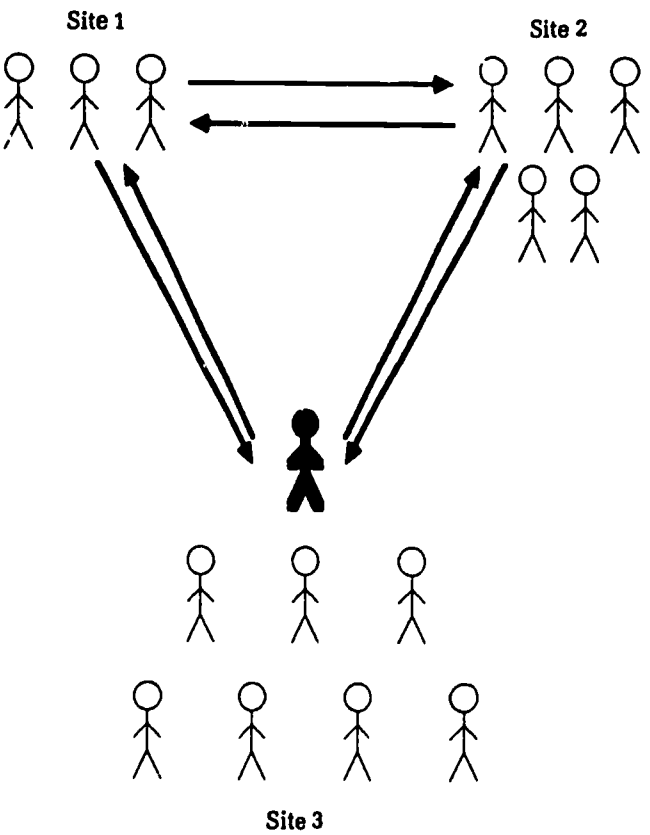

Figure 1. Audio and Visual Signals Sent and Received Among All Sites

foreign language class. Two are adult classes: A professional education class for parent educators and a food preservation class for Extension homemakers. Videotapes of class sessions and interviews with teachers and learners have provided the data which are being analyzed using ethnographic procedures. Themes emanating from the above questions are being identified, then organizing charts, matrices, and other devices are developed to systematically summarize the data.

ILLUSTRATIVE FINDINGS

Two findings from the studies are presented here as illustrations of what is being learned about teaching and learning in this context.

Extent of Intrusion of the Technology

The ITV technology did not appear to be a significant intrusion on the flow of lessons. Only about four percent of the comments in the secondary classes were related to adjusting or using the technology. When teachers did talk about technology, the comments were usually directed to the group of students in a specific site, as shown in Table 1. When the lesson was halted to correct equipment problems, usually the teacher had neglected to check the equipment before the class began and then had to adjust volume or image at the time a technical failure became evident. Students in the secondary settings quietly assumed much of the responsibility for adjusting the sound and picture. On rare occasions, reception of signals among sites failed altogether.

Teachers demonstrated a good deal of skill in coordinating the technology and the class activity to enable the students at distant sites to see and hear the content to be learned. For example, the foreign language teacher would switch to the overhead camera to present a view of stimulus words for translation and to emphasize correct spelling. Occasionally, there were discordant uses of the technology, such as when the vocational teacher forgot to switch the camera view, and students at remote sites saw a math problem on the monitor for 20 minutes while she talked about other topics. All classrooms have a large quantity of events and tasks, simultaneous occurrences, and unpredictable distractions teachers must attend to (Doyle, 1980); the coordination of the camera view with learning tasks adds yet another dimension for teachers to manage.

In contrast to the secondary teachers who had used the ITV system for five months at the time they were studied, both of the adult educators were using the system for the first time when data were collected. These instructors had received only a very limited briefing on the use of the system before their classes began; the camera view and learning activities lacked coordination in several episodes. The evidence suggests that teachers need instruction and practice using the ITV system before effective use of it is demonstrated.

Invisible Classrooms

In the secondary classes, one remote site—called Harris High School here—was, in a sense, "invisible." In both the vocational class and the foreign language class, there were fewer students at Harris than in any of the other schools, which may account for some of its invisibility. The two teachers directed fewer comments to the individuals at Harris as indicated in Table 1. Indeed, during the eight days of classes studied, the vocational teacher directed only 34 comments to individuals at Harris where there were five students; she directed 508 comments to the 16 individuals in the same room with her. The foreign language teacher directed about half as many comments to the group in Harris as he did to the group in the room with him. The vocational teacher directed about the same number of comments to the group with her as to the one in the remote site, but 22 percent of the comments were focused on using the equipment. Proportionately less interaction centered on course content or social exchange.

The Harris students initiated fewer verbal interactions with the teachers than students at the other sites. Students at Harris High School were less likely than students in other schools to interact with other students across sites. In these ways, the vocational class and the foreign language class went on without much notice of the Harris students.

Related to the invisibility of Harris High School was the social hierarchy that became evident among the schools. While the students at the other two high schools would laugh heartily at jokes during the foreign language class, the Harris students were silent, sometimes smiling, sometimes not. A student in a different school introduced an exchange student to the language class and said, "That's Harris. They're in the boon-docks." Later, during the same class period, the Harris students repeated that they were in the "boonies." These and other comments seemed to reflect a common understanding that Harris was the "out school."

In one of the adult cases—three sessions in duration—the teacher did not acknowledge the presence of one of the remote sites during the second session. Neither did the adult in that site speak up, but adults in the classroom with the teacher asked a

Table 1 Frequency of Teacher Comments About Technology

To Whom Teacher Comments Were Directed	Foreign Language Class					Vocational Class				
	Students at Sites		Total Comments	Comments about Technology		Students at Sites		Total Comments	Comments about Technology	
	n	%	n	∫	%	n	%	n	∫	%
All Students			576	3	1%			1289	12	
Sites										
Laredo	7	41%	524	28	5%					
Glenville[a]	6	35%	554	13	2%					
Harris	4	24%	253	29	11%	5	24%	101	22	22%
Bellview						16	76%	95	2	2%
Total for Sites	17		1331	70	5%	21		196	24	12%
Individuals										
Laredo			228	7	3%					
Glenville			256	6	2%					
Harris			123	12	10%			34	0	0%
Bellview[b]								508	29	6%
Total for Individuals			607	24	4%			542	29	5%
GRAND TOTAL			2406	97	4%			2027	65	3%

Note. Data are from eight class periods of each class.
[a]Teacher location for the foreign language class. [b]Teacher location for the vocational education class.

few questions. If the class had continued longer then three sessions, patterns of invisibility might have emerged there as well. In the other adult education class, which had 60 students in six sites, the instructor had each remote site form a work group for some activities. Analysis of data from this case might provide a different perspective of visibility of remote sites.

At present, the notion that invisibility might lessen opportunities for learning is untested, but teachers should be alert to the possibility until more research is done. It appears that teachers can help to minimize invisibility by "humanizing" the classroom (Monson, 1978). In the secondary classes, teachers focused on individuals and developed rapport by calling students in remote sites by name and by accommodating students' scheduled absences for activities in their own schools.

The ITV technology does not cause social hierarchies or cause students to be within or outside of the mainstream of a class. It links subcultures of learners together into the larger culture of an expanded classroom where interaction may or may not develop in ways that encourages participation from all persons and all sub-groups. This situation is somewhat like bringing urban high school students of various subcultures together in one room: The interaction of the persons in the differing subcultures tends to be uneven.

POTENTIAL IMPACT OF RESEARCH

This research is providing bases for administrators in education to make some programming decisions. The number of ITV systems is increasing, thus increasing the capacity of communities to provide education programming not previously available to them. Based on these four cases, planners have more insight into the number of sites which might be linked together, the responsiveness of adults and youth to the system, and the support that teachers need in order to succeed in this context.

Teachers using the system can reflect on the patterns of classroom interaction and patterns of technology usage found in the secondary and adult education cases. This knowledge enables teachers to

adapt teaching strategies they use in traditional classrooms and to orchestrate interaction between themselves and students and among students from all sites.

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AUTHOR NOTES

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