The Adoption and Perceived Effectiveness of Innovative Educational Technologies

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Introduction

Technology use in the field of agriculture often brings to mind images of precision farming, genetically modified crops and cloning livestock. Farmers and producers in the United States are on the cutting edge of adopting and implementing new technological practices but the field of agricultural education may not have been as quick to realize the advantages that technology has to offer. The paraphernalia used only a decade ago in agricultural education programs is nearly obsolete now in light of the advancements that have been made in communication technologies and presentation programs. Education technology is a field of swift change and new developments have revolutionized the way that information can be transmitted from educators to learners. Successful technology integration in a classroom requires will, skill, and access to technological tools on the part of the teacher. (Knezek *et al*., 2000) A variety of innovative tools that could be used by agricultural educators in their programs have been developed but it is not currently known how prevalent the use of technology is in Illinois agricultural education, what types of technology Illinois educators would like to be using or what barriers they encounter when adopting new technologies.

It is essential that basic technology tools be available to agricultural educators. Agriscience teachers in Louisiana strongly agreed that both teachers and students should have access to computers and the Internet. (Kotrlik, et al 2000) The same study also noted, however, that only half had computers at home and less than a third had a computer lab available in their department. These same educators indicated they both needed and valued technology skills although there were an inadequate number of in-services provided that would help them acquire those skills. (Kotrlik, et al 2000)

The use of computers and other innovative technologies has a number of advantages. Blom and Smolenaars (1994) found in their study that "computers may accelerate other educational innovations like a reduced emphasis in teaching and learning on memorizing facts in favor of emphasis on information handling and problem solving." Computers and other technological devices could conceivably increase the quality of teaching materials in addition to allowing teachers to focus more on higher rather than lower order thinking skills. Blom and Smolenaars (1994) found that computer applications were highly useful as an educational tool and as an exploratory environment.

Today's learners are more computer and technology savvy than ever before and the needs of the learners are changing as the society that they live in becomes more dependent on technology. Methods and materials that may have been useful in providing instruction in the past are quickly becoming outdated. "The development of instructional materials to meet the changing needs of students and society is a continuing process." (Kahler, 1993) Dooley and Murphy (2001) found that college agricultural educators at a land grant university believed that "Students today prefer a more visual learning experience" and they strongly agreed with the statement "Electronic communications and information will drastically alter how we teach in the next five years." Using technological devices that incorporate visual aspects into learning material may cause learner interest and retention to increase.

There are a variety of possible reasons why educators have not adopted the innovative technologies that are available for use. Over half of the faculty in Dooley's and Murphy's (2001) study indicated that they believed that the time they spent developing course materials for use in the department was not highly valued. The time it takes to learn the new technology and computer skills needed to use new equipment and methods is a one of the significant barriers to adopting new technologies. (Butler and Sellbom, 2002) Dooley and Murphy's study also indicated that one of the main obstacles that agricultural educators faced when attempting to incorporate new technologies in their program was access to the technological equipment. Studies completed by Dupin-Bryant (2002) listed a low familiarity with computers and an insufficient amount of adult training with computers as obstacles in technology adoption. Fletcher and Deeds (1994) also indicated that technology anxiety and a lack of training and support were causes for educators to refrain from attempting to use new technologies.

In a study conducted by Newman and Johnson (1994) it was found that high school Agriscience teachers ranked computers as one of the top three topics that they wanted to be covered via in-service workshops. Teachers thought that there was a vacancy in the area of computer and technology information and how to incorporate technologies into their classrooms. Not understanding how technology can be applied in the classroom environment or not having knowledge on how to incorporate innovative technologies into lesson plans are additional reasons why agricultural education teachers may not use innovative technologies in their classroom. Newman and Johnson (1994) additionally found that teachers thought that more instructional materials needed to be developed and distributed concerning the use of computers in their classrooms. Agricultural educators may face these same barriers when they endeavor to use new technologies in order to reach learners more effectively.

Objectives

The overall objective of this research project will be to provide information regarding the perceptions of Illinois agricultural instructors concerning effectiveness of educational technologies. Information concerning the current levels and planned future levels of technology applications and use in the classroom will also be provided. The specific objectives are:

1. To determine the nature and scope of the innovative instructional technologies being utilized in agricultural education programs in Illinois
2. To investigate the perceptions and attitudes of Illinois agriculture teachers concerning the effectiveness and adoption of innovative educational technologies.
3. To determine the perceived barriers and limitations for the adoption of instructional technologies
4. To determine the extent that teachers believe instructional technologies relate to student achievement and teacher effectiveness.
5. To provide suggestions for improving the instructional technologies of agriculture education programs in Illinois.
6. To explore future issues in instructional technology for agricultural education programs in Illinois.

Methods and Procedures

A survey instrument was developed that consisted of twenty-six different questions. Respondents were asked to list their name and e-mail address before they began the survey. The first eight questions were multiple choice and asked the participants to indicate what their job position was, how many years they had been involved in agricultural education, their educational degree, the size of the community they lived in, how the technology applications in their program were funded and how they accessed computers and the internet. The next two questions asked the respondents to indicate which of the technological devices listed in a table they currently used in their program or were planning to use. Questions eleven and twelve asked the agricultural educators to rate how useful the hardware and software technological items from the earlier question were in an agricultural education program. Questions thirteen through twenty-four asked the participants to strongly agree, agree, disagree, or strongly disagree with statements regarding the effectiveness and value of technology in agricultural education programs and the amount of support they received in using technology in their programs. The last two questions were open-ended and the respondents were invited to write in any additional information that pertained to the following two questions:

1. What are some of the barriers that prevent you from adopting and using new technologies in your program?
2. What types of support would you like to be made available that would enhance the level of technology you use in your program?

The survey was web-based and took the respondents an average of ten minutes to complete. E-mail was sent out on March 12th 2003 to agricultural educators in the state of Illinois, including high school teachers, extension unit educators and other professional agricultural education personnel, asking them to participate in the survey. The e-mail included the web link where the survey could be accessed and the password which was needed in order to be admitted to the survey web page. A password protected web page was used so that no unauthorized web users could submit a survey.

After a two-week time period, a reminder e-mail was sent out to the targeted Illinois agricultural educators who had not submitted a survey yet. This e-mail asked that they complete the survey within the next two weeks. Two weeks after the second e-mail was sent out the results of the survey were compiled and analyzed. There were a total of ninety-six respondents to the study, all of which were useable surveys.

Findings

Demographic data of the participants

The demographic data of those who chose to participate in the technology survey was varied. There was no one group that was represented in dominant numbers. Half of the respondents to the agricultural technology survey had earned their masters degree, while just less than half had a bachelor degree and the remaining participants had a doctorate degree. The majority of the respondents worked in either rural areas or small towns. Only a little more than ten percent of the people worked in cities and the remainder had their place of work located in suburban areas.

Secondary educator's composed the greater part of the respondents. Less then twenty percent were employed as college professors and a smaller number chose "other" as their job occupation description. The survey respondents came from a variety of different experience levels in agricultural education. Nearly forty percent had been teaching for five years or less and another fifteen percent had been teaching for a time period between six and ten years. Another quarter of the population had been involved in this field between eleven and twenty years. The remaining percentage of the respondents had been involved in formal agricultural education for at least twenty-one years.

Internet Access

Access to the Internet is important in order to obtain information, learn about current news and ideas and to find a variety of educational resource links. The Internet is also an invaluable communication resource. The majority of those who responded to the survey had access to the Internet both at home and at work. Less then thirty percent of the respondents had access to the Internet only at work. Accessing the Internet via a modem was by far the most popular method. Nearly three-quarters of the respondents had access through a modem with access through a broadband was the next most popular method. Very few people (less than five percent each) used satellite or microwave in order to link their computers to the Internet at home.

Funding

One of the barriers to adopting innovative technologies in agricultural education is funding. There is often a shortage of money that could be allocated to the development and purchase of new technologies. Educators rely on a variety of sources in order to obtain funds that they allot to obtaining and using new technologies in their programs. Over eighty-percent of the survey respondents were provided with funding from the schools in order to support technology. The Illinois State Board of Education was also a significant source of income. Over fifty percent of the programs reported that they receive funds from the ISBE for their agricultural education programs. Grants were counted as a source for half of the respondents while local sources, alumni, and miscellaneous sources accounted for additional avenues of funds attainment.

Hardware and Software Inventory

	Yes	No	Later
Digital Camera	86%	4%	10%
Computer	100%	0%	0%
Color Printer	90%	3%	8%
Scanner	84%	10%	6%
TV	97%	3%	0%
VCR	98%	1%	1%
DVD Player	42%	31%	27%
GPS	56%	33%	11%
CD-ROM	99%	1%	0%
Zip Disk	73%	20%	7%
Video Conferencing	28%	63%	8%
Camcorder	33%	47%	19%
Overhead Projector	90%	10%	0%
Laptop	81%	10%	9%
LCD	68%	16%	16%
PDA	30%	49%	22%
E-Mail	100%	0%	0%
Spreadsheet	96%	4%	0%
Web Browser	100%	0%	0%
Calendar	80%	15%	5%
Grade Tabulation Program	63%	29%	8%
Course Management (WebCT)	24%	63%	13%
Presentation (PowerPoint)	95%	0%	5%
Web Page Development	56%	30%	14%
Media (RealPlayer)	88%	8%	4%
Media Development	18%	67%	15%
Word Processor	100%	0%	0%

Conclusions and Recommendations

The findings of this study seem to indicate that the use of various technologies in agricultural education has increased and needs to continue to increase. The barriers to technological growth and enhancement appear to similar to those found in other studies and programs. While is may not be clear where the future of innovative technologies will lead to in agricultural education, it does appear as though the use of innovative technologies will continue to grow and be a viable aspect of future educational programs and instructional activities.

Further investigations need to be completed to determine not only the most effective uses of technologies for agricultural education, but also the impacts that technologies have upon various aspects of education programs. The future appears to be dependent upon using innovative technologies effectively in a timely and appropriate manner. It is that we risk losing educational programs because of the adoption of innovative technologies as it is apparent that we will risk greater losses if we do not.

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