ANALYZING THE BARRIERS AND BENEFITS TOWARD INSTRUCTIONAL TECHNOLOGY INFUSION IN NORTH CAROLINA AND VIRGINIA SECONDARY AGRICULTURAL EDUCATION CURRICULA

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Introduction/ Rationale

According to Reinventing Agricultural Education for the Year 2020 (a visioning and planning initiative of the National FFA Organization, 1999), the United States leading position in agriculture "lies in part because of its infrastructure for developing and delivery technology, including agricultural education programs in our public schools" (National FFA Organization, 1999). The National Research Council (1988), in the book Understanding Agriculture, emphasized that in order for agricultural education to remain viable, educators should emulate the best current programs while generating new ways to deliver agricultural education. "Rather than reacting to change as it comes "a passive approach" the agricultural education community must take a proactive stance and look ahead to develop a cohesive vision of its preferred future decade" (National FFA Organization, 1999). Educational delivery systems and current curriculum initiatives have not kept pace with the rate of technological change that the United States has experienced over the past decade (National FFA Organization, 1999).

Instructional technology infusion into the secondary level of public education has become a major focus of both the North Carolina Department of Public Instruction and the Virginia Department of Education. The Six-Year Educational Technology Plan for Virginia (1996-2000) emerged out of the awareness that technology is not simply equipment, but a systematic treatment of information and instructional content in a specialized way to achieve a specific purpose. "Teachers must be trained, support services must be provided, pilot studies must be initiated, equipment must be updated and maintained, guidelines must be developed, new technologies must be introduced, and an on-going program of evaluation must be established" (Virginia Department of Public Education: Division of Technology, 1996). North Carolina educators have also recognized the importance of instructional technology infusion in public schools. In 1995 educators in North Carolina, initiated a five-year plan, entitled the Long-Range Technology Plan, in order to address the need for instructional technology infusion in public education throughout the state (Milken Exchange, 1999). In the Long Range State Technology Plan (1999) it states that the classroom is the "focal point" for teaching and learning, therefore the standard for creating technology-supported schools should be centered on it. Two important factors will characterize a technology-supported classroom in North Carolina: 1. Equipped with diverse options for teaching and learning that only technology can offer or make possible. 2. Managed by a knowledgeable, skilled, and motivated teacher who is both comfortable and creative with technology (North Carolina Department of Public Instruction, 1999). In order to effectively implement any form of technology in the secondary agricultural education programs of North Carolina and Virginia, it is imperative to first gauge the perceptions of educators towards technology infusion.

Theoretical Framework

"With the increase in computer usage in agriculture education programs, it is important to identify what the agriculture instructors think about using the computer" (Nordheim & Connors, 1997, p. 320). Before implementing any form of instructional technology into secondary agricultural education, careful consideration should be given to the perceptions of the teachers who will utilize the technology. Nordheim and Connors (1997) investigated the perceptions of northwest agriculture teachers in relation to computers in the classroom. Over 85% of agriculture teachers surveyed felt they were competent in using computers, while 81% stated that computers made them more efficient instructors in the classroom. Sixty-nine percent of respondents indicated they were comfortable using computers in the classroom. Over 85% of agriculture teachers surveyed indicated computers made their students more efficient, while 82%percent of agriculture teachers agreed that computers are essential to their agricultural science class. Eighty-five percent of respondents agreed that students should learn to use the Internet; while 75% of teachers agreed that the Internet should be used in agriculture classes. Eighty percent of teachers stated that multimedia presentations spark students' interests, while 77% of respondents stated that multimedia presentations are an effective teaching method (Nordheim & Connors, 1997).

Murphy and Terry (1998) conducted a nationwide study using Delphi techniques to develop consensus and provide focus for future research concerning the adoption of electronic communication, information, and imaging technologies for instructional use in agricultural education settings. One of the major objectives of the study was to gauge agricultural educators opinions in relation to the positive effects they feel electronic technologies will have upon agricultural education instruction. Respondents suggested 21 ways technologies would improve instruction in agricultural education. Responses tended to gather around the following four areas: (1) an increase in the availability of educational opportunities, (2) improved informational resources for faculty and students, (3) more effective instructional materials, and (4) more convenient delivery methods for instructors (Murphy & Terry, 1998).

While instructional technology offers many great possibilities for the future of agricultural education, many obstacles could inhibit its implementation. Nordheim and Connors (1997) identified several barriers to using computers in secondary agricultural education. The majority of respondents indicated that computer hardware and software were too expensive for their agricultural education programs. Respondents also indicated that having little experience with using computers, as an instructional tool was a limiting factor. Murphy and Terry (1998) identified several obstacles to technology implementation in agricultural education. Lack of administrative support, lack of support services for equipment maintenance, resistance to change by educators, lack of a reward system for technology implementation, lack of preparation time, and lack of access to state-of-the-art equipment were identified as barriers to instructional technology implementation (Murphy & Terry, 1998).

Purposes and Objectives

The purpose of this research study was to identify the potential barriers and benefits toward instructional technology infusion in North Carolina and Virginia secondary agricultural education curricula:

1. To determine the future role that instructional technology will play in secondary agricultural education curricula.

2. To determine the potential barriers and benefits towards the implementation of instructional technology in secondary agricultural education curricula.

3. To determine the demographic and program variables of North Carolina and Virginia secondary agricultural education programs.

Methodology

An instrument was developed by the researcher based on the objectives of the study. Questions were adapted and modified from previous studies by Nordheim and Connors (1997), and Murphy and Terry (1998). Additional questions were added by the researcher to meet the research objectives. The completed instrument consisted of three sections, with section one consisting of two subsections. The sections were titled: Section I. (A) benefits of instructional technology, (B) obstacles to instructional technology, Section II; instructional technology's future role in agricultural education Section III; demographic and program variables. Sections one and two contained Likert-type items, while section three contained a mixture of open-ended questions and Likert-type items. The validity of the instrument was established by means of content and face validity. A panel of experts constituting the researchers graduate committee analyzed the instrument for content validity. Face validity was established during a pilot study consisting of 40 Iowa secondary agriculture teachers. On April 15, 1999 40 Iowa secondary agriculture teachers were mailed a preliminary survey and given two weeks to complete and return the survey. After two weeks sixteen surveys had been returned. After all pilot surveys had been collected; instrument reliability was determined by utilizing Chronbach's Coefficient Alpha. Chronbach's Coefficient Alpha for sections one and two was .89, and .84 respectively. After the reliability level was determined, a few questions were deleted and adjusted.

The population for this descriptive survey study consisted of secondary agriculture teachers in North Carolina and Virginia that were listed in the 1998-99 North Carolina Agricultural Education Directory (N = 370) and Virginia Vocational Agriculture Teacher's Association

Directory (N = 313). Based on Krejcie and Morgan's (1970) formula for a 5% margin of error, a random sample of 242 would be required for a population of this size. As is the nature of survey research a certain loss rate can be expected. In an attempt to achieve the target sample size of 242, the researcher investigated the return rate of similar studies in agricultural education in the area of instructional technology. Thompson and Connors (1998) obtained a 70% return rate and Nordheim and Connors (1997) received a 72% return rate. After a thorough analysis of these studies the researcher concluded that 65% could be expected to be returned. In order to account for the potential loss rate, 380 agricultural teachers were sampled. The sample size was calculated by taking the desired return rate of 65% and the target sample size of 242 into account. Two hundred forty-two comprises 65% of 380; by utilizing this logic the researcher was more confident in obtaining the target return of 242 agricultural education teachers across both states. The Statistical Package for the Social Sciences, Personal Computer Version 7.0, and Microsoft Excel were used to generate random numbers for the sample selection. The stratified random sample was drawn from the population of agricultural education teachers in North Carolina (N = 370) and Virginia (N = 313). After the random numbers were generated 210 agricultural education teachers from North Carolina and 170 from Virginia were selected for the study. Elements of Dillman's Total Design Method (1978) were utilized to achieve an optimal return rate. On May 21, 1999 380 surveys were mailed to randomly selected teachers across the states of North Carolina and Virginia. Along with the survey, and return stamped envelope, teachers received a cover letter from the researcher and researcher's major professor outlining the purpose of the research. In addition to these materials, teachers from North Carolina also received a letter from the North Carolina - State Agricultural Education Director, in support of this research. Teachers in Virginia received a similar letter from the chairperson of the agricultural education department at Virginia Polytechnic and State University. After two weeks 122 surveys had been received. A follow-up letter was mailed to non-respondents, after two more weeks, 43 more surveys had been received. On June 17, 1999, 225 surveys were mailed to all non-respondents along with another cover letter and a return stamped envelope. Non-respondents were given a deadline of July 31, 1999, to return the survey.

By July 1, 1999, 40 more surveys had been received for a final return rate of 53% (200 surveys). Readers should note that even though only 200 surveys were returned of the 380 mailed, 200 comprised 83 % of the target goal of 242. This was considered highly acceptable by the researcher. Of the 200 surveys that were returned, 195 were useable (NC = 85, VA = 110). Five surveys were lost due to frame error, and five surveys were returned unusable, mainly due to being incompletely filled out. Non-response error was handled by utilizing the "double-dip procedure" (Miller and Smith, 1983). Ten percent of the non-respondents were telephoned and asked selected questions from the survey. After this was accomplished, t-tests were conducted to compare the answers of respondents versus non-respondents. No statistically significant differences could be found between the two groups.

Findings

Respondents were asked their perceptions in relation to fifteen statements regarding the potential benefits instructional technology implementation could have for secondary agricultural education curricula. Table 1 shows the means, standard deviations, and rankings for the perceived benefits of instructional technology as they relate to secondary agricultural education curricula in North Carolina and Virginia. For purpose of data analysis readers should utilize the following specifications when interpreting the scale for Tables 1 and 2: 1 - 1.49 = Strongly Agree, 1.50 - 2.49 = Disagree, 2.50 - 3.49 = Undecided/Neutral, 3.50 - 4.49 = Agree, 4.50 - 5.00 = Strongly Agree. Agricultural educators in North Carolina and Virginia were in agreement on the following six statements related to the potential benefits of instructional technology: "Teachers will have greater availability to information resources", "Student's access to instruction will be greatly enhanced", "Feedback to students will be quicker and more comprehensive", "The availability of up-to-date information will greatly increase student learning", "Agricultural businesses and other specialist will be made more available to students.", and "A greater array of visual instructional materials will be utilized." North Carolina agricultural education teachers reached agreement on the following eight statements regarding the potential benefits of instructional technology, while Virginia agriculture teachers took a neutral stance in relation to the eight statements: "Textbooks will be available on CD-ROM.", "Virtual reality and other simulations will increase student comprehension." Overall when comparing the total means for North Carolina and Virginia secondary agricultural education teachers in relation to the perceived benefits of instructional technology implementation, with the research literature, many similarities exist. Respondents were in agreement on thirteen of the fifteen statements regarding instructional technology benefits as they relate to secondary agricultural education curricula. Respondents were undecided on two of the fifteen statements regarding the benefits of instructional technology in secondary agricultural education curricula. Ten of the thirteen statements agriculture teachers agreed upon in relation to the benefits of instructional technology in secondary agricultural education curricula were adapted from the Delphi study conducted by Murphy and Terry (1998). As was the case in this study, the following ten statements reached a high level of agreement in Murphy and Terry's (1998) study, and provide support for this research: "Teachers will have greater access to information resources," "Textbooks will be available on CD ROM," "Teachers will have greater availability to information resources," "Student's access to instruction will be greatly enhanced," "Feedback to students will be quicker and more comprehensive," "Virtual reality and other simulations will increase student comprehension," "Instruction will become more individualized," "The interest of students will be increased," "Agricultural businesses and other specialist will be made more available to students," and "A greater array of visual instructional materials will be utilized." "Instruction will become more individualized," "The interest of students will be increased," "Videoconferencing with other students at other secondary schools will aide the learning process," "Videoconferencing with agricultural businesses will increase the level of instruction," "Videoconferencing will increase student comprehension," and "Videoconferencing will increase student comprehension." Lastly one statement reached a level of agreement by Virginia secondary agricultural education teachers, in contrast to North Carolina teachers who took a neutral stance on the statement: "Teachers will have greater availability to information resources."

The following three statements were developed by the researcher and achieved a level of agreement in this study: "The availability of up-to-date information will greatly increase student learning," "Videoconferencing with other students at other secondary schools will the level of instruction," and "Videoconferencing with agricultural businesses will increase the level of instruction." The following two statements developed by the researcher were ranked as "undecided" by agriculture teachers in this sample: "Videoconferencing will increase student comprehension," and " Videoconferencing will increase student comprehension." As was the case in Murphy and Terry's (1998) study, responses tended to gather around the following four areas: (1) an increase in the availability of educational opportunities, (2) improved informational resources for faculty and students, (3) more effective instructional materials, and (4) more convenient delivery methods for instructors.

Respondents were asked their perceptions in relation to fourteen statements regarding the potential barriers to instructional technology implementation in secondary agricultural education curricula. Table 2 shows the means, standard deviations, and rankings for the perceived barriers of instructional technology as they relate to secondary agricultural education curricula in North Carolina and Virginia. Statements for this section of the survey were adapted from studies conducted by Murphy and Terry (1998) and Nordheim and Connors (1997). North Carolina and

Table 1.
North Carolina and Virginia Secondary Agricultural Education Teachers' Perceptions of Instructional Technology's Benefits (n = 195)

	North Carolina			Virginia			Total	
Benefits	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**	**Mean**	**SD**
Teachers will have greater access to Information resources.	3.41	1.55	13	3.85	1.22	2	3.66	1.39
Textbooks will be available on CD ROM.	3.67	1.07	9	3.48	1.10	9	3.56	1.09
Teachers will have greater availability to information resources.	4.42	.66	1	4.01	1.01	1	4.19	.90
Student's access to instruction will be greatly enhanced.	4.01	.97	3	3.67	1.08	4	3.82	1.05
Feedback to students will be quicker and more comprehensive.	3.74	1.00	7	3.52	1.08	7	3.62	1.05
Virtual reality and other simulations will Increase student comprehension.	3.71	.97	8	3.45	1.11	11	3.56	1.06
Instruction will become more individualized.	3.60	1.05	11	3.46	1.11	10	3.52	1.09
The interest of students will be increased.	3.88	.97	6	3.45	1.09	11	3.64	1.06
The availability of up-to-date information will Greatly increase student learning.	3.93	1.01	5	3.64	1.11	6	3.76	1.08
Videoconferencing with other students at other Secondary schools will aide the learning process.	3.67	1.03	9	3.44	1.19	12	3.54	1.13
Videoconferencing with ag-businesses will Increase the level of instruction.	3.54	.98	12	3.49	1.03	8	3.51	1.01
Videoconferencing will increase Student comprehension.	3.54	.99	12	3.34	1.10	13	3.43	1.06
Videoconferencing will increase student interest.	3.64	1.06	10	3.25	1.07	14	3.42	1.08
Agricultural businesses and other specialist will be made more available to students.	3.94	.84	4	3.65	1.06	5	3.77	.98

A greater array of visual instructional Materials will be utilized.	4.04	.81	2	3.71	.97	3	3.85	.92

Note: Based on scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided/ Neutral, 4 = Agree, 5 = Strongly Agree

Virginia secondary agricultural education teachers were neutral on the following seven statements regarding the perceived barriers to instructional technology implementation in secondary agricultural education curricula: "The cost of the various forms of instructional technology outweigh the benefits," "The lack of administrative support for instructional technology acquisition is a limiting factor," "Resistance to change by educators," "The lack of support from peers in securing such technologies," "Lack of awareness by administrators and legislators," "Lack of student knowledge to utilize technology," and "Lack of student interest." North Carolina and Virginia secondary agricultural education teachers were in agreement on the following four statements related to the perceived barriers to instructional technology implementation: "The lack of time by educators to master the immerging technologies for the classroom," "The lack of facilities designed to take advantage of new technologies," "Money for equipment," and "Money for software." The following statement reached agreement by North Carolina agriculture teachers in contrast to Virginia agriculture teachers who were neutral on the statement: "The lack of technical support to maintain equipment." The following two statements reached a level of agreement among Virginia agricultural education teachers, in contrast to North Carolina agriculture teachers who took a neutral stance on the statements: "Lack of telephone or data connection in classroom" and "Lack of teacher training in instructional technology." When comparing the total means for the perceived barriers of instructional technology implementation as they relate to secondary agricultural education curricula, with the research literature, many similarities and differences exist. In contrast to the aforementioned studies in which the statements were adapted, respondents ranked the majority of statements in this study as "undecided/neutral." The following statements were ranked as "undecided" by respondents in this study: "The cost of the various forms of instructional technology outweigh the benefits," "The lack of administrative support for instructional technology acquisition is a limiting factor," "Resistance to change by educators," "A lack of support from peers in securing such technologies," "Lack of awareness by administrators and legislators," "Lack of student knowledge to utilize technology," "Lack of student interest," and "Lack of telephone or data connection in classroom."

The following statements reached a level of agreement by agriculture education teachers in this sample and are consistent with Murphy and Terry (1998) and Nordheim and Connors's (1997) studies: "The lack of technical support to maintain equipment," "The lack of time by educators to master the immerging technologies for the classroom," The lack of facilities designed to take advantage of new technologies," "Money for equipment," "Money for software," and "Lack of teacher training in instructional technology." In relation to the final analysis, respondents overall ranked eight statements as "undecided/neutral" and six statements achieved a level of agreement.

Table 2.
North Carolina and Virginia Secondary Agricultural Education Teachers' Perceptions of Instructional Technology's Barriers (n = 195)

	North Carolina			Virginia			Total		
Barriers	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**
The cost of the various forms of instructional Technology outweigh the benefits.	2.98	1.21	11	3.19	1.22	9	3.10	1.22	10
The lack of administrative support for Instructional technology acquisition is a limiting factor.	3.32	1.80	8	3.11	1.36	10	3.20	1.57	9
Resistance to change by educators.	3.35	1.12	7	3.43	1.15	7	3.33	1.13	8
A lack of support from peers in securing Such technologies.	3.01	1.11	10	3.04	1.18	11	3.03	1.15	11
A lack of technical support to maintain equipment.	3.74	1.06	3	3.43	1.27	7	3.56	1.19	5
The lack of time by educators to master the Immerging technologies for the classroom.	3.71	1.14	4	3.63	1.14	4	3.66	1.14	4
Lack of awareness by administrators and legislators.	3.32	1.16	8	3.23	1.21	8	3.27	1.18	9
The lack of facilities designed to take Advantage of new technologies.	3.68	1.13	5	3.69	1.14	3	3.69	1.13	3
Lack of student knowledge to utilize technology.	2.78	1.16	12	2.99	1.16	12	2.90	1.16	12
Lack of student interest.	2.71	1.16	13	2.92	1.19	13	2.83	1.18	13
Cost of instructional technology:									
Money for equipment	3.98	1.00	2	3.88	1.08	2	3.92	1.04	2
Money for software	4.06	.98	1	4.00	.94	1	4.03	.95	1
Lack of telephone or data connection in classroom.	3.28	1.31	9	3.59	1.23	6	3.46	1.27	7
Lack of teacher training in instructional technology.	3.45	1.23	6	3.60	1.02	5	3.53	1.11	6

Note: Based on scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided/ Neutral, 4 = Agree, 5 = Strongly Agree

Respondents were asked their perceptions on ten statements in relation to the role they see instructional technology playing in secondary agricultural education curricula over the next five years. Table 3 shows the means, standard deviations, and rankings for the ten statements. For purpose of data analysis readers should utilize the following specifications when interpreting the scale for table 8: 1 - 1.49 = Strongly Agree, 1.50 - 2.49 = Disagree, 2.50 - 3.49 = Undecided/Neutral, 3.50 - 4.49 = Agree, 4.50 - 5.00 = Strongly Agree. North Carolina and Virginia agriculture teachers reached agreement on one of the ten statements related to the future of instructional technology in secondary agricultural education curricula: "Agriculture teachers will have access to lesson plans via the Internet." Agriculture teachers were generally undecided on nine of the ten statements in relation to the future of instructional technology in secondary agricultural education curricula: "Videoconferencing will be used to integrate resource persons into the classroom," " CD-ROM will take the place of many textbooks in teaching the agricultural sciences," "Virtual simulations will reduce the need for live instructional experiences," "The internet will take the place of school libraries in conducting research for class assignments," "Agriculture teachers will teach classes at a distance via videoconferencing," "FFA career development activities will be conducted via videoconferencing," "Videoconferencing will reduce the number of instructional field trips taken to agricultural related sites," "The majority of student assignments and presentations will be conducted through multimedia," and "The majority of instructor presentations will be conducted through multimedia." Overall, these findings are dissimilar to Murphy and Terry's (1998) nationwide Delphi study in which they found agriculture teachers reaching a level of agreement in relation to similar statements in the area of instructional technology. In general agriculture teachers in North Carolina and Virginia in relation to this study were undecided as to the future of instructional technology in secondary agricultural education curricula, unlike the results of Murphy and Terry (1998).

Demographic and program data was collected with section three of the survey. The majority of respondents in this study were male. The average age of North Carolina and Virginia agricultural teachers was forty. The majority of teachers in this study held a master's degree. Teachers in both states respectively had taught secondary agriculture for fourteen years. Teachers in North Carolina and Virginia on average had taken 25 hours of instructional technology training. A great proportion of North Carolina and Virginia agricultural teachers had home computers and Internet access. The majority of home computers were PC (IBM compatible) computers. Regarding program variables the average program in North Carolina and Virginia had an enrollment of 101 and 97 respectively. The average FFA membership for North Carolina and Virginia agricultural programs was 77 and 71 respectively. The majority of agricultural teachers taught subjects such as horticulture, agricultural mechanics, agricultural science, and animal science. In relation to program variables the bulk of computers in North Carolina and Virginia secondary agricultural programs were PC (IBM compatible).

Table 3.
Instructional Technology's Future Role In Agricultural Education (n = 195)

	North Carolina			Virginia			Total		
Future Roles	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**	**Mean**	**SD**	**Rank**
Videoconferencing will be used to integrate resource Persons into the classroom.	3.35	.97	2	3.51	1.03	2	3.44	1.01	2
CD-ROM will take the place of many textbooks in teaching the agricultural sciences.	3.15	1.14	3	3.23	1.19	5	3.19	1.16	5
Virtual simulations will reduce the need for live instructional experiences.	2.45	1.26	8	2.74	1.28	10	2.61	1.28	10
The internet will take the place of school libraries in conducting research for class assignments.	2.84	1.21	7	3.02	1.12	7	2.94	1.16	9
Agriculture teachers will have access to Lesson plans via the internet.	3.80	.91	1	3.75	.88	1	3.77	.89	1
Agriculture teachers will teach classes at a distance via videoconferencing.	3.15	1.02	3	3.20	1.07	6	3.18	1.05	6
FFA career development activities will be Conducted via videoconferencing.	2.75	1.11	6	2.94	1.10	8	2.86	1.11	8
Videoconferencing will reduce the number of instructional field trips taken to agricultural related sites.	2.85	1.14	5	2.89	1.20	9	2.87	1.17	7
The majority of student assignments and Presentations will be conducted through multimedia.	3.08	1.07	4	3.30	1.08	4	3.21	1.08	4
The majority of instructor presentations Will be conducted through multimedia.	3.15	1.11	3	3.35	1.14	3	3.27	1.13	3

Note: Based on scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided/ Neutral, 4 = Agree, 5 = Strongly Agree

Conclusions

The focus of objective one was to determine the future role that instructional technology will play in secondary agricultural education curricula. Agricultural teachers were relatively neutral on the majority of statements regarding the future role that instructional technology will play in secondary agricultural education curricula. North Carolina and Virginia secondary agriculture teachers reached agreement on one statement regarding the future role of instructional technology: "Agriculture teachers will have access to lesson plans via the Internet." Overall secondary agriculture teachers in North Carolina and Virginia took a neutral stance in relation to their perceptions towards the future of instructional technology in their respective programs. This was in direct contrast to the whole premise behind the North Carolina and Virginia technology plans, in which instructional technology was considered to be an essential component of the educational futures of both states.

The focus of objective two was to determine the potential barriers and benefits towards the implementation of instructional technology in secondary agricultural education curricula. Respondents tended to believe that there were many benefits to implementing instructional technology in secondary agricultural education curricula. As was the case in Murphy and Terry's (1998) study responses tended to be related to the following four areas: (1) an increase in the availability of educational opportunities, (2) improved informational resources for faculty and students, (3) more effective instructional materials, and (4) more convenient delivery methods for instructors. The aforementioned findings directly relate to the whole premise behind North Carolina and Virginia's technology plans.

Recommendations

1. School administrators should ensure that adequate technical support is provided for secondary agricultural education teachers in North Carolina and Virginia. This technical support may be provided through actual on-site visits, telephone, email, or through the Internet. Additionally, one teacher could be designated and trained as the school's technology specialist, which could provide teachers with onsite technology help.

2. In-service workshops should be provided to secondary agricultural education teachers in North Carolina and Virginia in an attempt to increase their skills in the area of instructional technology. By conducting in-service workshops perhaps secondary agricultural education teachers in Virginia who were undecided on the future of instructional technology in secondary agricultural education, may begin to see its instructional benefits.

3. North Carolina and Virginia secondary agricultural education teachers should inform school administrators, legislators, and local agricultural businesses about the need for funding to equip their agriculture programs with the latest in instructional technology equipment.

4. Pre-service agricultural education in North Carolina and Virginia should have a strong emphasis in the area of instructional technology. By implementing instructional technology into pre-service training new agricultural education teachers will be competent and have the skills needed to prepare students for the highly technological world of work.

References

Dillman, D.A. (1978). Mail and telephone surveys: The total design method. New York: John Wiley & Sons.

Krejcie, R.V. & Morgan, D.W. (1970) Determining sample size for research activities. Educational Psychological Measurement, 30. 607-610.

Miller, Larry E. & Smith, Keith (1983). Handling non-response issues. Journal of Extension. September/October Edition.

Milken. Exchange On Education Technology. The State of the States: North Carolina. *Education Week on the Web* [WWW document] URL http://www.edweek.org/sreports/tc98/states/nc.htm (visited 1999, May 7).

Murphy, H. & Terry Jr., H. Robert. (1998). Opportunities and obstacles for distance education in agricultural education. Journal of Agricultural Education. 39 (1), 28-36.

National FFA Organization. Reinventing agricultural education for the year 2020. [WWW document] URL http://www.teamaged.org/2020/exec_summ/page2.html (Visited 1999b, September 29).

National Research Council. (1998). Understanding agriculture: New directions for education. Washington D.C.: National Academy Press.

Nordheim, Gregory J. & Connors, James J. (1997). The perceptions and attitudes of northwest agriculture instructors towards the use of computers in agricultural education programs. Proceedings of the 24th Annual National Agricultural Education Research Meeting. Las Vegas, NV.

North Carolina Agricultural Education Directory. (1998). Raleigh: North Carolina State University Department of Agricultural and Extension Education.

Thompson, Joseph C. & Connors, James J. (1998). Internet use by vocational education teachers in Idaho. Proceedings of the 25th Annual National Agricultural Education Research Meeting, New Orleans, LA.

Virginia Department of Education: Division of Technology (1996, May). *Six-Year Educational Technology Plan for Virginia: Goals, Recommendations and Strategies* [WWW document] URL http://www.pen.k12.va.us:80/VDOE/Technology/6yrteach.html.

Virginia Vocational Agriculture Teacher's Association (1998). Richmond, VA: Virginia Department Of Education.