Journal of Agricultural Education
Volume 38, Number 1, pp. 54-60
DOI: 10.5032/jae.1997.01054

AGRICULTURAL EDUCATION AT A DISTANCE: ATTITUDES AND PERCEPTIONS OF SECONDARY TEACHERS

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Abstract

As the variety and sophistication of educational technologies continues to grow, the need to know more about the incentives and obstacles to technology adoption becomes more important. The purpose of this study was to investigate the usefulness of an interactive communications network (ICN) for agricultural education at the secondary level. The ICN is a state-wide two-way full-motion fiber optics telecommunications system that connects students and teachers who are separated by distance and allows them to share in real-time video, data, and voice instruction. The primary objectives of the study were to: (1) describe obstacles that may inhibit use of the ICN as perceived by secondary agriculture teachers; (2) describe secondary agriculture teachers' attitude toward using the ICN for delivering agricultural instruction; and (3) describe relationships between teachers' attitude, perceived obstacles, and selected variables. Results indicate that teachers were most concerned about obstacles related to scheduling problems and difficulties associated with managing laboratory and SAE experiences. Data related to teacher attitudes indicate that teachers were undecided about using the ICN to teach agriculture. Recommendations included the development of planned experiences with ICN technology, the development of demonstrations for using the system, andfollow-up research to assess changes in attitude over time.

The evolution of distance education in the United States can be traced to correspondence courses used by corporations, the military, and universities (Bruder, 1989; Moore & Thompson, 1990). Distance education has become more visible and popular in recent years as communications technologies have developed rapidly (Doerfert & Miller, 1995). Media advocates, predictably, tend to promote new educational technologies as an elixir for previous instructional media problems (Boone, Miller, & Brown, 1995). However, the new technologies would more appropriately be viewed as tools that make more and better educational opportunities available to students (Miller & Honeyman, 1993).

Many states have or are installing technologies which will enable all levels of education to participate in distance learning programs (Moore & Thompson, 1990; School Tech News, 1986). Will this technology be accepted by secondary educators in general and agricultural educators specifically?

Few secondary educators have been trained to use distance education technologies, and most published research has focused on postsecondary applications while ignoring the secondary level. Also, faculty have rarely been subjects of research related to distance education technologies (Dillon & Walsh, 1992).

Dillon et al. found that faculty resistance was often listed as the major barrier keeping distance education technologies from being implemented. Negative teacher attitudes, additional workloads, lack of funding, reduced student interaction, lack of time, and technical problems have all been identified as obstacles to the adoption of distance education technologies (Dillon & Walsh, 1992; Hansford & Baker, 1990; Jackson & Bowen, 1993; Jurasek, 1993; Swan & Brehrner, 1992). Additionally, fear of technology and fear of job loss have been listed as further barriers to the acceptance of distance education by teachers (Bruder, 1989; Koontz, 1989). Teacher experience

with technology appears to be key in overcoming such barriers, however. Several researchers (Dillon & Walsh, 1992; Jurasek, 1993; Koontz, 1989) have concluded that faculty with distance teaching experience generally have more positive attitudes toward technology mediated instruction.

The transfer of technology from researcher to end user is a complex process. Five distinct phases have been identified that take place in the adoption process. These phases are awareness, interest, evaluation, trial, and adoption (Lionberger & Gwin, 1982; Rollins, 1993). In addition to these phases, individual differences must also be taken into account. Rollins summed up this issue by stating that "the failure to recognize and address the psycho-social component of technology adoption as part of the educational process has served to illustrate that generating knowledge is not always synonymous with diffusing and adopting knowledge" (p. 254). As the variety and sophistication of educational technologies continues to advance, the need to know more about the incentives and obstacles to technology adoption becomes more important (Key, 1994).

Purpose and Objectives

The purpose of this descriptive study was to investigate the usefulness of an interactive communications network (ICN) for agricultural education at the secondary level. The ICN is a state-wide two-way full-motion fiber optics telecommunications system that connects students and teachers who are separated by distance and allows them to share in real-time video, data, and voice instruction.

The objectives of the study were as follows:

1. Describe selected demographic characteristics of secondary agriculture teachers who participated in the study.
2. Describe obstacles that may inhibit use of an interactive communications network as perceived by secondary agriculture teachers.
3. Describe secondary agriculture teachers' attitude toward using an interactive communications network for delivering agricultural instruction.
4. Describe relationships between teachers' attitude, perceived obstacles, and selected variables.

Procedures

The population for the study consisted of all secondary agricultural education teachers in Iowa (N=216). Based on Krejcie and Morgan's (1970) formula for a 5% margin of error, a random sample of 140 teachers was drawn.

The questionnaire utilized in the study consisted of 3 parts including the attitude toward the ICN scale, obstacles that may inhibit use of the ICN scale, and selected demographic questions. Content and face validity were established by a panel of experts in agricultural education.

Obstacles that may inhibit use of the ICN by secondary agriculture teachers were identified by interviewing persons responsible for administering different aspects of the ICN, agriculture teachers not included in the sample, and from an instrument used by Swan (1992) for a similar purpose in North Dakota. Response categories for the Likert-type scale ranged from insignificant (1) to significant (6). Readers are encouraged not to confuse the scale descriptors with tests of statistical significance. The descriptors simply represent how significant the respondents thought the obstacles were. The Cronbach's alpha reliability coefficient for the obstacles scale was .82.

Teachers' attitude toward the ICN was measured with a 28 item Likert-type scale, with five response categories ranging from strongly disagree (1) to strongly agree (5). The attitudinal instrument was tested for suitability and reliability with a group of 10 teachers not included in the sample. Cronbach's alpha was used to estimate the internal consistency of the instrument. The reliability coefficient was .93.

Data for the study were collected by mailed questionnaire. The questionnaire, along with a cover letter and a stamped return envelope, was sent to all secondary agriculture teachers included in the sample. After 10 days, a second mailing was sent to all nonrespondents. Ten days after the second mailing, a reminder letter was sent to all nonrespondents stressing the importance of their participation. Approximately 10 days following the third mailing, telephone calls were made to the nonrespondents. One hundred and two teachers completed and returned the questionnaire for a response rate of 73%. Nonresponse error was controlled by comparing early to late respondents (Miller & Smith, 1983). No significant differences were found between early and late respondents.

Analysis of Data

All data were analyzed with the SPSS/PC+ personal computer program. Appropriate statistics for description (frequencies, percents, means, standard deviations, pearson correlations, and point biserial correlations) were used. The alpha level was set a priori at .05, and Davis' (1971) descriptors were used to interpret all correlation coefficients.

Results

The agricultural educators who participated in the study ranged in age from 23 to 64 years. The mean age of respondents was 36.94 with a standard deviation of 9.50. In regard to gender, 90.2% (92) of the teachers were male.

Teachers were asked to report their highest level of education. Bachelors degrees were held by 71% (66) percent of the respondents, 26.9% (25) of the teachers held masters degrees, and 2.2% (2) held doctoral degrees. Teachers were also asked to indicate the number of years they had taught agricultural education, and whether on not they had tenure. Years of experience ranged from one to 35 with a mean of 12.44 and a standard deviation of 8.5 1. Approximately three-quarters (77) of the teachers had tenure.

The teachers were asked if their school was currently connected to the ICN. They were also asked if they had ever taught or taken a class via the ICN. At the time of the survey, 22.5% (22) of the schools represented by the agriculture teachers were connected to the ICN. None of the teachers had taught using this technology. Nine teachers (9.1%) indicated that they had taken at least one course via the ICN.

The teachers responded to sixteen statements representing obstacles which might inhibit their use of the ICN. A Likert-type scale with response categories ranging from insignificant (1) to significant (6) was used to assess the significance of each obstacle. The distribution of overall mean scores on the obstacles scale shows the collective significance of the obstacles. Table 1 shows that forty-eight percent (49) of the teachers provided an overall mean score in the range of 4.51 to 5.50 (moderately significant). Approximately 39% (38) of the teachers reported mean scores in the range of 3.5 l-4.50 (slightly significant). Means scores in the range of 1.51-3.50 (moderately or slightly insignificant) were reported by less than eight percent (8) of the teachers. The overall mean score for the 16 obstacles was 4.49 (slightly significant), with a standard deviation of .63.

Table 2 shows the percentage of teachers who selected slightly significant, moderately significant, or significant for each of the sixteen obstacles. School and class scheduling problems were

Table 1. Distribution of Overall Mean Scores for Obstacles that May Inhibit Use of an Interactive Communications Network by Agriculture Teachers

Mean	f	%	cum %
1.51-2.50	1	1.0	1.0
2.51-3.50	7	6.8	7.8
3.51-4.50	38	39.3	47.1
4.51-5.50	49	48.0	95.1
5.5 l-6.00	5	4.9	100.0
Total	102	100.0	100.0

Mean 4.49 Std. Dev. .63 Note:Based on Scale: 1 = insignificant; 2 = moderately insignificant; 3 = slightly insignificant; 4 = slightly significant; 5 = moderately significant; 6 = significant

considered most significant by the agricultural educators. Lack of local support staff, the inability to have lab sessions, and materials distribution were each considered slightly significant, moderately significant, or significant by 87.3% of the teachers. costs, training, and preparation time were considered slightly significant to significant obstacles by 80-85% of the agriculture teachers. Obstacles receiving the lowest frequencies in the slightly significant, moderately significant, or significant categories were lack of student interest and negative attitudes of teachers towards the ICN.

On a five-point Likert-type scale, teachers were asked to respond to 28 statements related to their attitude toward using the ICN to teach agriculture. The distribution of overall mean scores was reported to display the degree to which teachers were positive or negative toward teaching via the ICN. Table 3 shows that 62.7% (64) of the teachers provided a mean score in the range of 2.5 1 to 3.50 (undecided). An additional 32% (33) of the agriculture teachers provided a mean score in the range of 3.51-4.50 (agree). The remaining 4.9% (5) of the teachers provided mean scores between 1.5 1 and 2.50 (disagree). The overall mean score for the attitude scale was 3.26 (undecided) with a standard deviation of .47.

Table 2. Percentage of Teachers Who Selected Slightly Significant, Moderately Significant, or Significant for Each Obstacle.

Obstacle	%
1. Coordination of schedules between schools.	94.1
2. The ICN could create scheduling problems.	88.2
3. Laboratory sessions cannot be taught via the ICN.	87.3
4. Distributing materials between sites.	87.3
5. Lack of local support staff.	87.3
6. Supervised agricultural experiences cannot be managed via the ICN.	86.3
7. Costs associated with using the ICN.	85.3
8. Lack of training.	83.3
9. Preparation time needed by teachers.	82.4
10. Fear that the ICN would reduce the number of agriculture programs.	78.4
11. Agriculture teachers are to busy to teach via the ICN	77.5
12. Lack of incentives for teaching via the ICN.	77.5
13. Administrators do not understand teachers needs when teaching via the ICN.	77.5
14. Difficulty in establishing cooperative relationships among schools.	68.6
15. Negative attitude of teachers towards the ICN.	61.8
16. Lack of student interest.	58.8

Pearson correlations and point biserial correlations were used to describe relationships between obstacles that may inhibit the use of the ICN and selected variables (Table 4). The associations ranged in magnitude from negligible to moderate. Teachers who provided higher scores on the obstacles scale tended to have less positive

Table 3. Distribution of Overall Mean Scores for Agriculture Teachers' Attitude Toward Using an Interactive Communications Network to Teach Agriculture

Mean	f	%	cum %
1.5 l-2.50	5	4.9	4.9
2.51-3.50	64	62.7	67.6
3.51-4.50	33	32.4	100.0
Total	102	100.0	100.0

Mean 3.26 Std. Dev. .47 Note: Based on Scale: 1 = strongly disagree; 2= disagree; 3= undecided; 4= agree; 5=strongly agree

Table 4. Summary of Relationships Between Obstacles That May Inhibit Use of the ICN and Selected Variables

Variable	Association
Attitude toward ICN	-.36*
School connected to ICN	-.13
Years of teaching experience	-.08
Age	-.16

p =>.05

attitudes towards the ICN, were less likely to be located in a school connected to the ICN, and were younger. The association between years of teaching experience and perceived significance of the obstacles was negligible.

Table 5 shows the associations between attitude toward using the ICN for delivering agricultural instruction and selected variables. The associations ranged in magnitude from negligible to low. Female agriculture teachers tended to have more positive attitudes towards using the ICN to teach agriculture. The associations between years of teaching experience, connection to the ICN, and age were negligible.

Conclusions and/or Recommendations

Overall, the 16 obstacles to using the ICN in secondary agriculture programs were perceived to be slightly significant. Teachers were most concerned with scheduling problems, but were also concerned that laboratory sessions and supervised agricultural experience programs cannot be managed over the system. Additionally, the respondents were concerned with costs, lack of training, and incentives for using the system.

Table 5. Summary of Relationships Between Attitude Toward the ICN and Selected Variables

Variable	Association
School connected to ICN	.06
Years of teaching experience	-.07
Gender	.21*
Age	-01

*p = >.05

Perhaps scheduling, training, and incentives are less problematic than concerns related to S.A.E. and laboratory experiences. Can quality programs in agricultural education be delivered while sacrificing the application of learning provided through S.A.E. and laboratory experiences? Do agriculture teachers really have to sacrifice these components of an agriculture program? It is recommended that pilot or demonstration programs be developed that include laboratory and hands-on learning experiences within the interactive distance education delivery mechanism. The interactive and video components of distance education should be exploited to demonstrate viable alternatives to conventional methods of teaching agricultural education.

Data suggest that secondary agriculture teachers are undecided about using the ICN as a tool for teaching agriculture. If attitudes are a reflection of an individual's personal perspective and are strongly predictive of behavior (Na and Lee, 1993), what does this tell us about agriculture teachers willingness to use this educational technology? Perhaps Lionberger et al.'s (1982) adoption process theory, which includes awareness,

interest, evaluation, trial, and adoption could explain the indecisiveness of the teachers included in the study. Few teachers had taken or taught and course by ICN and only 25% of schools represented in the study were connected to the network. The ICN has received a lot of publicity in Iowa, and each county had at least one ICN site at the time of the study. Even so, teachers were most likely at the early stages of the adoption process. It is recommended that teacher educators provide secondary agriculture teachers with current information related to the ICN to increase awareness and stimulate interest. Also, secondary agricultural education teachers should be provided opportunities, both as a recipient and provider of distance education, to gain experience with the ICN technology. Studies in technology and distance education have shown that teacher attitudes become more positive as a result of experience with technology (Na & Lee, 1993; Rollins, 1993).

Teachers were more positive about the ICN technology when they perceived that the obstacles to its use were less significant. While a temporal ordering of these variables would be difficult to establish, it may be reasonable to suggest that administrators of the system be encouraged to eliminate or minimize the deleterious influence of the obstacles. A follow-up study should be conducted after a period of five years to identify innovations instituted to enhance the usefulness of the system. Further, shifts in teacher use and attitudes toward the ICN over time should be assessed.

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