Educational Instruction Via Interactive Video Network

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Education must overcome the challenges of declining enrollment, increased graduation requirements, and lack of funding for elective courses (National Research Council, 1988). According to Kitchen (1987), America's rural communities face increased challenges for providing equitable services and economic stability.

Technology has produced another alternative: the use of interactive video networks (Whisler, 1988). Rural schools interact with other schools via interactive video networks--a type of distance learning. Distance learning is characterized by the use of technology to link instructors and learners who are physically apart from one another (Hughes, 1988). McClelland (1987) reported that young people in small public high schools in sparsely populated areas 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. Educational programs in the United States are constantly being monitored and often come under criticism that calls for improvements to keep abreast of advancements in today's society. More specifically, the discipline of agricultural education is being monitored and evaluated to determine changes needed to keep pace with technology in agriculture (National Research Council, 1988).

Educators and teacher educators are faced with the challenge of how to best combine the many tools of distance education technology with the talents of educators (Norenberg & Lundbald, 1987). Distance education technology can provide a medium that will allow school districts to share the opportunities for advanced courses and other courses that rural school districts may not be able to provide (Whisler, 1988).

Distance learning provided by video and audio technologies via interactive video networks (IVN) has helped to alleviate some of the problems facing rural America such as geographic isolation, declining enrollment, shrinking tax bases, and increased requirements for high school graduation (Whisler, 1988). As classes become smaller, the financial burden increases as a result of decreased state funds and retained costs of instructors and facilities (Mihalevich, 1990). By not offering low-enrollment classes, schools deprive students of educational opportunities. Rural school districts without access to an interactive video network face two options: provide instructors for low-enrollment classes and thereby take on greater financial burden, or eliminate low-enrollment classes and ultimately leave students at an educational disadvantage (Whisler, 1988).

Much of the application of interactive video networks is to provide courses that otherwise would not be offered due to minimal student enrollment or to comply with increased state requirements for courses that must be offered. Distance learning provides students with opportunities to enroll in courses they may not have had the opportunity to experience previously. Distance learning also provides school districts with opportunities to offer classes in subjects for which many school districts do not have qualified instructors. Teacher/staff inservice and student development courses are other possibilities (Evans, 1988).

Potential uses of interactive video networks are limited only by imagination, time, budget, and the delivery system (deBlas, Knox, McArthur, Wallace, & Dean, 1988). Interactive video network systems are limited in potential only by human constraints. Used creatively, the system can offer students a wider range of educational experiences than the institution, hindered by bricks and mortar, can possibly provide (Kitchen, 1988). Academic achievement has not been shown to be significantly different between those students taking courses taught traditionally and those in interactive video network settings (Barr-on 1987; US West Communication, 1988).

In testimony to the Senate Committee on Labor and Human Services, Kitchen (1987)

summarized the results of a study from 1983-1986 by the Minnesota Department of Education which researched the 11 technology demonstration sites in Minnesota implementing interactive video networks (IVN). Following is a summary of the Minnesota findings (Kitchen, 1987):

> IVN allows schools to offer a wider range of elective courses and permits students greater access to subject matter.
>
> IVN requires cooperation among schools. Whereas cooperation may be difficult, the improved programming would have been difficult or impossible to achieve without cooperation.
>
> Teachers require training, preparation and support to deal successfully with teaching via IVN. When teachers are properly prepared, they can adapt to and enjoy teaching via IVN. Seventy-five percent of the teachers who taught via IVN would choose to do so again.
>
> Students enjoy learning via IVN and are motivated by it.
>
> No systematic, statistically significant difference in achievement was found between students taking courses traditionally and those in IVN sections. Achievement does not seem to be influenced by the use of IVN.
>
> IVN seems to be particularly appropriate for language and math instruction, for which it is heavily used.
>
> IVN can be relatively expensive as a delivery system. Costs can be reduced, however, through business/education partnerships, cooperative purchasing, and planning.

The results of the study reveal a solid base for the effectiveness and the continued expansion and use of interactive video networks. With these systems in place there is optimism for rural America, without these systems there is limited hope (Kitchen, 1987).

Purpose and Objectives

The purpose of this study was to ascertain the perceptions of secondary educators (agricultural education instructors, principals, and superintendents) in the delivery of educational programs via interactive video networks (IVN). The objectives of the study are reflected in the following research questions:

> What perceived level of understanding do secondary educators have toward IVN?
>
> What perceived level of interest do secondary educators have toward using IVN?
>
> What perceived obstacles exist preventing implementation of IVN education?
>
> What programs are perceived as priorities for IVN delivery?

Procedures

The population for the study included all agricultural education instructors, principals, and superintendents employed in public secondary schools having an agricultural education program during the 1990-91 school year in a midwestem state. The entire population was sampled. School districts having agricultural education programs were identified by the State Supervisor for Agricultural Education.

The survey instrument constructed for the purpose of this study was based on previous research conducted by Pullen (1989). Thirty-eight items within three parts of the instrument were examined for validity by a panel of experts. To determine the educators' self-reported levels of understanding and interest in using two-way interactive television, a Likert-type scale (l-6) was utilized to define the levels. Six pilot sites that offer agricultural education programs were selected from a neighboring state's schools. Analysis of instrument reliability confirmed that the instrument provided sufficiently reliable data, r=.9 1 using Cronbach's Coefficient alpha at the .05 alpha level.

Data were gathered through the use of direct-mail questionnaires. The overall response rate for the questionnaire was 81.4 percent (201 of the 247). Measures of central tendency were

calculated to ascertain the perceptions of educators toward the use of interactive video networks in the delivery of educational programs. To determine if significant differences existed between groups, multivariate analysis of variance (MANOVA) procedures were used. Univariate analysis of variance (ANOVA) procedures were used to determine whether any univariate differences existed (SPSSx, 1988). An alpha level of .05 was used to ascertain significant differences.

Results

A significant difference was found among secondary educators in 6 of the 38 items dealing with level of understanding. Items were rank ordered with grand means (GM) ranging from 2.62 to 4.22. The rank order of items were similar for all groups. Educators' self-reported understandings were highest for the following two items: (1) IVN GM = 4.22 and (6) cooperation necessary among schools who are using IVN GM = 3.87. Agricultural education instructors' self-reported understandings of IVN were significantly lower on all items than the responses of superintendents. Lowest ranking items of all groups were (4) training in the use of IVN GM = 2.68 and (5) teaching classes using IVN GM = 2.62. The lowest ranking items indicate a lack of experience in IVN usage.

Secondary Educators' Perceived Use of IVN as Students

The majority of educators, 75.6 percent, reported a willingness to participate on an IVN system as students. Lowest in ranking were principals (65.1%); highest in ranking were agricultural education instructors at 85.0 percent. Results reported indicate that educators are willing to use IVN as students.

Secondary educators' perceptions, reported in Table 1, were not significantly different on eight survey items. Six of those eight items refer to financial resources. The six items include the following: (21) be less expensive than busing students, (34) be too expensive for our school, (27) give financial gain by providing classes to other schools, (18) be less expensive than sharing teachers, (33) require school to be a "provider" and receive little in return, and (36) create a classroom shortage. When finances are considered, educators indicate that they are in agreement. There is no indication, however, that agreement exists for the same reasons.

A significant difference existed among groups on 10 items focused on interest in using IVN. Items were rank ordered with a range in GM from 4.02 to 4.96. Educators' self-reported interests were strongest for the following items: (11) increasing the number of inset-vice programs for teachers, GM = 4.96; (9) offering continuing education for staff via IVN, GM = 4.95; and (12) encouraging the use of IVN by community, GM = 4.62. This self-reported interest is understood to indicate a desire to participate on IVN with their students. Agricultural education instructors' third-ranked item, (14) committing time to become familiar with IVN, GM = 4.47, was ranked sixth out of the ten items as ranked by three groups of educators. Principals' third-ranked item, (8) receiving classes from other schools via IVN, Gm = 4.40, was ranked seventh out of the ten items by the three groups of educators. Lowest ranking items included (7) offering classes to other schools via IVN, GM = 4.30; (16) promoting school board in using IVN, GM = 4.20; and (13) teaching others to use IVN, GM = 4.02. Low-interest items indicated a need for practice in using IVN to gain confidence.

Table 2 identifies four of the twenty-five most frequently listed obstacles perceived as hindrances to successfully implementing IVN. The obstacles listed in rank order were: (a) costs; (b) negative attitudes of faculty, resistance to change, and "technophobia"; (c) selecting and training quality teachers for systems'; and (d) coordination of courses, time, schedules, and grading. Of all respondents, 70.6 percent reported cost as the highest-ranked obstacle to the successful implementation indicating one major reason IVN has not been used extensively.

Negative attitudes of faculty, resistance to change, and "technophobia" were reported by 20 percent of the respondents and indicated a need for inservice to smooth the transition associated with change.

Secondary Educators' Perceived Uses of IVN as Teachers

The majority of educators (72.6%) reported a willingness to participate on an IVN system as

Table 1. Means, Standard Deviations, and Rankings of Educators' Self-Reported Perceptions of Interactive Video Network

Survey Item No.	Item		AEI[a]	PR	SU	GM
20	Allow offering of college and inservice classes to teachers*	M[b]	4.90	5.25	5.49	5.24
		SD	.92	.86	.68	.84
		R	1	1	1	1
30	Allow school to share highly skilled instructors*	M	4.60	5.08	5.40	5.06
		SD	.94	.97	.76	.94
		R	2	2	2	2
31	Allow offering of low-enrollment courses*	M	4.35	5.02	5.37	4.96
		SD	1.10	1.17	.79	1.10
		R	5.5	3	3	3
29	Expose our students to technology*	M	4.55	5.00	5.17	4.93
		SD	.95	1.02	.78	.94
		R	3	4	4	4
38	Expand our curriculum offerings*	M	4.48	4.78	5.01	4.78
		SD	.85	1.21	1.03	1.06
		R	4	5	5	5
23	Allow offering of community adult education via IVN*	M	4.35	4.71	5.09	4.75
		SD	.92	1.20	.84	1.03
		R	5.5	6	5	6
28	Allow offering of post-secondary classes to students*	M	4.22	4.62	4.85	4.59
		SD	1.19	1.33	.87	1.15
		R	7	7	9	7
17	Improve the quality of education in North Dakota*	M	3.93	4.59	4.95	4.53
		SD	1.34	1.29	1.07	3.59
		R	12	8	7	8
39	Enhance educational leadership among area schools*	M	4.08	4.49	4.85	4.51
		SD	.98	1.15	.90	1.05
		R	9	9	9	9
26	Be better than bussing students to neighboring schools*	M	3.72	4.41	4.85	4.51
		SD	1.42	1.42	1.26	1.43
		R	16	10	9	10
37	Help maintain or enhance relationships with area schools*	M	4.03	4.29	4.67	4.36
		SD	.99	1.21	.88	1.05
		R	10	13	11	11

[a]AEI=Agricultural Education Instructor, PR=Principal; SU=Superintendent; GM=Grand Mean.
[b]Scale: 1=Strongly Disagree; 2=Moderately Disagree; 3-Slightly Disagree; 4=Slightly Agree; 5=Moderately Agree; 6=Strongly Agree.
*=Significantly different at the .05 level.

Table 1 continued.

Survey Item No	Item		AEI[a]	P R	SU	GM
24	Be a way for our school to become a leader in education*	M[b]	3.90	4.35	4.64	4.33
		SD	1.36	1.28	1.02	1.25
		R	13	11	12	12
25	Nearly eliminate travel time when sharing teachers*	M	3.88	4.30	4.58	4.28
		SD	1.24	1.24	1.25	1.27
		R	14.5	12	13	13
21	Be less expensive than bussing students	M	3.98	4.00	4.36	4.13
		SD	1.32	1.37	1.44	1.39
		R	11	15	14	14.5
35	Allow similar benefits for all schools*	M	3.88	4.19	4.28	4.13
		SD	1.06	1.13	1.03	1.08
		R	14.5	14	15	14.5
34	Be too expensive for our school	M	3.68	3.97	3.74	3.80
		SD	1.28	1.40	1.59	1.44
		R	18	16	19.5	16
19	Be cost effective overall*	M	3.50	3.68	4.05	3.77
		SD	1.46	1.50	1.38	1.45
		R	21.5	18.5	16	17.5
32	Be a way of cooperating to save small schools	M	3.68	3.83	3.79	3.77
		SD	1.51	1.72	1.60	1.60
		R	18	17	18	17.5
27	Give financial gain by providing classes to other schools	M	3.65	3.68	3.81	3.72
		SD	1.15	1.39	1.18	1.24
		R	20	18.5	17	19
22	Likely be replaced by other technologies in near future	M	3.68	3.57	3.59	3.61
		SD	1.11	1.39	1.34	1.29
		R	18	20	21	20
18	Be less expensive than sharing teachers	M	3.50	3.48	3.74	3.59
		SD	1.41	1.48	1.53	1.48
		R	21.5	21	19.5	21
33	Require school to be a "provider" and receive little in return	M	3.37	3.25	3.22	3.27
		SD	1.23	1.39	1.39	1.34
		R	23	22	22	22
40	Eliminate teaching positions*	M	4.10	3.02	2.77	3.24
		SD	1.30	1.37	1.30	1.43
		R	8	23	23	23

Table 1 continued.

Survey Item No.	Item		AEI[a]	PR	SU	GM
36	Create a classroom shortage	M[b]				
		SD	3.05 1.27	2.751.09	2.721.25	2.831.21
		R	24	24	24	24

Table 2. Obstacles to Successful Implementation of IVN Identified by All Survey Groups

Obstacles	N	%
costs	142	70.6
Negative attitudes of faculty, resistance to change, "technophobia"	41	20.4
Selecting and training quality teachers for system	32	15.9
Coordination of courses, time, schedules, and grading	29	14.4

teachers. Least willing were principals (66.7%); most willing were superintendents (76.9%). Results indicate that educators are willing to use IVN as teachers.

The four most frequently listed priorities for use of IVN included (a) high school courses--advanced math and science, business, computers, agriscience, foreign languages, history, social studies, geography, fine arts, writing, English, speech, and home economics courses; (b) teacher inservice and/or staff development; (c) adult and community programs; and (d) continuing education and post-graduate courses. High school courses were reported as a priority by 87 percent of educators, whereas teacher inservice and/or staff development was noted by 43 percent of the respondents, which may indicate the educators' desire to stay current on technology and offer currently unavailable courses to all schools. Adult and community programs were identified by 36 percent.

On the following four survey items, agricultural education instructors had a higher mean perception than either of the administrator groups: (22) likely be replaced by other technologies in the future, (33) require school to be a "provider" and receive little in return, (40) eliminate teaching positions, and (36) create a classroom shortage. Based on these negatively worked items, a more negative attitude toward the technology is exhibited by agricultural education instructors than by principals or superintendents.

Conclusions and Recommendations

IVN is a relatively new technology, and educators have an unknown quantity of knowledge regarding the technology. The amount of knowledge of IVN among respondents was adequate to formulate meaningful perceptions of items presented in the instrument. Following are the major reported sources on information about IVN from highest to lowest; interactive video network systems in local schools and/or other sites (34.3%), demonstrations, workshops, personal observations, and/or telephone companies (32.8%); consortia, meetings, and the Department of Public Instruction (DPI) (28.9%); and magazines and journals (20.4%). Adequate knowledge of IVN was gained by educators to formulate meaningful perceptions toward the use of IVN.

Objective One

A significant difference was found among educators in all items in Section A of the survey instrument. Educators possess adequate understanding of IVN, cooperation necessary among schools who are using IVN, and classes or programs used on IVN. Educators possess least adequate understanding of teaching methods to be used on IVN, training in the use of IVN, and teaching classes using IVN. The items ranked lowest refer to the application of IVN and indicate a lack of experience in the actual use of IVN.

Objective Two

A significant difference existed among groups on all items. Educators' interests in IVN regarding inservice programs and continuing education for the school staff and community indicated a desire to gain more exposure to IVN by

participating with the system from a student-type role. Educators' lack of interest in offering classes to other schools, promoting school board use, and teaching others to use IVN indicated a need for practice in using IVN to gain confidence.

Objective Three

The four most frequently listed obstacles perceived as hindering the successful implementation of IVN by rank order include costs; negative attitudes of faculty, resistance to change, and "technophobia"; selecting and training quality teachers for system; and coordinating courses, times, schedules, and grading.

The fact that cost was considered an obstacle to the implementation of IVN, by greater than a three-to-one margin over the second-ranked obstacle, indicated a very evident reason why more schools have not implemented IVN. Negative attitudes of faculty and resistance to change indicated a need for inservice to smooth the transition associated with change.

Objective Four

High school courses were reported as a priority by 87 percent of educators, nearly two times the number of the second priority. Teacher inservice and/or staff development was ranked second in priority by 43 percent of the respondents. Adult and community programs were ranked third with 36 percent of educators indicating this as a priority. Educators' second highest ranking, priority teacher inservice and/or staff development, may indicate a desire to stay current on technology and offer currently unavailable course to all schools.

Based upon the findings reported, the following conclusions have been formulated:

Educators accept IVN as appropriate technology for high schools.

Educators express interest in gaining more knowledge of IVN through inservice.

There is a perceived need for financial assistance in the start-up of IVN sites.

There is a need for inservice in educating instructors, principals, superintendents, and constituents of the school districts involved with IVN.

Rural American can deliver education to more students through the technology of IVN.

Based upon the findings and conclusions of this study, the following recommendations are offered.

Similar studies should collect data from a population made up of all educators exposed to IVN technology.

Future studies should concentrate on the courses to be taught via IVN, and results should be shared with curriculum writers to develop courses specifically for delivery via IVN.

Results of this study should be reviewed by all teacher education departments to assist in the preparation of teachers and in fulfilling the inservice needs of present teachers.

References

Barron, D. (1987). Faculty and student perceptions of distance education using television. Journal of Education for Library and Information Science, 27(4): 262-263.

deBlas, D., Knox, J.E.G., McArthur, J.R., Wallace, M.S., & Dean, F.C. (1988) Two-way cable television: An instructional alternative for the future. Strategies and teaching techniques for honors and advanced placement (AP) foreign language instruction via two-way cable television. Rockville, MD: Montgomery County Public Schools, Department of Instructional Resources. (ERIC Document Reproduction Service No. ED 305 893).

Evans, J. (1988). Distance learning brings courses closer. School and College, 27(8), 16.

Hughes, A.L. (1988, April). The crisis of distance learning: A dangerous opportunity. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED 304 128).

Kitchen, K. (1988). Interactive television at community colleges in Minnesota. The

American Journal of Distance Education, 2(1): 73-76.

Kitchen, W. (1987, March). Education and telecommunications: Partners in progress Testimony to the Senate Committee on Labor and Human Services. (ERIC Document Reproduction Service No. ED 282 551).

McClelland, J. (1987). Use of two-way interactive television in education (project number eighteen). St. Paul: University of Minnesota, Department of Vocational and Technical Education (Eric Document Reproduction Service No. ED 288 503).

Mihalevich, J.R. (1990). Principal and teaching partner perceptions about clusters of aualitv instruction via satellite in Missouri public schools. Unpublished doctoral dissertation. University of Missouri-Columbia.

National Research Council. (1988). Understanding agriculture: New directions for educatio n. Washington, DC: National Academy Press.

Norenberg, C.D. & Lundblad, L. (1987). Distance delivery of vocational education technologies and planning matrixes. St. Paul, MN: Research and Development Center for Vocational Education.

Pullen, D.H. (1989). Adoption of two-way telecommunications bv schools in the Valley and Lakes Education District. Unpublished master's thesis. North Dakota State University, Fargo.

SPSS, Inc. (1988). SPSS-X user's guide (3rd ed.). Chicago, IL: Author.

u s West Communication (1988). Communications for today's learning institution. Author.

Whisler, J.S. (1988). Distance learning technologies: An aid to restructuring schools? Noteworthv, Aurora, CO: Mid-Continent Regional Education Laboratory, 28-42.