Computer Literacy, Access, and Use of Technology in the Family and Consumer Sciences Classroom

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The purpose of this study was to determine if a relationship exists between computer literacy and use of technology as well as if a relationship exists between teachers' access to technology and their use of technology in Family and Consumer Sciences Education classrooms in the state of Kentucky. Teachers were presented with statements regarding computer literacy, access to technology, and use of technology. It was concluded that, when compared to Davis's (1971) Conventions for Correlation Coefficient, computer literacy and use of technology had a substantial relationship while access to technology and use of technology had a moderate relationship.

For years, schools across the nation have joined the technology revolution. By 2000, students had at least some form of technology available to them in school (Croxall & Cummings, 2000, Roblyer, Castine, & King, 1993). This trend is not likely to change. There is an increasing need for teachers who are literate in the use of various types of technology. In contemporary classrooms, teachers and students have access to a wide variety of technology. Various types of technology, including computers, projectors, hand-held devices, televisions, and digital cameras, are more accessible now than ever before. This type of technology, also called instructional technology, has helped move the classroom from a teacher-centered environment to a more student-centered one (Trotter, 1998). Additionally, Lu and Miller (2002) stated that instructional technology encompasses a wide variety of technologies as well as systems used to deliver information. Many Family and Consumer Sciences (FCS) classrooms are integrating technology to help students better understand the concepts that are being taught (Croxall & Cummings, 2000).

While teachers are trying to implement new types of instructional technology into their classrooms, many of them face barriers that hinder their attempts to advance. Beyond mere awareness and competence; anxieties, lack of training, and outdated equipment are barriers that teachers face on a daily basis (Budin, 1999; Croxall & Cummings, 2000; Keane, 2002; McFadden, Croxall, & Wright, 2001; Redmann & Kotrlik, 2004; U.S Department of Education, 2005). Teachers will be able to fully integrate more technology into the classroom when barriers to the use of technology are addressed, thus providing students with a variety of learning opportunities to help them become more "technologically prepared for the future" (Manley, Sweaney, & Valente, 2000, p.27).

Purpose of the Study

While research (Alston, Miller, & Williams 2003; Croxall & Cummings, 2000; Lu & Miller, 2002) has been conducted in several states (North Carolina, Virginia, New Mexico, and Ohio) regarding the use of technology in FCS, there is no known published information on

Kentucky. The purpose of this study was to determine if a relationship exists between computer literacy and use of technology, and between teachers' access to technology and their use of technology in FCS classrooms in the state of Kentucky.

The objectives for this study were to: a) describe the selected demographic characteristics (age, gender, number of teachers in the FCS program, years of teaching experience, highest education level attained, classes taught, institution where degree was received); b) determine computer literacy of FCS teachers in Kentucky; c) determine the access FCS teachers have to various types of technology; d) determine the use of technology in FCS classrooms in Kentucky; e) determine the relationship between FCS teachers' computer literacy and their use of technology in the classroom; and f) determine the relationship between FCS teachers' access to technology and their use of technology in the classroom.

Theoretical Framework

The theoretical framework for this study lies within the diffusion of innovations theory. The diffusion process can be defined as "the spread of a new idea from its source of invention or creation to its ultimate users or adopters" (Rogers, 1962, p. 13). According to Rogers and Shoemaker (1971), there are five categories into which adopters fall based upon their innovativeness: laggards, late majority, early majority, early adopters, and innovators. The placements of the five areas of innovativeness are arranged on a bell curve. The adoption process of the diffusion of innovations theory is considered to be a type of decision-making. According to Rogers (1962), the adoption of an innovation requires a decision by an individual. Individuals must begin using a new idea and allow it to replace the previous idea they were using.

The diffusion of innovations theory can be linked back to teachers' computer literacy, access to and use of technology. By analyzing prior research related to technology, certain indicators are present that indicate shifts between the five categories of adoption: laggards, late majority, early majority, early adopters, and innovators (Rogers & Shoemaker, 1971). Daulton (1997) found that FCS teachers' adoption rates for technology increased from 5% in 1983 to 83% in 1993. This increase shows that as technology became more common in the school setting, teachers moved from the late majority category to the early adopter category. According to a report published by the National Association of State Boards of Education [NASBE] (2003), 63% of schools surveyed reported that the majority of teachers used the Internet and computers for instruction, but almost one quarter of those schools classified their teachers as "beginners" when using technology. This shows that teachers have the desire to incorporate technology into the classroom (early adopter) but face challenges in acquiring knowledge to do so.

Related Literature

Computer Literacy

When trying to determine computer literacy, access to technology, and use of technology in classrooms, it is important to look at relative advantage and compatibility of adoptions. Rogers (1995) identifies relative advantage to be a good determinant of innovation adoption because when an innovation is adopted the physical benefits (gains in social status or savings in time, money, or effort) are easily acknowledged (Tornatsky & Klein, 1982). Rogers also indicates the persons' past experiences and beliefs should fit their needs or purposes for the innovation in order to have them become adopters. If the innovation is not compatible with the needs, values, or beliefs of the adopter, then they will not see its relative advantage.

Mason and McMorrow (2006) suggested there are two distinct components to computer literacy: *awareness* and *competence*. Awareness requires that a person have understanding of how computers impact their day-to-day life as well as the larger society. Competence expects a person be able to exhibit a hands-on expertise with a software application. Both of these components should be evaluated when looking at computer literacy within the classroom setting.

Some of the most basic computer literacy skills include using word processor, email, mailing lists, and the World Wide Web (Evans, 1999; Manley, et al., 2000). Computer literacy is even thought to be as important as writing, reading, and math in the school setting; as children in today's society have never experienced schools without computers (Croxall & Cummings, 2000; Robyler et al., 1993). These skills are essential in today's school systems as more tasks are completed using computer technologies.

After conducting a study related to technology integration in Career and Technical Education classrooms, Redmann and Kotrlik (2004) had several recommendations as to how teachers can be proactive in their quest to become more computer literate. These included attending workshops and conferences, taking college classes that deal with technology, and by engaging "in self-directed learning to stay current with the use of technology in the teaching-learning process" (p. 21). Self-directed learning might include experimenting with equipment, planning lessons using the computer, and exploring various types of software available on the computer and on the Internet (Croxall & Cummings, 2000).

Eisenberg and Johnson (1996) state that computer literacy needs to include more than just the "how" of using computers; it also needs to focus on the "when" and "why." Through their research, Eisenberg and Johnson developed some suggestions as to what computer literacy should cover. Some of their basic suggestions included being able to identify parts of the computer, creating drafts/final projects using a word processor, and using the internet to search for information. The more advanced suggestions included knowing computer terminology, being able to operate and maintain a computer, having the knowledge to use instructional technology, having the skills to do various programming activities, and having a working knowledge of the impact of technology on society and all that society encompasses.

Acquiring the skills to use instructional technology in the classroom is a necessity in today's society (Robyler et al., 1993). Further, computer literacy is an important component in having the ability to successfully and confidently use technology (Croxall & Cummings, 2000; Eisenberg & Johnson, 1996) within the FCS classroom. Russell's (1995) six-stage process can be used to help teachers develop a better understanding of technological applications, as can attending workshops or taking classes that deal with using technology in the classroom (Redmann & Kotrlik, 2004). Russell's six stages are: awareness, learning the process, understanding and application of the process, familiarity and confidence, adaptation to other contexts, and creative application to new contexts.

Access

For teachers to effectively integrate technology into the classroom, they must have easy access to various types of technology. Alston et al. (2003) found that in North Carolina schools certain types of technology were widely available for teachers' use, meaning the various types of technology were located in the classroom or were easily accessible within the building. These include videotape, television, desktop computer with CD-ROM, internet, email, laser printer, and video camera. Alston et al. also found that certain types of technology were not easily accessible for teacher use. LCD panel, computer projector, laptop computer, and digital camera were

technologies that teachers in North Carolina did not have within their classroom or even within the school.

The Internet has become an important resource for classroom activities. For Family and Consumer Sciences Education teachers to be able to use the Internet, they must have access to not only a computer but also a phone line, modem, an Internet Service Provider, and training in how to use these types of technology (Cohen, Negrini, Cluff, Laus, Volpe, Dun, & Sternheim, 1999). The teacher would also need to have classroom access to the Internet and an idea as to how to guide students in their search for information and use of activities related to Family and Consumer Sciences Education. Recent findings indicate that almost all schools (99%) in the United States have internet access and within those schools 87% of the individual classrooms have access (U.S. Department of Education, 2005). With easier access to the Internet, teachers are better able to implement its use into classroom instruction.

Eisenberg and Berkowitz' Big Six Skills Approach (Eisenberg & Johnson, 1996) was used by Eisenberg and Johnson to develop criteria for computer skills. The Big Six focuses on task definition, information seeking strategies, location and access, use of information, synthesis, and evaluation. Location and access are important factors when implementing technology into the classroom.

Technology Use in the Classroom

Instructional technology is a vital part of Career and Technical Education and includes computers and all the related technologies as well as the systems and processes for implementing technology use in the classroom (Lu & Miller, 2002). In recent years, there has been an increased emphasis on the integration of technology into curriculum especially at the high school level (Peake, Briers, & Murphy, 2005). Lu and Miller described the technology used in the classroom in various forms including computers, DVD/VCR players, digital and video cameras, televisions, cooking equipment, and welding equipment. They also describe how classroom technology can help the teacher to use, assess, alter, and present information in a variety of ways.

Research indicates that FCS teachers' attitudes toward the use of technology in the classroom are positive (Croxall & Cummings, 2000; Martin & Lundstrom, 1988; Rogers, Thompson, Cotton, & Thompson, 1993). These positive attitudes about computer/technology use have led teachers to more readily incorporate technology into the classroom in order to enhance student interest and involvement (Croxall & Cummings, 2000; Schofield, 1995; Way & Montgomery, 1995).

Methodology

Research Design

The research design of this quantitative study was descriptive-correlational. The purpose of this study was to examine two or more variables and determine if there was a relationship and the extent of that relationship (Ary, Jacobs, & Razavieh, 2002). When using this type of research, there are three main applications that are used: determining relationships, assessing consistency, and prediction. This study focused on determining relationships.

Population and Sample

The target population for this descriptive-correlational study consisted of middle and high school FCS teachers in the state of Kentucky [$N = 389$] (Kentucky Department of Education, 2006). A purposive sample was used consisting of all FCS teachers attending the Kentucky

Career and Technical Education Summer Teachers Conference held in July 2007. Because this is a purposive sample, findings can only be applied to this specific sample.

Instrumentation

To determine computer literacy, access to technology, and the use of technology within FCS classrooms in Kentucky, it was determined that a questionnaire was the most appropriate and feasible method. The questionnaire contained four sections. The first section was designed based on existing research (Alston et al., 2003; Croxall & Cummings, 2000; Kentucky Department of Education, 2006; Mason & McMorrow, 2006; Peake et al., 2005) and inquired into the use of various types of technology in the classroom. The second section included questions that were designed to determine the teachers level of computer literacy (Lokken, Cheek, & Hastings, 2003; Mason & McMorrow, 2006). The third section included questions that were designed to determine what types of technology teachers had access to in their classroom or within the school. (Alston et al., 2003; Croxall & Cummings, 2000; Peake et al., 2005; Redmann & Kotrlik, 2004)

A six-point Likert scale was used to rank the responses with the ranking as follows: 6=strongly agree; 5=moderately agree; 4=slightly agree; 3=slightly disagree; 2=moderately disagree; 1=strongly disagree.

The fourth section included demographic information such as age, gender, number of teachers in the program, years of teaching experience, highest education level attained, classes taught, and institution where degree was received.

For this study, face and content validity was determined by using a panel of experts. Seven experts from the FCS education profession, including state staff and teacher educators, were asked to review the questionnaire and provide feedback as to what they liked and what they thought should be changed. Once the panel of experts finished with the questionnaire, validity was established.

For this study, reliability was determined using a pilot group. The pilot group (n = 30) consisted of FCS teachers from Missouri. Using Cronbach's alpha, a reliable coefficient of 0.80 was established for Section I, which was use of technology; a reliable coefficient of 0.77 was found for Section II, which was computer literacy; and a reliable coefficient of 0.88 was found for Section III, which was access to technology.

Data Collection and Analysis

The questionnaire was distributed at the Kentucky Career and Technical Education Teachers Conference. Once the questionnaire was received by the researcher, the data was entered into the SPSS program and analyzed.

Demographic characteristics of the Family and Consumer Sciences Education teachers selected for the study were the first objective for the study. These characteristics included age, gender, number of teachers in the FCS program, years of teaching experience, the highest education level attained, courses taught during the 2007-08 school year, and institution where initial certification was received. Mean scores and standard deviations, frequencies, and percents were reported as appropriate.

For Objective Two through Four, means and standard deviations were reported. In addition, for each individual item, the frequency and percentage was reported. A grand mean was calculated from the individual items to create construct scores for "computer literacy," "access," and "use of technology."

Objectives Five and Six sought to determine the relationships between FCS teachers' computer literacy and their use of technology in the classroom, in addition to FCS teachers' access to technology and their use of technology in the classroom. The Pearson Product Moment Correlation was calculated for each and an alpha of .05 was established at a priori. To interpret correlation coefficients, Davis' (1971) conventions were adopted.

Findings and Discussion

Objective One

Demographic characteristics for this study included age, gender, highest education level attained, and classes taught. These demographics were compared to those of previous studies in relation to FCS education teachers and technology. Several studies indicated that the highest number of respondents were female (Bradley & Russell, 1997; Taylor, Torrie, Hausafus, & Strasser, 1999), as was the case with this study. This is a common trend in FCS education, as women are typically the ones who choose this field of education. The average number of years of teaching experience for participants in this study was 13.39 years and the average number of teachers in a program was 2.53.

Of the 94 participants who responded to the question regarding age, 36.2% (n = 34) were between the ages of 50-59 with an additional 4.3% (n = 4) who were 60 and over. A total of 31% were between 31-49 years of age and 29% were between the ages of 20-30. A total of 78.5% (n = 73) had a masters degree or higher. In the study by Taylor, et al. (1999) several similarities were found among the other demographics. In both Taylor's study and this one, the largest percentage of teachers were over the age of 31 and held degrees higher than a bachelors.

Participants in this study were asked to list all classes they would be teaching during the 2007-08 school year. Since teachers provided this information with the names they use for the courses they teach and were not given a selection from list on the survey, not all course titles were the same. A total of 53 different course titles were listed by the respondents. There were 22 approved courses in the Kentucky Family and Consumer Sciences Curriculum. The most commonly listed courses were FACS Life Skills (n = 65), followed by Foods and Nutrition (n = 57), Child/Human Development (n = 42), and Parenting (n = 33). Two of the most commonly taught classes for both this study and Taylor, et al. (1999) were Foods and Nutrition and Child/Family Development.

Objective Two

Upon completion of the research, it was found that Kentucky FCS teachers slightly agreed that they had knowledge related to computer literacy (Table 1).

A grand mean of 4.82 (SD = .69) was then calculated for the construct Computer Literacy. Computer literacy is an important component in having the ability to successfully and confidently use technology (Croxall & Cummings, 2000; Eisenberg & Johnson, 1996). To help instill this confidence and ability, teachers need to be provided the opportunity to participate in workshops and conferences that deal with using technology (Redman & Kotrlik, 2004). The teachers need to be proactive in their quest to learn about technology. They need to explore what is available on the internet for their use, plan lessons using the computer, and experiment with various types of technologies to become more comfortable with the use of technology. FCS teachers, both at the high school and college level, need to incorporate technology into their classroom lessons and teach their students how to understand the terminology.

Table 1
Computer Literacy as Perceived by FCS Education Teachers in the Study

Statement	*N*	*%*	*M* [a]	*SD*
I have a basic knowledge of computers.	94	100	5.38	.88
I have avoided computers because they are unfamiliar to me.	94	100	5.04	1.48
I have a working knowledge of computer terminology.	93	98.9	4.74	.94
I understand the technical aspects of computers.	94	100	3.93	1.30
I feel secure about my ability to interpret a computer manual.	94	100	3.99	1.20
I feel confident about using computers.	94	100	4.95	.93
I know there are different internet research tools (Google, Yahoo, etc.) available to use.	94	100	5.77	.53
Grand Mean			4.82	.69

[a] Scale (1=strongly disagree; 2=moderately disagree; 3=slightly disagree; 4=slightly agree; 5=moderately agree; 6=strongly agree).

Objective Three

It was found that Kentucky FCS teachers moderately agreed with statements regarding their access to technology. This shows that the technology most commonly used in classrooms is easily accessible for the teachers. Most teachers had access to a TV, DVD/VCR, projector, desktop computer, printer, and the Internet (Table 2).

A grand mean of 5.29 (*SD* = .57) was then calculated for the construct Access to Technology. Research conducted by Alston et al., (2003) also found these types of technology to be readily accessible to teachers in North Carolina. By having access to various types of technology within the classroom or school, teachers will be more apt to try to implement it into their daily classroom lessons. More research is needed to determine how schools allocate money for technology purchases and what type of training is provided to help teachers become more familiar with the new technology.

Objective Four

Upon completion of the research, it was found that Kentucky FCS teachers in this study indicated they occasionally used certain types of technology that they had available within their classroom or school. The majority of the teachers who participated in the study indicated that they used word processing programs, email, and grading programs on their computers. While these were the three highest areas mentioned, they also used a wide variety of technologies within their classrooms, yet ranked them lower (Table 3). A grand mean of 4.72 (*SD* = .69) was then calculated for the construct Technology Use.

Table 2

Teachers Access to Various Types of Technology as Reported by FCS Education Teachers in the Study

Statement	*N*	*%*	*M* [a]	*SD*
I have access to a television.	94	100	5.99	.10
I have access to DVD/VCR.	94	100	5.97	.23
I have access to a projector.	94	100	5.59	1.09
I have access to a digital camera.	94	100	5.62	1.01
I have access to a full page scanner.	92	97.8	4.40	2.00
I have access to a laser printer.	92	97.8	5.08	1.64
I have access to a desktop computer.	94	100	5.87	.73
I have access to a laptop computer.	94	100	4.96	1.73
I have access to presentation software.	94	100	5.46	1.11
I have access to the internet in my school.	92	97.8	5.96	.20
The internet is reliable at my school.	90	95.7	5.41	.93
I have adequate amount of technology for the number of students in my classes.	93	98.9	3.81	1.83
I have access to effective instructional software for the courses I teach.	92	97.8	4.58	1.26
Grand Mean			5.29	.57

[a] Scale (1=strongly disagree; 2=moderately disagree; 3=slightly disagree; 4=slightly agree; 5=moderately agree; 6=strongly agree)

Table 3

FCS Education Teachers Use of Various Types of Technology

Statement	*n*	*%*	*M* [a]	*SD*
I use email on a regular basis.	94	100	5.66	.52
I utilize word processing to develop materials for class.	92	97.8	5.46	.73
I use presentation software (Microsoft Word, PowerPoint, etc.) to develop lessons/units.	92	97.8	4.96	1.02
I use presentation hardware (Projector, Smart Board, etc.) to present lessons and units.	92	97.8	4.16	1.52
I keep track of grades using computers.	92	97.8	5.90	.33
I utilize various internet research tools.	91	96.8	5.15	.94
I create multimedia presentations using a scanner.	93	98.9	2.90	1.39
I create multimedia presentations using a digital camera.	91	96.8	3.29	1.47
I create multimedia presentations using a video camera.	93	98.9	2.69	1.32
I use the computer for word processing.	93	98.9	5.66	.71
I use the computer to create databases.	91	96.8	3.68	1.70
I use the computer to create spreadsheets.	91	96.8	3.63	1.65
I use the computer to access email.	92	97.8	5.90	.29
I use the computer to access the Internet.	93	98.9	5.84	.42
I use the computer to create presentations.	93	98.9	4.86	1.37
I use various technologies to support classroom instruction.	93	98.9	4.97	.85
Grand Mean			4.72	.69

[a] Scale (1=never; 2=not very frequently; 3=rarely; 4=occasionally; 5=very frequently; 6=always)

Culture has become very technologically-oriented, meaning that students are using technology on a regular basis (Manley et al., 2000). By utilizing various types of technologies within the classroom, teachers are better able to meet the learning needs of more students as well as keep them engaged in the lesson. Teacher education programs should require technology courses for students, so that when they enter the classroom they are competent in the uses of various technologies. It is also important to look at the access and use of technology that students are exposed to both in school and at home.

Objectives Five and Six

From the findings, we can see that there is a substantial relationship between computer literacy and the use of technology, while there was a moderate relationship between access to technology and use of technology. The relationship between computer literacy and use of technology had a positive correlation of .60 (Table 4). When compared to Davis's (1971) Conventions for Correlation Coefficient, the relationship between the two areas is substantial. The relationship between access to technology and use of technology had a positive correlation of .45. According to Davis, this relationship is moderate in nature.

Table 4
Correlations among Computer Literacy, Technology Use, and Access

	Computer Literacy	Technology Access	Technology Use
Computer Literacy	1	.14	.60
Technology Access		1	.45
Technology Use			1

These relationships tell us several things about FCS Education. First, teachers have a basic understanding of computer logistics, such as terminology and navigation of programs. This knowledge helps teachers have more confidence when they actually decide to use technologies in their classrooms. Second, teacher preparation programs need to require that students take a technology class if one is not already required. Technology classes will help the students gain a better understanding, not only of how to use technology, but also in how to interpret the more technical aspects of the technology (i.e., manual, programs). By properly teaching the new FCS Education teachers how to use and understand technology, they will be better able to utilize various technologies when teaching their students. The students can then take what they have learned about technology in the FCS classes and apply it to their other classes and assignments. Finally, access to technology is not always adequate. Many teachers reported that they did not have adequate technology for the number of students in their classes. This limits what they can have their students do, so they may be more apt not to use technology to teach their lessons. By providing technology grants to teachers, this problem will hopefully be a thing of the past.

Implications and Recommendations for Future Research

One of the issues encountered during the course of the research was the naming of courses as reported by the teachers who participated in the study. Often times the identity of FCS is unclear and "not branded" because of the inconsistency by which teachers label or identify the courses they teach. When the course names were first evaluated for this study there were 53 different course titles. These were then condensed into 22 categories, based on the Kentucky

Valid Course List, which was retrieved from the Kentucky Department of Education (2006). Further research is needed to determine how Kentucky FCS teachers determine what their class names will be, why they chose names that are not on the Valid Course List, and how they determine what curriculum will be taught.

Another issue that was encountered dealt with the questionnaire itself. After the pilot group returned questionnaires, each section was evaluated for reliability using Cronbach's alpha. The reliability rates were lower than anticipated with use at .80, computer literacy at .77, and access at .88. It is recommended that the instrument needs to be reevaluated and tightened for the purpose of replication.

Further research is also needed to compare the computer literacy, use, and access to technology of FCS teachers in Kentucky and with other Career and Technical Education (CTE) teachers and academic core teachers nationally. This could help to assist schools in equalizing resources and access to technology between teachers and school buildings. Schools would also have a better understanding as to what types of trainings that could be offered as professional development to help improve teachers' competencies in relation to technology.

Based on the research, the following recommendations for future research can be made:

1. Further research is needed to determine how Kentucky FCS teachers determine what their course title will be, why they chose names that are not on the Valid Course List, and how they determine what curriculum will be taught.
2. A study of how other state FCS teachers name their courses and select their curriculum would be useful to address the "branding" issue that continues to plague the FCS profession.
3. A comparison of technology literacy, use, and access of FCS teachers in Kentucky and with other CTE teachers and academic core teachers nationally may assist schools in equalizing resources and access to technology.
4. As technology continues to develop at a fast pace, research on systems of resource allocation in schools for purchasing technology tools and professional development on literacy of those tools may provide information on how to better serve teachers in the use of new and innovative technologies.
5. Research on teacher education programs for FCS and CTE, concerning what technology competencies are taught across states and nationally, may assist in determining where the advances are and where the pre-service teachers are already proficient**.**
6. Research on the level of literacy, use, and access secondary students have in their home and school may assist teacher education programs in developing high levels of these skills in future teachers to keep up with their students.
7. Reevaluate and tighten the instrument for replication.

As can be seen, there are a lot of areas for further research that can be applied to both FCS education, CTE, and academic core areas. By promoting technology through teacher preparation programs and through professional development, teachers will be better able to use various types of technology to promote learning within their classrooms.

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