

THE IMPACT OF TECHNOLOGY TRAINING ON FAMILY AND CONSUMER SCIENCES TEACHER ATTITUDES TOWARD USING COMPUTERS AS AN INSTRUCTIONAL MEDIUM

Sheri L. Lokken
Mississippi State University

Wanda K. Cheek
Mississippi State University

Shirley W. Hastings
University of Tennessee

With the introduction of technology in the family and consumer sciences (FACS) secondary classroom, the need for training teachers to use technology and integrate it effectively into the curriculum has increased. This transition has not come without challenges. FACS teachers, like their colleagues from other disciplines, have attitudes toward technology that impact the outcome of training. In this article, FACS teacher attitudes toward technology and the effect of a two-week, hands-on training were investigated. The relationship of pre-existing teacher characteristics to technology attitudes was also assessed. Teacher attitudes toward technology improved after training on three of four measures. Age, computer use, and computer experience were related to teacher attitudes toward technology. Findings from this study are helpful in planning professional development technology training for FACS teachers.

Over the past two decades, the quantum strides made in computer technology have impacted not only personal, family, and work lives, but the education of the nation's children. Improvements in technology have created a movement away from computer labs to integration of computers in the classroom (Scheffler & Logan, 1999). Technology has forced a re-evaluation of the teacher's role in learning (Chin & Hortin, 1993-94). In family and consumer sciences (FACS), teachers have been encouraged to emphasize strategies whereby students learn to ask questions and then seek solutions to practical problems (Redick et al., 1998). Use of technology in the classroom is a useful tool for accomplishing this goal. "[T]eachers and technology must be viewed in tandem" (Way & Montgomery, 1995, p. 12).

Morrison, Lowther, and DeMeulle (1999) note that the transition to computer-based instruction and student-centered learning environments should have been a relatively smooth process. Instead, major advancements in student learning with infusion of the new technology have not occurred. Several causes for this situation have been cited in the literature including lack of school and administrative support and teacher anxiety about computers (Bradley & Russell, 1997). In earlier research, Cuban (1986) presented a more comprehensive view. He stated that for a long time teachers have been uncomfortable with the use of technology in the classroom. He suggested this resistance stemmed from "the organizational realities of school and classroom life and the teacher's holistic perspective on what's important to young people" (p. 90). He asserted further that a general lack of consensus existed on how students should learn and how teachers should teach.

Preparing in-service teachers to integrate the technology has brought many challenges. Teacher anxiety about computers and overall attitude toward technology can influence the use of computers in the classroom, and, thus, the success of technology integration into the curriculum. Teachers can be expected to have the same traits as adult learners in general: (a) their past experiences serve as a resource to support new learning, (b) they are ready to learn when there is an identified need to know, and (c) they also learn what they perceive to have importance in helping them deal with problems they confront in life (Knowles, 1990). Thus, adult learners with limited experiences in technology-based environments can be expected to hold feelings of anxiety. Teachers as adult learners may experience anxiety and poor attitudes toward computers, and excessive levels may lead to reduced use of computers.

The integration of computers in secondary FACS classrooms has been investigated in several studies. Daulton (1997) found in a longitudinal study that the rates of adoption of computer technology in the curriculum by FACS teachers increased from 5% in 1983 to 83% in 1993, a respectable improvement. Longstreth, Kelly, and Paris (1989) found that approximately one half of the FACS teachers in their study who had access to school computers had adopted them as instructional tools. However, in a national study of all vocational teacher educators, Miller (1997) found that home economics respondents reported lower levels of computer experience than teacher educators in other vocational areas. Kotrlik, Harrison, and Redmann (2000) concluded from a study of secondary vocational educators that FACS teachers self-reported average to below average knowledge and skill in both general and software technology, as did teachers in other vocational areas.

Research on computer anxiety and negative attitudes toward computers by FACS teachers needs investigation. High school teachers exhibiting computer anxiety can be a hindrance to helping students form positive attitudes toward computers, gain knowledge about computer technology, and develop requisite computer skills. Jordan and Follman (1993) suggest that teacher computer anxiety must first be addressed in order to change their attitudes about technology use.

Will intensive technology training better prepare FACS teachers to integrate technology in the classroom and impact their attitudes toward computers? Martin and Lundstrom (1988) found that FACS teachers' attitudes toward computers improved following training. In a recent study of technology training completed by vocational teachers, self training, including personal experience received on the job, written materials, and formal in-service training provided by school districts were the most frequently cited sources of information (Kotrlik, Harrison, & Redmann, 2000).

The intent of this study was to gain an understanding of FACS high school teacher anxieties about and attitudes toward using technology in their classrooms. Specifically, researchers examined characteristics of teachers that were correlated with computer anxiety and technology attitudes and whether an intensive, two-week training workshop on integrating current technology in FACS curriculum had an effect on these attitudes.

Review of Literature

Computer Anxiety and Attitudes Toward Computers

Computer anxiety has been defined as a fear of interaction with a computer that is unnecessarily high compared to the genuine danger presented by the computer (Howard, 1986). McInerney, McInerney, and Sinclair (1994) add, "[n]egative cognitions and attitudes toward

computers may also accompany such feelings of anxiety and include worries about embarrassment, looking foolish or even damaging computer equipment” (p. 28).

Prior computer experience has been the most commonly cited variable correlated to lower computer anxiety (Bradley & Russell, 1997; Chu & Spires, 1991; Fletcher & Deeds, 1995; Liu & Reed, 1992; McInerney et al., 1994; Reed & Overbaugh, 1993; Ropp, 1999; Woodrow, 1992). A strong negative correlation has been found between computer anxiety and increased computer use (Larner & Timberlake, 1995). McInerney et al. also reported positive attitudes toward computing, good perceptions of self-efficacy, and high expectations of success to be correlated with decreased levels of computer anxiety. Cognitive styles based on the Myers Briggs Type Indicator were discovered to be determinants of computer anxiety by Chu and Spires (1991). Still, other researchers have found dislike of change, negative perceptions of technology, and poor mechanical attitude as correlates to higher computer anxiety (Heinssen, Glass, & Knight, 1987; Weil, Rosen, & Wulgalter, 1990). Some studies have reported that females were more likely to have computer anxiety than males (Bradley & Russell, 1997; Liu & Reed, 1992; McInerney et al., 1994).

Conflicting results about the correlation of age and computer anxiety have been published. Dyck and Smither (1994) found that the older participants in their study (55 and older) had less computer anxiety, had more positive attitudes toward computers, and had more liking for computers than the younger participants (30 and younger). Jones and Wall (1989) and Rosen, Sears, and Weil (1980), on the other hand, determined age was significantly related to computer anxiety, indicating older participants had higher levels of computer anxiety. Rosen and Maguire (1990) in a meta-analysis of research on age and computerphobia noted no correlation between the variables although this conclusion was drawn from a small number of studies. Still, other researchers have documented no significant correlations for computer anxiety with any background characteristic variable (age, computer experience, education, or gender) (Harris & Grandgenett, 1996; Honeyman & White, 1987; Yang, Mohamed, & Beyerbach, 1999).

Attitudes and attitude change are concepts that have been discussed in the literature for nearly 100 years. However, one universally-accepted definition of attitude is difficult to cite. Simonson (1995) described attitudes as “latent and not directly observable in themselves, but they act to organize, or to provide direction to, actions and behaviors that are observable” (p. 366). Thus, attitudes toward technology can impact interaction with technology. Attitudes toward technology include variables such as confidence, liking, interest, awareness, comfort, and usefulness (Chou, 1997). Woodrow (1992) found correlations between gender, previous computer experience, locus of control, and attitudes toward technology. Chou also found that previous computer experience influenced teacher attitudes toward computers. Ropp (1999) determined computer access and hours of computer use per week to be correlated to computer attitude.

In summary, background characteristics of teachers have not been consistently correlated to computer anxiety or attitudes toward computers. Teacher attitudes toward computers can greatly influence the learning process for both the teacher and the student. The relationships that may exist make technology training more of a challenge. It would appear that teachers who need training the most—those with the least amount of computer competence and most negative attitudes toward computers—are also the most anxious about learning to use computers.

Impact of Training on Computer Anxiety and Attitudes

Research supports the idea that the biggest obstacle to teachers using technology in their classrooms is the lack of adequate teacher training (Yildirim, 2000; Vagle, 1995). In a study of accomplished teachers who integrated computers in their classrooms, Sheingold and Hadley (1990) found that teachers in their study had taken advantage of in-service training opportunities as well as completing training on their own time. In an extensive review of research on the impact of training on teachers' use of technology in the classroom, Chin and Hortin (1993-94) concluded that teacher attitudes toward technology can change if proper staff development training and support are provided.

What are the anticipated impacts of providing technology training for teachers? It would appear that computer anxiety is lessened by exposure to computers through training and use. Yildirim (2000) found that technology-competent teachers had significantly more positive attitudes, more confidence, and less anxiety toward computers than less competent teachers prior to completing a computer literacy course. Following the completion of the course, however, group differences disappeared, indicating training made a difference. In another pre-test post-test study of computer anxiety and attitudes toward computers, Hakkinen (1994-95) found that the pre-service teachers in his sample had reduced computer anxiety, higher estimation of their own computer skills, and more positive thoughts and feelings related to computers after completing a basic computer course. Ropp (1999) and Reed and Overbaugh (1993) also found significantly reduced computer anxiety following instruction. Kluever, Lam, Hoffman, Green, and Swearingen (1994) concluded that teachers who participated in technology training also showed improvement on attitudes toward computer post-test scores. From this research, it would seem that exposure to training would reduce or minimize computer anxiety.

Research Purpose and Hypotheses

The purpose of the study was two-fold: (a) to determine what characteristics of FACS teachers were related to their attitudes toward technology, and (b) to assess whether there was a change in teachers' attitudes toward technology after completing an intensive, two-week technology training workshop. Teacher characteristics evaluated were age, computer use, and computer experience. Attitudes of teachers were measured as anxiety toward computers, confidence in ability to use or learn about computers, liking of computers, and the views of the importance of computers as a learning method.

Based on the literature, it was hypothesized that as teachers' computer experience and computer use increase, computer anxiety will decrease and their attitudes of confidence, liking, and importance as a learning method will become more positive. It was also hypothesized that older teachers would have higher levels of computer anxiety and their attitudes of confidence, liking, and importance as a learning method would be less positive. A third hypothesis related to the effect of training on teachers' attitudes toward technology was constructed. It was hypothesized that training would affect teachers' computer anxiety, their liking of computers, their confidence in ability to use or learn about computers, and their view on the importance of computers as a learning method.

Method

Sample

Data for this study were collected over a three-year period from FACS teacher participants from high schools designated to receive funding from the Mississippi Department of

Education for a new technology-based classroom and curriculum, resulting in a non-random, convenience sample of 42 teachers. Sixteen schools participated in 1997, 11 schools in 1998, and 12 schools in 1999 (some schools had two FACS teachers). FACS teachers from each of these schools were required to attend a two-week intensive training on use of the technology and curriculum (see Cheek, Hastings, & Lokken, 2001). All teachers completing the training participated in the study.

The 42 teacher participants ranged in age from 23 to 64 years old with a mean of 46.45 (see Table 1). A total of 18 teachers (42.9%) had a master's or education specialist degree, and the remaining 24 teachers (57.1%) had a bachelor's degree. Seventeen teachers participated in the program in 1997, 13 in 1998, and 12 in 1999.

Table 1
Characteristics of Sample

Characteristics	1997 (<i>n</i> =17)	1998 (<i>n</i> =13)	1999 (<i>n</i> =12)	Total (<i>N</i> = 42)
Age				
23-34	1	1	4	6
35-49	6	7	6	19
50 & older	10	5	2	17
Education				
Bachelor's	9	7	8	24
Master's	7	5	4	16
Education Specialist	1	1	0	2
Computer Use Score ^a				
<i>m</i>	21.82	21.62	22.75	22.02
<i>s.d.</i>	2.19	2.75	3.49	2.75
Computer Experience Score ^b				
<i>m</i>	53.53	145.92	158.17	112.02
<i>s.d.</i>	56.03	127.86	144.17	118.29

^a Calculated by summing scores on three questions: (a) hours per day of home computer use, (b) days per week of home computer use, and (c) number of tasks a home computer is used for.

^b Calculated by sum of scores on: (a) days in the past year spent entering data into a computer, (b) number of software packages proficient in, (c) typing speed, (d) number of high school computer courses, and (e) number of college computer courses.

Procedures

A pre-test post-test design was employed to investigate the attitudes toward computers held by teachers and the impact of training on these attitudes. The pre-test and post-test were administered respectively on the first and last day of the two-week workshop. For purposes of this study, the technology-training workshop served as the treatment for the participants.

The purpose of the training was to prepare teachers to teach six FACS courses including prescribed technology prior to opening their new classroom. The six courses were: Family and Individual Health, Nutrition and Wellness, Child Development, Family Dynamics, Resource

Management, and Personal Development. The key outcome was to ensure that all teachers had the technology skills required to implement the curriculum and improved confidence in their ability to implement the technology. The participants' levels of computer skill were assessed prior to the workshop through a mail questionnaire. It was determined from this instrument that most teachers had only basic computer skills, and few had experience with recent teaching technology and software.

The training was conducted by a team of three university faculty members over three consecutive summer training sessions. Measures were taken to ensure consistency in training procedures, which took place at one of the pilot sites. This training allowed teachers to gain hands-on experience in a setting that closely simulated their local teaching environment. During the two-week workshop, approximately 40 hours was devoted to technology training and discussion interspersed with 30 hours of hands-on practice. The remaining time was spent on curriculum review and integration of the technology. The training site and each teacher's home classroom contained 16 student computer stations, a teaching station, and multiple software to support the curriculum. In addition, the teaching station had other technology equipment (i.e., scanner, digital camera) for which training was also provided (see Cheek, Hastings, & Lokken, 2001 for description of curriculum, software and technology-based classroom). It should be noted that some teachers were actively involved in getting the programs in their schools, whereas others were told the program was coming after the fact and advised they would need to complete the training, particularly during the first year.

The training was planned with the needs of adult learners in mind and allowed teachers to progress at their own pace following periods of explanation and instruction. During the two-week period, participants learned to use all software, completed projects using the software, learned classroom presentation technologies, and gained skill in basic computer functions. Upon completion of the training, each teacher was assessed by the researchers on proficiency in the operation, management, and use of all equipment, software and technology. In addition, each teacher prepared and presented a 20-minute PowerPoint® slide show based on a lesson plan from the curriculum.

Instrument

An existing instrument, the Computer Anxiety and Attitudes Toward Computers measure (Chou, 1997), was used in the study. The instrument was developed from a review of the literature of existing computer anxiety and attitudes toward computers scales and used in a national study of agriculture education teachers, a comparable group to the present study participants. Chou reported that the instrument was validated by members of the dissertation committee. The instrument was pilot-tested with a student sample, refined, and then pilot-tested with a simple random sample of secondary agriculture teachers not included in the final study.

The questionnaire was composed of three sections. Part I, the Computer Anxiety (CA) Questionnaire, consisted of 12 computer anxiety-laden statements (see Figure 1) with a four-point Likert type scale: "1" (strongly disagree), "2" (somewhat disagree), "3" (somewhat agree), and "4" (strongly agree). Chou (1997) reported selecting a four-point scale instead of a five-point scale based on Smith's (1993) conclusion that "a 4-point scale results in a forced-choice response in either the developmentally based or traditional direction, with no room for a neutral response" (p. 25). Chou reported a reliability coefficient (Cronbach's α) of .86 for the 12-item Computer Anxiety section. The possible range of sub-scores was 12-48 for the Computer Anxiety section.

Part II, the Attitudes toward Computers (ATC) Questionnaire, contained 26 items (see Figure 1), all derived from a review of the literature. Again, the four-point Likert type scale was used. Statements measured confidence in ability to use or learn about computers, liking or enjoying computers, and attitudes toward the importance and effectiveness of computers as an educational medium. Chou reported a reliability coefficient of .94 for the 26-item Attitude towards Computers section. Cronbach's α was .84 for computer confidence, .92 for computer liking, and .84 for attitude toward using the computer as an instructional medium. The possible range of sub-scores were 10-40 for liking of computers, 10-40 for confidence in ability to use or learn about computers, and 6-24 for importance of computers as a learning method.

To facilitate measurement of the attitude variables for this study, global measures of computer anxiety, liking, confidence, and importance as a learning method were created by summing the applicable Likert-scale ratings. Cronbach's α was computed to evaluate internal reliability of the global measures. In this study, Cronbach's α was .75 for pre-test anxiety, .72 for pre-test liking, .73 for pre-test confidence, .78 for pre-test importance of computers as a learning method, .74 for post-test anxiety, .67 for post-test liking, .64 for post-test confidence, and .70 for post-test importance as a learning method.

Figure 1

Individual Attitude Items

Anxiety (12 items, score range = 12–48)

- I understand the technical aspects of computers. *
- It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.
- I feel secure about my ability to interpret a computer manual. *
- I feel confident about using computers. *
- I have avoided computers because they are unfamiliar to me.
- I hesitate to use a computer for fear of making mistakes that I cannot correct.
- I am afraid that if I begin to use computers I will become dependent upon them and lose some of my reasoning skills.
- I dislike working with machines that are smarter than I am.
- I feel hostile toward computers.
- Computers make me feel uneasy and confused.
- Working with computers makes me feel cut off from other people.
- I like walking into a room filled with computers. *

Liking of Computers (10 items, score range = 10–40)

- I dislike working with computers. *
 - The challenge of solving problems with computers does not appeal to me. *
 - I think working with computers is enjoyable.
 - When there is a problem with a computer that I can't immediately solve I would stick with it until I have the answer.
 - I find it hard to stop once I start to work with a computer.
 - If I had a computer problem that I couldn't solve, I would continue to think about it afterward.
 - I do not enjoy talking to others about computers. *
 - I dislike using computers to learn. *
 - A job using computers would be very interesting.
 - I do not feel comfortable using computers. *
-

Confidence in Ability to Use or Learn about Computers (10 items, score range = 10–40)

- I feel confident learning terms relating to computer software.
 - I feel confident learning terms relating to computer hardware.
 - I feel confident troubleshooting computer problems.
 - Generally, I would feel OK about trying a new program on the computer.
 - I have a lot of self-confidence when it comes to working with computers.
 - I am not sure I could learn a computer language. *
 - I am happy when I can make a computer do what I want.
 - I learn a lot with computers.
 - Computers can eliminate a lot of tedious work for people.
 - I could learn to use a new type of software I hadn't seen before.
-

Importance as a Learning Method (6 items, score range = 6–24)

- Schools should use computers for instruction.
 - Learning by computer adds something to regular instruction.
 - Learning by computers is more enjoyable than with a teacher.
 - Computers motivate students to do better work.
 - Computers can improve learning of higher order thinking skills.
 - Computers improve education.
-

* Reverse coded variable.

Part III, Background Characteristics, consisted of ten questions concerning age, level of education, years of teaching, computer use, and computer experience. To measure computer use and computer experience, construct loadings from Chou's research were used (1997). Computer use was calculated by summing scores on three questions: (a) hours per day of home computer use, (b) days per week of home computer use, and (c) number of tasks a home computer is used for. To measure computer experience, scores on five questions were summed: (a) days in the past year spent entering data into a computer, (b) number of software packages proficient in, (c) typing speed, (d) number of high school computer courses, and (e) number of college computer courses. Cronbach's α was computed to evaluate internal reliability of these measures as well. An α of .40 was found for computer use and an α of .56 was found for computer experience in this study. These low reliabilities may be due to the small number of questionnaire items used to calculate these variables.

Results

Computer Experience and Use

Pearson correlations were run to test for relationships among variables for the first two hypotheses. The significance level for all analyses was .05. Higher scores on computer experience and computer use were expected to be related to low computer anxiety and to positive technology attitudes, as measured on the pre-test. As shown in Table 2, there was a significant negative relationship between computer use and anxiety ($r = -.326, p \leq .05$). However, the negative relationship between computer use and technology attitudes (liking of computers, confidence in ability to use or learn about computers, and importance as a learning method) was not significant, and computer experience was not significantly correlated with any of the attitude variables.

Age

It was expected that age would be related to anxiety and the three technology attitude variables. Pre-test measures of the attitudes were used in the correlation. As shown in Table 2, age of the teacher and anxiety with computers was correlated ($r = .429, p \leq .01$), suggesting older teachers in this sample had higher computer anxiety. Teachers' age and the three technology attitude variables were negatively correlated (Table 2), but only age and confidence were statistically significant ($r = -.345, p < .01$). Thus, older teachers in this sample had lower confidence in their ability to use computers.

Table 2

Pearson Correlations Between Teacher Characteristics and Technology Attitudes (Pre-test)

	1	2	3	4	5	6	7
1. Age	1.00						
2. Experience	-.194	1.00					
3. Use	-.260	.380*	1.00				
4. Anxiety	.429**	-.097	-.326*	1.00			
5. Liking	-.294	.261	.299	-.789***	1.00		
6. Confidence	-.345*	.254	.285	-.734***	.804***	1.00	
7. Importance	-.126	-.085	.142	-.530***	.581***	.667***	1.00

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

$N = 42$

Impact of Training

Changes in teacher computer anxiety, confidence in ability to use or learn about computers, liking of computers, and importance of computers as a learning method were compared using paired-sample t -tests to analyze differences from pre-test scores to post-test scores. Paired-sample t -tests were chosen because a significant change in scores would indicate attitudes were changed regardless of participant characteristics such as age, education, and previous computer experience and use.

Results of the paired t -tests (Table 3) showed a significant difference in the mean pre- and post-test scores for computer anxiety ($t = 4.264, p \leq .001$). Thus, the mean computer anxiety scores (the sum of participants' responses to 12 questionnaire items) decreased after training.

Liking of computers and confidence in ability to use or learn about computers also showed a significant difference in the mean pre- and post-test scores. Participants' mean scores on liking of computers increased from the pre-test to the post-test ($t = -5.532, p \leq .001$). Liking of computers score was a sum of ten questionnaire items. Results of the paired t -test mean scores for computer confidence (sum of participants' responses on ten questionnaire items) indicated a statistically significant increase in teacher confidence ($t = -3.129, p \leq .01$).

Paired t -test results indicated scores for attitude toward importance of using computers as a learning method increased, but it was not statistically significant. These scores were a sum of six questionnaire items. Figure 1 details the individual items used to sum the scores.

Table 3
Paired t-test Analyses of Pre- and Post-test Attitude Scores

	Pre-test		Post-test		<i>df</i>	<i>t</i>
	<i>m</i>	<i>s.d.</i>	<i>m</i>	<i>s.d.</i>		
Computer Anxiety	23.2	6.2	18.6	5.13	41	4.264***
Confidence	31.5	5.71	34.4	4.11	41	-3.129**
Liking of Computers	30.5	5.79	35.5	3.68	41	-5.532***
Importance as a Learning Method	19.5	3.01	20.5	1.93	41	-1.906

** $p \leq .01$, *** $p \leq .001$

$N = 42$

Implications and Conclusions

This study investigated correlates of computer anxiety and attitudes of confidence, liking, and importance of computers as a learning method in a group of high school FACS teachers. In addition, the impact of technology training on their computer anxiety and attitudes toward computers was also examined. Caution should be exercised in extrapolating the findings of this study to other populations, however, given the limitations of using a non-random, convenience sample. Also, a control group was not used for comparison because this was not a part of the training model. A further limitation is that the post-test was administered immediately following the two-week training. Therefore, the teachers did not have ample opportunity to practice skills and implement technology in their classrooms. A second follow-up post-test a year later could have provided additional information on retention of knowledge and possible changes in attitudes toward computers as an educational medium.

Findings from this study show higher frequency of computer use by teachers appears to be correlated with less computer anxiety prior to any technology training. However, previous computer experience was not related to computer anxiety in this study, contrary to previous research (Bradley & Russell, 1997; Chu & Spires, 1991; Fletcher & Deeds, 1995; Liu & Reed, 1992; McInerney et al., 1994; Reed & Overbaugh, 1993; Ropp, 1999; Woodrow, 1992). This result may be due to the definition of computer use and computer experience developed by the author of the instrument (Chou, 1997) and used in this study. Also, internal reliability for the computer experience and computer use variables is suspect, due to the low Cronbach's α previously reported for computer use (.40) and computer experience (.56). Neither computer use nor computer experience was found to be related to technology attitudes (liking, confidence, and importance of computers as a learning method).

Older teachers in this study had more anxiety toward computers. This supports some previous research findings on the correlation between age and anxiety (Jones & Wall, 1989; Rosen, Sears, & Weil, 1980). However, others have found no correlation between age and anxiety (Bradley & Russell, 1997; Harris & Grandgenett, 1996; Honeyman & White, 1987; Rosen & Maguire, 1990; Yang, Mohamed, & Beyerbach, 1999). Older teachers in this study also had less confidence in their ability to use computers. This is similar to findings of Dyck and Smither (1994) who found computer confidence was lower for older adults.

The finding that older teachers exhibited highest levels of computer anxiety and had less confidence in technology is also of concern given that the nation has an aging teaching workforce. Therefore, characteristics of older teachers and their corresponding relationship to computer anxiety, attitudes toward technology, and confidence in using computers should be taken into account by trainers in preparing technology instruction for teachers. Training should

be based on best practices identified for reaching adult learners (Knowles, 1990). Several of the older teachers in the present study who reported little or no computer experience prior to the workshop chose to seek additional computer training beyond the basic training provided in this study. This was perceived to be an indicator that they were more confident in their ability to use computers and desired to learn more. The age factor has implications for the FACS teacher cadre. In Mississippi, for instance, 45% of teachers holding FACS endorsements have 20 or more years of teaching experience (Cheek, 2002), indicating an aging FACS teaching force.

Results of this study indicate that computer training can be helpful for teachers in overcoming their anxieties about using computers in the classroom. This finding supports previous research by Ropp (1999) and Reed and Overbaugh (1993) who found significantly reduced computer anxiety following instruction. Technology training can also help improve teachers' confidence in their ability to use or learn about computers and their liking or enjoyment of computers. In the current study, teacher computer anxiety decreased while their confidence in ability to use or learn about computers and liking of computers increased following technology training.

Trainers who plan technology workshops for in-service teachers, however, should be cautioned about assuming "a simplistic belief that increased computer experience alone will reduce computer anxiety" (McInerney et al., 1994, p. 27). Quality of training as opposed to quantity of training is the key (Bradley & Russell, 1997). However, even long-term computer use will not eliminate the need for training, and even teachers who are currently technologically proficient will need update training on new technology (Scheffler & Logan, 1999).

In the present study, two weeks of technology training did not appear to have an influence on teacher attitudes toward the importance and effectiveness of computers as an educational medium. This finding may be expected because teachers did not yet have the opportunity to incorporate technology in their classrooms at the time the post-test was given. If their attitudes had been assessed at a later time, perhaps they would have viewed computers as an educational medium more positively.

Although extensive planning for the training occurred prior to the study to ensure that participants were given ample time to practice using software during the two-week period, follow-up training is advised. This supports Honeyman and White's (1987) conclusion that teachers with limited computer experience "require adequate time working with the computer to allow these anxiety levels to lower, and educators should be cautious about using short-term inservice activities which allow minimal computer contact when working with beginning adults" (p. 129). In the present model, an optional two-day session was provided one year later for the first two groups. This training was well received and provided an opportunity for study participants to learn new technology applications and build on the basic skills acquired in the two-week training. A side benefit was the strengthening of the esprit de corps among the trainees.

Given the increasing amount of technology available for use in high school FACS classrooms, more technology training experiences need to be provided for practicing teachers. Teachers who have not received support training can be expected to be reluctant to incorporate technology in the classroom. The model used in this study, whereby training was developed and provided by university FACS faculty, was credible and can be replicated in other states.

Finally, faculty in university teacher education programs should also evaluate current curriculum to assure adequate technology education and experiences for pre-service FACS teachers. This conclusion is important in view of the fact that the National Council for

Accreditation of Teacher Education (NCATE) has added a technology component to its standards to help ensure that teacher education candidates have adequate preparation for using technology in teaching (National Council for Accreditation of Teacher Education, 2001). Further, the International Society for Technology in Education (1998) has released the national educational technology standards for students for grades Pre-K through 12, which necessitate that educators be skilled in the use of technology for student learning. According to a special report by the U.S. Congress Office of Technology Assessment (1995), new teacher education graduates are not being prepared to use technology as a teaching tool.

Technology is a reality, and teaching with technology is an expectation in the FACS classroom. As Rosen and Weil (1995) concluded, “[students] must be taught about technology by adults who are comfortable with the technology and confident in their technological skills” (p. 27).

References

- Bradley, G., & Russell, G. (1997). Computer experience, school support and computer anxieties [Electronic version]. *Educational Psychology, 17*(3), 267-285.
- Cheek, W. K. (in press). Supply pipeline for FCS teachers in Mississippi: A preliminary analysis. *American Association of Family and Consumer Sciences 2002 Proceedings*.
- Cheek, W. K., Hastings, S. W., & Lokken, S. L. (2001). FCS secondary curriculum: Developing leaders for the new millennium. *Journal of Family and Consumer Sciences, 93*(4).
- Chin, S. S., & Hortin, J. A. (1993-94). Teachers' perceptions of instructional technology and staff development. *Journal of Educational Technology Systems, 22*(2), 83-98.
- Chou, T. R. (1997). *The relationships among computer usage, experience with the computer, computer anxiety, and attitudes toward computers for secondary agricultural education teachers in the United States*. Mississippi State University: Dissertation.
- Chu, P. C., & Spires, E. E. (1991). Validating the Computer Anxiety Rating Scale: Effects of cognitive style and computer courses on computer anxiety. *Computers in Human Behavior, 7*, 7-21.
- Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York, NY: Teachers College Press.
- Daulton, M. (1997). Microcomputer adoption by family and consumer sciences teachers: An historical perspective. *Journal of Family and Consumer Sciences Education, 15*(2), 55-60.
- Dyck, J. L. & Smither, J. A. (1994). Age differences in computer anxiety: The role of computer experience, gender, and education. *Journal of Educational Computing Research, 10*, 239-248.
- Fletcher, W. E., & Deeds, J. P.,(1995). Computer anxiety and other factors preventing computer use among United States secondary agricultural educators, *Journal of Agricultural Education, 35*(2), 16-21.
- Hakkinen, P. (1994-95). Changes in computer anxiety in a required computer course. *Journal of Research on Computing in Education, 27*(2), 141-153.

- Harris, J. B., & Grandgenett, N. (1996). Correlates among teachers' anxieties, demographics, and telecomputing activity [Electronic version]. *Journal of Research on Computing in Education*, 28(3), 300 – 318.
- Heinssen, R., Glass, C., & Knight, L. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale, *Computers in Human Behaviour*, 3, 49-59.
- Honeyman, D. S., & White, W. J. (1987). Computer anxiety in educators learning to use the computer: A preliminary report. *Journal of Research on Computing in Education*, 20(2), 129-138.
- Howard, G. S. (1986). *Computer anxiety and management use of microcomputers*. Ann Arbor, MI: UMI Research Press.
- International Society for Technology in Education. (1998, June). *National educational technology standards for students*. Eugene, OR: Author.
- Jones, P. E., & Wall, R. E. (1989). Components of computer anxiety. *Journal of Educational Technology Systems*, 18, 161-168.
- Jordan, W. R., & Follman, J. M. (1993). *Using technology to improve teaching and learning* (Report No. IR 016 026). Tallahassee, FL: SouthEastern Region Vision for Education. (ERIC Document Reproduction Service No. ED 355 930)
- Kluever, R., Lam, T. C. M., Hoffman, E. R., Green, K. E., & Swearingen, D. L. (1994). The Computer Attitude Scale: Assessing changes in teachers' attitudes toward computers [Electronic version]. *Journal of Educational Computing Research*, 11(3), 251-261.
- Knowles, M. (1990). *The adult learner: A neglected species*. Houston, TX: Gulf.
- Kotrlik, J. W., Harrison, B. C., & Redmann, D. H. (2000). A comparison of information technology training sources, value, knowledge, and skills for Louisiana's secondary vocational teachers. *Journal of Vocational Education Research*, 25(4). Retrieved May 15, 2002, from Digital Library and Archives.
- Larner, D. K., & Timberlake, L. M. (1995). *Teachers with limited computer knowledge: Variables affecting use and hints to increase use*. (Report No. EDO-SP-36-93, ERIC No. ED 384 595).
- Liu, M., & Reed, W. M. (1992). Teacher education students and computers: Gender, major, prior computer experience, occurrence, and anxiety [Electronic version]. *Journal of Research on Computers in Education*, 24(4), 457-468.
- Longstreth, M., Kelly, M. E., & Paris, K. L. (1989). Microcomputer adoption and use among home economics teachers. *Journal of Vocational Home Economics Education*, 7, 80-91.
- Martin, R. E., & Lundstrom, K. (1988). Attitudes of vocational home economics teachers towards computers. *Journal of Vocational Education Research*, 13(1), 83-93.
- McInerney, V., McInerney, D. M., & Sinclair, K. E. (1994). Student teachers, computer anxiety and computer experience. *Journal of Educational Computing Research*, 11(1), 27-50.

- Miller, L. W. (1997). Computer integration by vocational teacher educators. *Journal of Vocational and Technical Education*, 14(1). Retrieved May 15, 2002, from Digital Library and Archives database.
- Morrison, G. R., Lowther, D. L., & DeMeulle, L. (1999). *Integrating computer technology in the classroom*. Upper Saddle River, NJ: Merrill.
- National Council for Accreditation of Teacher Education. (2001). *Professional standards for the accreditation of schools, colleges, and departments of education*. Retrieved December 17, 2001, from <http://www.ncate.org>
- Redick, S. S., Vail, A., Smith, B. P., Thomas, R. G., Copa, P., Mileham, C., Laster, J. F., Fedje, C., Johnson, J., & Alexander, K. (1998). *Family and consumer sciences: A chapter of the curriculum handbook*. Alexandria, VA: The Association for Supervision and Curriculum Development.
- Reed, W. M., & Overbaugh, R. C. (1993). The effects of prior experience and instructional format on teacher education students' computer anxiety and performance. *Computers in Schools*, 9(2/3), 75-89.
- Ropp, M. M. (1999). Exploring individual characteristics associated with learning to use computers in preservice teacher preparation [Electronic version]. *Journal of Research on Computing in Education*, 31(4), 402-425.
- Rosen, L. D., & Maguire, P. (1990). Myths and realities of computerphobia: A meta-analysis. *Anxiety Research*, 3(3), 175-191.
- Rosen, L. D., Sears, D. C., & Weil, M. M. (1980). Computerphobia. *Behavior Research Methods, Instruments, & Computers*, 19(2), 167-179.
- Rosen, R. D., & Weil, M. M. (1995). Computer availability, computer experience and technophobia among public school teachers. *Computers in Human Behavior*, 11(1), 9-31.
- Scheffler, F. L., & Logan, J. P. (1999). Computer technology in schools: What teachers should know and be able to do [Electronic version]. *Journal of Research on Computing in Education*, 31(3), 305-327.
- Sheingold, K., & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice*. (ERIC No. ED 322 900).
- Simonson, M. (1995). Instructional technology and attitude change. In G. J. Aglin (Ed.), *Instructional technology: Past, present, and future* (pp. 365-373). Englewood, CO: Libraries Unlimited.
- Smith, K. E., (1993). Development of the primary teacher questionnaire. *Journal of Educational Research*, 87(1), 23-29.
- U.S. Congress, Office of Technology Assessment. (1995). *Teachers and technology: Making the connection*. OTA-HER-616. Washington, DC: U.S. Government Printing Office.
- Vagle, R. (1995). Technology instruction for preservice teachers: An examination of exemplary programs. In *Technology and teacher education annual, 1995* (pp. 230-237). Charlottesville, VA: Association for the Advancement of Computing in Education.

- Way, W. L., & Montgomery, B. (1995). Hypermedia technology: Tools for implementing critical science-based curricula in family and consumer education. *Journal of Family and Consumer Sciences Education, 13*(1), 1-15.
- Weil, M., Rosen, D., & Wulgalter, S. (1990). The aetiology of computerphobia. *Computers in Human Behaviour, 6*(4), 361-379.
- Woodrow, J. E. J. (1992). The influence of programming training on the computer literacy and attitudes of preservice teachers. *Journal of Research on Computing in Education, 25*(2), 200-219.
- Yang, H. H., Mohamed, D., & Beyerbach, B. (1999). An investigation of computer anxiety among vocational-technical teachers. *Journal of Industrial Teacher Education, 37*(1), 64-82.
- Yildirim, S. (2000). Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use [Electronic version]. *Journal of Research on Computing in Education, 32*(4), 479-497.

About the Authors

Sheri Lokken, Ph.D. and Wanda K. Cheek, Ph.D. are Assistant Professors in the School of Human Sciences at Mississippi State University. Shirley W. Hastings, Ph.D. is Professor and Associate Dean at The University of Tennessee Agricultural Extension Service (formerly director of the School of Human Sciences at Mississippi State University). The authors served as members of the university training team for the study.