

Educational Technology Tools used by Extension Professionals in the North Central Region

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Introduction

Technological advances in video, audio, and computer hardware/software have provided educators with many innovative and valuable teaching tools. Many of these tools are especially useful in reducing the barriers to improved communication in the classroom. Educational technology tools (ETt) are pieces of hardware equipment and related software that support educational program delivery and management. Examples range from the traditional overhead projector to emerging technologies such as the satellite uplink/downlink.

Agricultural education has two major components--formal classroom education and nonformal Extension education (Macias, 1990). Both are oriented toward problem solving and have defined learning objectives in a structural program (Blackburn, 1989). Also, both frequently use ETt as a delivery method.

Extension professionals have recognized the importance of utilizing a variety of teaching methods and instructional tools to carry out their programs (Creswell, 1990). ETt are now available for use in the Extension teaching-learning process and can provide learning experiences for achieving the educational goals of adults (Gerver, 1987).

Purpose and Objectives

The mission of the Cooperative Extension Service (CES) is to help people improve their lives through an educational process using scientific knowledge focused on issues and needs (Rasmussen, 1989). Extension professionals must be aware of their clients' needs, learning styles, the process of educational development, and the delivery systems to accomplish that mission.

The National Agricultural Research and Extension Users Advisory Board, in 1980, recommended that Extension personnel improve their teaching methods and technology transfer systems with a better use of the most current technology (cited in Creswell, 1990). Likewise, the Electronic Task Force, in May 1985, recommended that ". . . the CES must embrace the philosophy that the adoption of emerging electronic technology will enhance its program delivery capability . . ."

This article focuses on the use of educational technology tools (ETt) within the Extension Service and its professional staff including administrators, state and area specialists, and county-based staff in the 12- state North Central Region of the United States.

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The specific objectives of this study were: 1) to identify the current inventory of educational technology tools available to Extension personnel; 2) to identify and quantify barriers that may inhibit the greater use of ETt; 3) to assess the current and future use of educational materials and software related to educational technologies; 4) to measure the current use and anticipated use of ETt in the administration and planning, group instruction, and individualized instruction programming functions of the Extension Service; and 5) to determine the relationships between selected demographic variables and the current and future use of ETt.

Procedures

The descriptive survey method was used for this study, as defined by Mason and Bramble (1978). The population for this study consisted of all Cooperative Extension Service staff in the North Central Region which includes the following states: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. According to the 1991-92 Directory of County Agents, there were 4,870 Extension professionals and administrators (includes all county, area, state, and campus-based professional staff) in these states. The sample size was based upon research procedures described by Krejcie and Morgan and was drawn by taking every fifth name listed in the directory. Names were alphabetized by state. A total of 1,061 questionnaires were mailed.

The survey instrument consisted of six sections. Section 1 and 2 provided demographic data and inventory data on ETt available. Section 3 was designed to gather information on perceptions toward the use of ETt. Sections 4, 5, and 6 provided data on barriers and the current and future use of ETt. Content validity of the instrument was verified by a panel of experts and field testing of the questionnaire. The survey instrument was tested for reliability using Cronbach's coefficient alpha. The reliability score for the entire questionnaire was 0.9375.

Five hundred and thirty (530) responses were received within three weeks after the mailing for a return rate of 44.9 percent. No state constituted more than 12 percent of the total sample or questionnaires received. The number of respondents by state varied from 16 to 63. Follow-up questionnaires were mailed to 50 non-respondents and no significant differences were found between the respondents and non-respondents.

Findings and Discussion

Demographic and Inventory Information

Demographic data indicated that the average age of Extension personnel participating in the study was 44.8 years with 15.2 years of Extension work experience. For the respondents, 65 percent were male, 71 percent had a B.S. and/or M.S. degree, 51 percent had majored in social sciences for their last degree, nearly 40 percent had given fewer than 20 group presentations in the last year, and 36 percent had made more than 30 individualized contacts per week in the last year. Additionally, nearly one-third had attended more than two in-service training programs on ETt in the last two years and 26 percent had attended 6 or more in-service training sessions on ETt in the last three to five years.

Inventory data indicated that more than 90 percent of the staff had access to a carousel slide projector, an overhead projector, and a microcomputer. Seventy percent of the staff had access to a VCR player/recorder, an audio cassette player, microcomputer modem, and a movie projector. Less than 50 percent of the professionals had access to a satellite uplink/downlink, an overhead computer projector, or an interactive videodisc machine.

Barriers in the Use of ETt

Respondents were asked to rate eight barriers that may have inhibited their use of traditional, computer, video, and emerging technologies using a five-point Likert-type scale (1=not limiting; 5=completely blocks). The results are shown in Table 1.

The traditional tools included the overhead projector, carousel slide projector, movie projector, and audio cassette tape player. Computer technologies included microcomputers, minicomputers, computer modems, and computer overhead projection units. Video technologies included the VCR player, VCR camera, and the VCR recorder/player. Emerging technologies included such things as the satellite uplink/downlink, microwave communication tower systems, fiber-optics transmission system, and interactive videodisc/computer.

The results indicated that there is no single barrier limiting the use of traditional technologies. The "lack of time" was identified as the most limiting barrier for computer technologies. With respect to the video technologies, "lack of funds" and "lack of time" were the most limiting barriers. "Lack of funds", "lack of experience", and "lack of training" were identified as the most limiting barriers for the emerging technologies.

An analysis of variance was conducted to determine if there were significant differences in the barriers for the technologies when grouped by states. Table 2 shows the results. Significant differences were found among the states when the barriers and the satellite uplink/downlink technology were compared. This finding suggests that the barriers that impede the use of these technologies are not uniform among the states.

Current and Anticipated Use of ETt

Extension professionals rated their current use and anticipated use (within the next two years) of the various ETt using a five-point Likert-type scale. A paired t-test was performed to determine significant differences. Data from Table 3 showed that significant differences were found in all technologies except for the traditional technologies. The anticipated use of these technologies was significantly higher with computers and video technologies having the highest means for anticipated use, but the emerging technologies are expected to show the largest percentage of increase in use. This finding suggests that agents expect to use computers and video equipment more in the next two years; however, the largest percentage increase in usage will be emerging technologies.

Current and Expected Use of Educational Materials/Software

Extension professionals rated the current use and anticipated use of educational materials/software using a five-point Likert-type scale. Educational materials/software were classified by traditional (spreadsheets, word processing, data bases), teaching aids

Table 1. Means, standard deviations, and rank of barriers that have prevented use of ETI.

Barriers	Traditional			Computer			Video			Satellite Up/downlink		
	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank
Lack of time	1.56	.90	1	2.61	1.15	1	2.26	1.56	2	2.66	1.24	4
Lack of funds	1.39	.77	2	2.50	1.17	2	2.37	1.20	1	3.30	1.38	1
Conflict with job	1.36	.76	3	2.07	1.13	5	1.83	1.02	5	2.33	1.26	5
Lack of training	1.22	.58	4	2.32	1.12	4	2.02	1.05	4	2.88	1.32	3
Lack of experience	1.18	.50	5	2.42	1.10	3	2.06	1.07	3	3.02	1.29	2
No interest	1.18	.58	6	1.41	.85	8	1.40	.82	8	1.86	1.12	8
Lack of administrative support	1.14	.49	7	1.70	1.03	6	1.64	.93	6	2.11	1.27	7
Unaware of technology	1.11	.45	8	1.67	.94	7	1.45	.83	7	2.15	1.36	6
Microwave Transmission												
Barriers	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank
Lack of time	2.91	1.33	5	2.86	1.32	5	2.90	1.30	5	2.90	1.30	5
Lack of funds	3.99	1.11	1	4.02	1.18	1	4.07	1.03	1	4.07	1.03	1
Conflict with job	2.59	1.37	7	2.56	1.35	7	2.60	1.35	7	2.60	1.35	7
Lack of training	3.73	1.25	3	3.66	1.31	3	3.60	1.29	3	3.60	1.29	3
Lack of experience	3.83	1.16	2	3.72	1.22	2	3.66	1.17	2	3.66	1.17	2
No interest	2.31	1.41	8	2.18	1.37	8	2.20	1.37	8	2.20	1.37	8
Lack of administrative support	2.82	1.40	6	2.76	1.44	6	2.81	1.36	6	2.81	1.36	6
Unaware of technology	3.25	1.25	4	3.16	1.45	4	3.05	1.47	4	3.05	1.47	4
Fiber-Optics												
Barriers	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank	Mean ^a	SD	Rank
Lack of time	2.91	1.33	5	2.86	1.32	5	2.90	1.30	5	2.90	1.30	5
Lack of funds	3.99	1.11	1	4.02	1.18	1	4.07	1.03	1	4.07	1.03	1
Conflict with job	2.59	1.37	7	2.56	1.35	7	2.60	1.35	7	2.60	1.35	7
Lack of training	3.73	1.25	3	3.66	1.31	3	3.60	1.29	3	3.60	1.29	3
Lack of experience	3.83	1.16	2	3.72	1.22	2	3.66	1.17	2	3.66	1.17	2
No interest	2.31	1.41	8	2.18	1.37	8	2.20	1.37	8	2.20	1.37	8
Lack of administrative support	2.82	1.40	6	2.76	1.44	6	2.81	1.36	6	2.81	1.36	6
Unaware of technology	3.25	1.25	4	3.16	1.45	4	3.05	1.47	4	3.05	1.47	4

^aRated on a 5-point Likert scale with 1 as "This barrier is not limiting in the use of this technology" and 5 as "This barrier completely blocks the use of this technology."

Table 2. Analysis of variance of several barriers that may have inhibited the use of educational technologies among states

Source	DF	SS	MS	F-ratio	Prob.
Traditional					
Between groups	11	2.08	0.18	1.01	.428
Within groups	491	91.16	0.18		
Total	502	93.24			
Computer					
Between groups	11	9.65	0.87	1.78	.054
Within groups	493	242.60	0.49		
Total	504	252.25			
Video					
Between groups	11	4.24	0.38	0.72	.719
Within groups	488	261.32	0.53		
Total	499	265.56			
Satellite up/downlink					
Between groups	11	54.05	4.91	5.54	.001
Within groups	472	418.52	0.88		
Total	483	472.57			
Microwave transmission					
Between groups	11	19.59	1.78	1.96	.030
Within groups	405	367.82	0.90		
Total	416	387.42			
Fiber-optics					
Between groups	11	15.40	1.40	1.43	.154
Within groups	406	396.20	0.97		
Total	417	411.60			
Interactive videodisk					
Between groups	11	10.10	0.91	1.04	.402
Within groups	422	369.99	0.87		
Total	433	380.10			

Table 3. Paired t-test analysis of the current and anticipated use of educational technologies.

Technology	Current Use		Anticipated Use		t-value	t-prob.
	Mean ^a	SD	Mean ^a	SD		
Traditional	2.78	1.02	2.81	1.02	-1.29	.19
Computers	2.80	1.05	3.30	1.07	-16.57	.00
Video	2.37	0.97	2.84	1.09	-15.12	.00
Satellite up/downlink	1.53	0.67	2.18	0.99	-17.91	.00
Microwave transmission	1.56	0.85	1.16	0.50	11.11	.00
Fiber-optics	1.18	0.55	1.70	0.96	-12.91	.00
Interactive videodisk	1.12	0.38	1.68	0.89	-14.29	.00

^aRated on a 5-point Likert scale with 1 as "None (0 times/month)" and 5 as "Nearly always (>15 times/month)"

(presentation graphics, tutorial programs, drill/practice programs, simulation programs, etc.) and other programs (videotapes, CDs, etc.). Paired t-tests were used to test the differences, and significant differences were found. The results are shown in Table 4. The results suggest that Extension professionals expect to significantly increase their usage of all three types of software. The largest percentage increase is expected to be in the use of teaching aids. Grouping these same data by state indicated there were no significant differences among the states.

Table 4. Paired t-test analysis of educational materials and software

Type of use	Mean ^a	SD	t-value	t-prob.
Traditional programs				
Current use	2.89	1.01	-12.26	.000
Anticipated use	3.31	1.00		
Teaching aids				
Current use	1.65	0.68	-17.57	.000
Anticipated use	2.21	0.86		
Other forms				
Current use	2.40	1.02	-17.56	.000
Anticipated use	3.01	1.11		

^aRated on a 5-point Likert scale with 1 as "None (times/month)" and 5 as "Nearly always (>15 times/month)"

Pearson product moment correlations were used to test the relationship between the value Extension personnel placed on the current use and anticipated use of educational materials/software and selected demographic data. All the software, except for traditional software, were positively correlated with the number of group presentations per year or with the number of in-services attended in the last two to five years. This finding suggests that Extension staff use a variety of software as they increase the number of presentations per year and attend more in-service training.

Current and Expected Use of ETt in Extension Programming Delivery

Differences in the current and anticipated use of ETt in the major Extension programming delivery methods were tested by using a paired t-test. The three delivery modes were: administration and planning (administrative activities related to planning and implementation of programming), group instruction (meetings, conferences, short courses, etc.), and individualized instruction (office callers, telephone calls, site visits, counseling, etc.). Significant differences were found in the current and anticipated use except for the traditional tools.

The relationship between the current and future use of ETt in the Extension delivery mode and selected demographic variables was examined by using Pearson product moment correlation. For the current use of video and emerging technologies, positive correlations were found between the number of group presentations, the number of in-services attended in the last two years and the use of this technology in all three delivery modes. For the anticipated use of video and emerging technologies, the number of group presentations, and the number of in-service training sessions attended were positively correlated with the use of these technologies in all three delivery modes.

Conclusions and Recommendations

This study focused on the use of ETt within the Extension Service and its professional staff in the North Central Region. Based upon the data and findings, the conclusions and recommendations offered are:

More than two-thirds of the Extension professionals had attended an in-service on ETt during the last two years. Therefore, most Extension staff are aware of the potential use of ETt in Extension education.

"Lack of time" rather than "lack of training" or "lack of experience" was identified as the most limiting barrier in the use of computer technologies. This suggests that computer technology is rapidly becoming a traditional technology in Extension and that the Extension Service has done an adequate job in providing computer training to its staff. Extension administrators should review how these resources are being used and perhaps be re-allocated to other types of ETt.

Emerging technologies are not readily available to Extension personnel. Furthermore, "lack of experience" and "lack of training" were identified as the most limiting barriers. Having access to emerging technologies would provide Extension professionals with innovative equipment to expand their instructional efforts.

No significant differences were found among the states and the various types of educational materials/software to support ETt. Therefore, software applications and the training on software could be developed on a regional basis and shared among the states.

Extension staff anticipate using more emerging technologies in the future. Extension administrators should consider allocating more resources (hardware and software) and more training to these forms of ETt. Expanding the use of emerging ETt is one way of reaching an expanded number of Extension clientele with limited resources. Extension should continue to provide in-service training opportunities or ETt.

Programming delivery in Extension is a key factor in the success of Extension programs. This study suggests that Extension professionals are aware of and would use educational technology tools (ETt) but are in need of additional training, time, and experience.

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