A STUDY OF THE USE OF COMPUTERS IN FAMILY AND CONSUMER SCIENCES CLASSROOMS IN THE STATE OF UTAH

by

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ABSTRACT

A Study of the Use of Computers in Family and Consumer Sciences

Classrooms in the State of Utah

by

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In the last decade alone, the number of computers in schools has increased tenfold. Experts attribute this tremendous surge in technology in schools to sweeping changes in the workplace. Lawmakers and parents have pressed educators to prepare students to compete in a high-tech workplace.

In Utah millions of dollars have been spent installing computer technology in public schools. Although computers are generally available in every school in the state, many teachers do not use them because of inadequate or out-of-date training. Many teachers simply do not know how to utilize computers in their role as teachers. Teachers who are not computer literate cannot be expected to model and/or teach appropriate use of technology in their classrooms.

The purpose of this study was (a) to investigate the extent and effect of computer training of secondary family and consumer sciences (FACS) teachers in the state of Utah, and (b) to determine whether there is a relationship between teacher computer training and teachers' utilization in their role as FACS teachers. Specifically, this study examined three aspects of computer training: type of training, length of computer training, and source of computer training.

During the 1995-96 school year, a random sampling of FACS teachers in the state of Utah was asked to participate in this research. The response rate was 80%, which represented 61.7% of the population.

The design of the study was survey research. A three-part questionnaire was sent to participants to gather data on personal demographics, school characteristics, and computer attitudes. The data were coded and entered into SPSS 7.5 for analysis. Inferential statistics, including t tests, ANOVA, Pearson product-moment correlation, and chi-square, were used to analyze the data.

Analysis of the data revealed that there was a significant relationship between computer training and many of the personal demographic variables. There were also statistically significant relationships between computer training and several of the school characteristics. As expected, computer anxiety decreased as computer training increased. Computer confidence and computer liking were both increased with computer training.

(210 pages)

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CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

In July 1993, Michael O. Leavitt, the governor of the state of Utah, delivered an address to the legislators and the Utah State Board of Regents encouraging the use of "innovative technological advancements" in education in the state of Utah (Leavitt, 1993). Governor Leavitt is not alone in recognizing that technology has the potential to be a powerful tool in the hands of teachers and that educators must make changes in order to take advantage of the new technology (Maness, 1992).

In July 1994, the Technology Resource Center for Family and Consumer Sciences (TRCFACS) was established in the state of Utah. This center is located in the FACS Department on the campus of Southern Utah University. One of the main goals of this center is to support the use of technology in the FACS classroom. Since its inception the TRCFACS has co-sponsored numerous computer workshops for FACS teachers designed to train FACS education teachers to use computer technology in the instructional programs.

In 1995, the Utah Family and Consumer Sciences (FACS) Advisory Board, which is made up of the state FACS (formerly Home Economics) specialist and representatives from each of the state's four-year universities offering degrees in FACS education, modified the mandated requirements for a bachelor of science degree in FACS. One of the changes implemented at that time was the addition of a course on computer literacy for all preservice FACS teachers.

The Utah State Office of Education and several professional organizations, including the Utah FACS Association and the Utah Association of Teachers of Vocational FACS, have attempted to encourage the use of computers by FACS teachers by offering computer workshops and presentations. Many FACS teachers have taken advantage of these education and training opportunities.

Additionally, some school districts and schools have offered computer workshops for their teachers with the same end in mind. The number of FACS teachers who have received such training has not been documented.

Although many FACS teacher educators and school administrators believe that most FACS teachers have received computer training, no data exist to support this belief or to indicate the impact of the training that has taken place to date. Therefore, this study examined the number of FACS teachers who have received computer training, the type of training, computer attitudes of FACS teachers, computer use, the frequency of training, and the impact of the training on the classroom.

Purpose of the Study

The purpose of this study was to examine the extent of computer training of secondary Family and Consumer Sciences (FACS) teachers in the state of Utah to determine whether there is a relationship between teacher computer training and the teachers' use of the computers in their role as FACS professionals. More specifically, three aspects of computer training will be examined: the type of training, the length of training, and the source of the training. This research examined the impact of computer workshops on the computer use and computer attitudes of secondary FACS teachers.

In order to encourage the use of technology in secondary FACS programs, detailed information was needed about the impact of the computer training that has taken place. This research examined the effects of computer technology training on secondary FACS teachers in the state of Utah.

Limitations

This study only examined computer training and its impact for secondary FACS teachers in the state of Utah.

The limitations acknowledged in this research are:

1. The subjects in this study were limited to secondary FACS teachers during the 1995-1996 school year.

2. The study addressed Utah public schools only.

3. The data collected for this study were self-reported and thus are subject to the errors of this technique.

This study will not attempt to address the issue of the effectiveness of the use of technology in the classroom. There have been numerous studies examining this issue and the conclusions and recommendations are available.

Impact of the Study

This study provides information regarding the influence of training on application. The information gathered by this research will be made available to the State Office of

Education for use in planning inservice workshops for FACS teachers. It will also be available for use by the TRCFACS to help identify and meet the training and technology needs of FACS teachers, and to the colleges and universities with majors in secondary FACS education.

Research Questions

This research focused on three main areas: the affect of computer training, factors that may effect computer use, and computer attitudes.

Is computer use (hours used, classes used in, how used, nonuse, location of computer in the school, type of computer) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Are the computer attitude variables (anxiety, confidence, liking) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Is computer use (hours used, classes used in, how used, nonuse, location of computer in school, type of computer) related to (a) demographic variable (gender, age, income, degree, year of degree, membership in professional organizations), (b) school characteristics (grades taught, school enrollment, class size, number of preparations), and/or (c) computer attitude variables (anxiety, confidence, liking)?

Are computer attitude variables (anxiety, confidence, liking) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations), and/or (b) school characteristics (grades taught, school enrollment, class size, number of preparations)?

Assumptions

This research assumes that subjects represented themselves honestly when responding to all parts of the questionnaire.

CHAPTER II

REVIEW OF LITERATURE

Since computers first entered public schools, literally thousands of studies have been conducted investigating their educational effects. Although criticism and controversy exist, much of the literature reports computer technology's positive effects on achievement (Hadley & Sheingold, 1993; Reeves, 1998).

This review of literature will not attempt to debate the usefulness of computers in the classroom, but rather will focus on the following areas: computer use in education, factors affecting teachers' use of computers, barriers to use of computer technology in education, and contributors to successful use of computer technology in schools. This will be followed by a review of the literature regarding the use of computers in education in the state of Utah and computer use by secondary Family and Consumer Science Education (FACS) teachers.

Computer Use in Education

Investment in educational technology and innovations is not new to the reform movement of the 1990s. Snider (1992) noted that from the 1950s to the late 1960s, just after the Russian Sputnik success, the United States spent billions of dollars on all types of educational innovations. In this century, schools have seen lantern slides, sound recordings, silent and then talking movies, filmstrips, radio, teaching machines, televisions, and video cassette recorders. School personnel believe they must have the latest technology in order to provide an "up-to-date" education (Ely, 1990). One of the most recent technological advances used in education is the personal computer.

Personal computers have been in existence for approximately 25 years, and for the majority of that time, they have been present in the classroom (Shotsberger, 1992). Vast sums of money have been spent in the effort to place computers in classrooms. In 1996, Sivan-Kachala and Bialo reported that more than 18.1 million computers were installed in public and private schools, colleges, and universities as of December 1994.

In 1984(a), Loyd and Gressard stated that there was no longer a question about whether computers should be used in the classroom; discussion now focuses on how and when they should be used. Years later, Katz (1992) said that computers in education had not yet become the potent force that had been expected. There are a number of possible reasons for this, chief among them being the enormous cost involved in acquiring the needed hardware and software and teachers who are unprepared to use the emerging technology.

Despite years of notable failure, the current technological revolution, brought about primarily by the power of personal computers, will not be quickly abandoned. The sheer power of the computer and its implications for future labor markets are among the reasons Snider (1992) believes that the technological revolution will be widely adopted and integrated into schools as well as society at large.

Snider is not alone in this view. A review of documents in the ERIC system reveals hundreds of articles that present a favorable view of computer technology as a way of reforming public education. So pervasive is the assumption that these innovative technologies are capable of causing significant reform that it suggests that many educators view the adoption of computer technology as a reform movement in and of itself.

Unfortunately, the proliferation of computer technology in schools has not been accompanied by a similar increase in its instructional use. Although the vast majority of teachers have access to computer technology in their classrooms, less than one-half of them actually integrate computer use into the curriculum (Hadfield, Maddux, Cleborne, & Love, 1997).

A review of literature on computer use in schools reveals several issues that have been addressed. They include: why computer technology is used in schools (Heavyside & Farris, 1995), how computer technology is used in schools (Crain, 1992), frequency of computer use in schools (Ely, 1990), and who uses computer technology in schools (Hayes, 1995).

Why Technology Is Used in Schools

In addressing the issue of why computers are used in schools there are two different approaches that can be taken. One is to look at the purpose of the use of technology, and the other is to look at the benefits of using technology in schools.

Purpose of Computers in Schools

Hawkridge, Jaworski, and McMahon (1990) addressed the issue of "why" computers are used in schools when he identified four rationales for computer use. The social rationale contends that computers are used because they are an integral part of society and all students should know how to use them. The vocational rationale theorizes that learning to use computers is an important competency, that there are many employment opportunities for people with skills in using computers. The pedagogic rationale says that students can learn from computers, that computers have advantages over traditional methods of teaching. The catalytic rationale assumes that schools can change for the better; computers facilitate change, are a symbol of progress, and they encourage learning.

Trotter (1998), in discussing classroom technology, said that one of the difficulties in determining the effectiveness of education technology is that there is little consensus about its purpose. He suggested four broad goals that may explain why computers are used in schools. First, many parents and business leaders see technology as a tool to prepare students for the workplace. Second, technology may be used to improve the school climate, by involving parents, motivating students, and making schools run better. Third, technology may be used to help raise standardized test scores. The fourth and last goal suggested by Trotter is that technology is seen as a way to foster other educational reforms, such as making classrooms learner-centered, changing the way teachers teach, and improving assessments. He noted that policymakers see the primary benefit of technology in schools as preparing students to live and work in the Digital Age.

Today a driving force in the use of technology in schools is to meet the challenge issued by President Clinton in 1996 when he launched a national mission to make all children technologically literate by the 21st century (America's Technology Literacy Challenge, 1996).

Benefits of Using Computers in Schools

In 1981, Johnson stated that emerging computer technology had the potential of making education interesting, active, and exciting. Since that time, other researchers (Heavyside & Farris, 1995; Miller, 1990) have examined the use of computers in schools and have identified specific ways in which computers can benefit the process of education.

Lawton and Gerschner (1982) found that students felt that computers have infinite patience, never get tired, and never get frustrated or angry. Computers also, when appropriately programmed, never forget to give praise or feedback and they can easily individualize instruction. Clements (1981) found that students liked computers because they were self-paced, did not embarrass students when they made mistakes, and gave immediate feedback. Miller (1990) pointed out that computers could improve educational access. This is especially beneficial to students who live in remote areas with insufficient school enrollment to employ full-time faculty in every curriculum area.

Moreover, Miller (1990) also found that computers reduced learning time, reduced cost, provided instructional consistency, encouraged mastery of learning, and provided privacy. Miller also pointed out that computers increase safety by allowing students to experiment with various subjects without fear of injury.

Computers increase the ease with which a teacher can individualize instruction, track student progress, and remediate students, thus saving time. Computers are excellent for drill and practice and for structuring instruction to be delivered in small increments. Computers save time by generating tests, worksheets, and letters. They can also assist teachers in writing lesson plans and maintaining student grades (Hope, 1997).

According the U.S. Advisory Council on the National Information Infrastructure (1996), educational technology has many benefits. It (a) brings the world to the classroom; enables students to learn by doing; (b) encourages students with limited or no English skills to learn English; (c) includes parents as partners in their children's education; (d) makes it possible for educators to teach at more than one location simultaneously; (e) enables educators to accommodate the varied learning styles and paces of learning within the classroom; (f) encourages students to become lifelong learners; (g) enables administrators and educators to reduce time spent on administration and record keeping; and (h) helps students become proficient in the basic technological skills needed to take their place in society.

Legislation

The issue of why computer technology is used in schools cannot be adequately addressed without addressing the issue of legislation. Legislators on local, state and national levels have recognized the value of computer technology in schools and have addressed the issue in a variety of forms.

In 1996, President Clinton launched a national mission to make all children technologically literate by the dawn of the 21st century (America's Technology Literacy Challenge). He challenged the private sector, schools, teachers, parents, students, community groups, state and local governments, and the federal government to meet the goal by building four pillars that would:

1. Provide all teachers the training and support they need to help students

learn through computers and the information superhighway.

2. Develop effective and engaging software and on-line learning resources as an integral part of the school curriculum.

3. Provide access to modern computers for all teachers and students.

4. Connect every school and classroom in America to the information superhighway.

President Clinton created a $2 billion, 5-year, Technology Literacy Challenge Fund to jump-start and leverage state, local, and private sector efforts so that schools could provide all children with a greater opportunity to learn the skills they need to thrive in the next century.

How Computer Technology Is Used in Schools

Many researchers have identified ways in which the computer can be used in education (Crain, 1992; Dryli & Kinnaman, 1994; Soulier, 1988; Tolman & Allred, 1991). The literature reveals that computer use falls into two distinct categories: as a productivity enhancement tool and for delivery of instruction. As a productivity enhancement tool, computers are used for tracking students' grades and producing materials for teaching.

When delivering instruction, some of the more frequently cited categories of use include: drill and practice, tutorials, simulations, problem solving, and games. Computers can be used as an instructional or learning tool or to help manage instruction. Heavyside and Farris (1995) found that computers were used most often for word processing, followed by drill and practice, and then educational games.

Frequency of Computer Technology Use in Schools

In 1976, Bukoski and Korotkin predicted that by 1984 all secondary schools in the United States would have access to computers for instructional and administrative purposes. By 1982, approximately one third of all schools in the US had computer access (Tolman & Allred, 1991). In 1994, Siegel reported that 99% of schools in the United States had computers and that 93% of students used computers at school sometime during the school year. In October 1995, Hayes reported that the national average of students to personal computers was 12:1.

Unfortunately, the proliferation of computer technology in schools has not been accompanied by a similar increase in its instructional use in all disciplines. The frequency of use appears to be related to both the subject matter taught (Tolman & Allred, 1991), and teachers' attitudes toward computers (Dupagne & Krendl, 1992). These topics will be discussed subsequently.

Who Is Using Computers in Schools

Hayes (1995) reported that when computers first entered schools, they were most likely to be found in computer labs. They then spread to libraries or other learning centers, and eventually found their way into individual classrooms. In spite of this trend, Heavyside and Farris (1995) found that computers were most often used by administrators. Libraries were next most likely to have computers.

Many schools have computer centers, thus requiring teachers to take their students to a different room in the school to use the computers. Tolman and Allred (1991) reported that 56% of all high school computers are located in computer labs. Individual classrooms are the least likely location in schools to have computers. Among teachers, those who teach math are the most likely to use computers (23%), followed by English (14%) and science teachers (11%). Computer coordinators stated that they expected to see an increase in the use of computers in other curriculum areas over the next few years.

The issue of who uses computers cannot be adequately addressed without examining who knows how to use computers. Students cannot learn about computers unless they have teachers who are knowledgeable about computer technology. Yet, while computers are abundant in schools, a majority of teachers do not have the background knowledge needed to use them effectively (McNamara & Pedigo, 1995). Even in schools with a moderate number of computers, many teachers are unprepared to incorporate the computers into their curriculum or to instruct their students in the use of computers. It is illogical to expect computer-illiterate teachers to teach students to become computer literate (Piotrowski, 1992; Stecher & Solorzano, 1987).

Factors Affecting a Teacher's Use of Computers

There are many potential influences on whether or not a teacher will use computer technology in the classroom. Among them are the teacher's training, personal characteristics of the teacher, the characteristics of the school in which he/she teaches, and barriers and contributors to successful use of computers. Each of these will be addressed.

Teacher Training

Twenty-first century schools will demand 21st century teachers capable of using what may be the ultimate resource for teaching and learning--computers. The ability to use computers to access, retrieve, and apply information to specific learning and tasks will be a prized skill. The teacher who possesses this skill will be at a definite advantage (Hope, 1997). One of the more regretable aspects of educational technology is how ill prepared most teachers are to use it--despite widespread attention to this issue.

As has been discussed, most schools in the United States now have computers available for use by teachers. Unfortunately, there is a discrepancy between the technological resources available to teachers and the teachers' ability to effectively use these technologies.

According to Natale (1997), the biggest obstacle to the implementation of technology in education is not a lack of hardware, but rather the fact that many teachers are not ready to use the computers that are available to them. Teachers lack computer knowledge because most current teachers received no training in computer technology in college and have not received such training during their teaching career (Kearsley, 1998). National statistics have shown that teachers receive far less on-the-job training in technology than any other professional group.

The problem with training teachers goes beyond recognizing the need for training. Fulton (1988) observed that there is controversy in deciding who is responsible for training the teachers: the universities, the local school boards, or the state board of education. Outen (1994) pointed out that valuable time is being lost while a debate is carried on as to who should train the teachers.

This problem should begin to diminish as current teachers graduate from college with at least one computer course. Many colleges and universities have already begun requiring a minimum amount of computer literacy education for preservice teachers and the National Council for Accreditation of Teacher Education (Natale, 1997) plans to require schools to meet technology standards for accreditation after the year 2000.

Although new requirements for accreditation will help to alleviate the problem of technologically illiterate teachers, many teacher education programs may be unprepared to adequately provide preservice teachers with appropriate computer training. Colleges and universities face many of the same funding problems that K-12 schools face and therefore cannot afford to maintain up-to-date equipment. Another potential problem for colleges and universities planning to educate preservice teachers in computer literacy is finding faculty at their school who have the expertise to train teachers (Willis, 1997).

Assuming that colleges and universities could adequately meet the computer training needs of preservice teachers still leaves schools with a large proportion of their faculty untrained in the use of computers in the classroom. Therefore, staff development needs to be addressed. One of the many lessons learned from the past two decades of school technology planning is that dropping computers into a classroom and “dipping staff members in technology training workshops” is not an effective way to get teachers to use technology in their classrooms (Hoffman, 1997).

While most school personnel would agree that lack of training is the major factor that prevents the effective use of educational technology, the majority of school districts are not investing sufficient funds in computer education for teachers (McNamara & Pedigo, 1995). Despite the educational community's generosity in purchasing computers, it generally has not been willing to devote the necessary funding to provide computer training for teachers and to hire computer resource teachers (Barker, 1994).

Since technology is constantly changing, even those teachers who have received computer training may already be lacking in needed skills. In order for teachers to be knowledgeable about computer technology and use it effectively, they need continuing training (Becker, 1994).

Day (1996) stated that staff development needs to move out of the horse-and-buggy era. We cannot expect teachers to become proficient in using computers in the classroom if adequate technology training is not provided. A recent national study indicated that more than 25% of schools spend nothing on staff development. On average, districts devote no more than 15% of technology budgets to teacher training. Millions of dollars are spent for acquisition of software and hardware, billions on new and retrofit buildings, but very little on refitting teachers.

There is little point in acquiring hardware but making no provision for teacher development and support. At the federal level, two major education initiatives–the Goals 2000: Educate American Act and the Improving America's Schools Act–have made professional development a priority, though neither has singled out technology training specifically (Harrington-Lueker, 1996).

Even though there has been some improvement in technology expertise among teachers over the last few years, there has been a much more rapid increase in sophistication of hardware and software during the same period. Thus, the gap between the two widens as time passes (Maddux, 1997).

If computer technology is to have any impact on education, significant changes need to be made in the way teachers are trained. Professional development is essential if teachers are to take advantage of the instructional opportunities that computer technology affords. Time and effort must be spent to help teachers gain the skills necessary to use technology in new ways (Mergendoller, 1997).

Teacher Characteristics

While some teachers show interest in learning to use computers, others resist. Researchers have attempted to identify the reasons why some teachers seem to be more willing to adopt computer technology than others. The possible reasons can be broken into two categories: personal demographics and attitudes toward computers.

Personal Demographics

Personal demographic characteristics which might have an impact on computer usage include: age (Dyck & Smither, 1994; Martin & Lundstrom, 1988; Massoud, 1991), gender (Coutts, 1996; Dyck & Smither, 1994; Shashani, 1994; Wiburg, 1994-5), and previous computer experience (Brady, 1991; Dupagne & Krendl, 1992; Dyck & Smither, 1994; Pickard, 1988).

Age. Older Americans are often stereotyped as having negative attitudes toward change and innovation. The literature on the effect of age on computer use is not conclusive. Some researchers have suggested that older people have more computer aversion than younger people do (Hadfield et al., 1997). Other studies do not support this idea (Igbaria & Chakrabarti, 1990; Ray & Minch, 1990).

Gender. A popular suggestion has been that computing is a male endeavor, and females will therefore exhibit a higher degree of computer aversion than will males. Results of a study by Reinen and Plomp (1997) indicated that females knew less about information technology and enjoyed using the computer less than male students did. Brosnan (1998) reported that females had higher levels of computer anxiety than males.

However, several investigators have found gender to be unrelated to any measure of computer aversion (Busch, 1995; Dyck & Smither, 1994; Edelbrock, 1990; Leite, 1994). In their meta-analysis of empirical studies, Rosen and Maguire (1990) concluded that the differences in computer aversion between the sexes were neither strong nor consistent. Loyd and Gressard (1984a) reported no significant differences in attitudes toward computers of males and females at high school and college age level.

Experience. Computer aversion is often blamed on inexperience of teachers and past computer experience has been shown to be inversely related to computer aversion. One survey reported that only 25% of teachers had taken an undergraduate computer course, and 51% stated that the major factor that would influence them to increase the use of computer technology in their classroom would be to receive more and better training (Hadfield et al., 1997; Instructor Survey, 1991).

Geissler and Horridge (1993) found that attitudes of students who had taken high school or university computer courses were significantly different from those students who had not. Research conducted by Levine and Donitsa-Schmidt (1997) supports the hypothesis that a casual model exists for computer experience and commitment to learning about computers. Walters and Necessary (1996) reported that prior computer experience (in particular, having a computer at home) had a stronger influence on computer attitudes than did gender.

The results of research by Dyck and Smither (1994) indicated that when the effects of computer experience were controlled, there were no gender differences. This suggests that the influence of computer experience may explain the mixed results of prior work.

Attitudes Toward Computers

One possible cause of lack of desire to use computers is computer anxiety. A number of variables may be related to computer anxiety, including gender, age, location of computers, major program area, level of education, years of teaching experience, location of school, hours of computer use, and formal computer training (Gordon, 1995; Pomeroy, 1990).

Loyd and Gressard (1984a) conducted an empirical study of attitudes and found that three types of attitudes were significant: computer anxiety, computer confidence, and computer liking. They defined computer anxiety as an anxiety toward or fear of computers or of learning to use computers. Computer confidence relates to a person's confidence in their ability to learn about or to use computers, and computer liking refers to enjoyment of computers and using them. Pickard (1988), noted that attitudes toward computers were predictive of a person's intention to use or not use a computer. This idea was supported by Martin and Lundstrom (1988), who found that attitudes toward technology play an important role in the acceptance of innovations. For teachers, it is important to have a positive attitude toward computers because they are teaching tools. Loyd and Gressard (1984b) also reported that positive attitudes increase the likelihood that computers would be used, whereas negative attitudes decreased the likelihood. Hignite and Echternacht (1992) found a significant correlation between computer attitudes and computer literacy among educators.

Necessary and Parish (1996) used the Computer Attitude Survey developed by Loyd and Gressard in their research. They found computer experience to be significantly related with reduced computer anxiety, enhanced computer confidence, and increased liking of computers.

To provide computer-based and computer-assisted instruction to more students, teachers in all subject areas must be prepared to integrate computers into their curricula by becoming computer literate. It has been shown that teachers often experience more computer anxiety than their students do. Because computer anxiety is usually thought of as a temporary condition that can be overcome by learning in an environment structured to reduce anxiety, the first step in gaining computer literacy is to provide adequate instruction to overcome that anxiety. Both content-specific and introductory computer courses were found to be effective in reducing computer anxiety (Overbaugh & Reed, 1994-5).

School Characteristics

Even when a teacher has the necessary knowledge and desire to use computers in the classroom, the school setting may be inhibiting. Several factors related to the school itself may impact computer use, among them the size of the school and school district, principal's attitude toward computer use in education, the availability of computer hardware and software, and the location of the hardware/software (Brady, 1991).

Barriers to Computer Use

Literature reveals many possible reasons why teachers are not using computer technology in the classroom more extensively.

Inadequate Training

As previously discussed, the lack of time devoted to training may often be the result of a lack of funding earmarked for that purpose. If a school's equipment is to be used well, experts generally agree that at least 30% of the technology budget ought to be expended on professional development (Natale, 1997).

More often than not, adequate training is difficult to obtain. Often, states will spend millions of dollars on equipment, and may only spend a fraction of that budget–2 to 3%–on training. There are few nationwide data on what percentage of teachers have received training, and even less on what form that training has taken. A 1994 survey by the U.S. Department of Education shows that only 15% of the nation's teachers had spent at least 9 hours in educational technology instruction (Bobbit, S. A., Broughman, S. P., & Gruber, K. J., 1995).

Administrators and policy makers tend to think they are getting more for their money if it goes for something they can touch, and they cannot touch teacher training. There is a notion that if money is spent on teacher training, it is taking money away from spending on students. Many people believe that teachers ought to pay for their own training. Just because a district spends money on training does not mean that it will be effective (Natale, 1997).

Some teachers may have experienced computer training that in reality was "non-training." Many computer training courses offered to inservice teachers are conducted by computer or programming experts. These experts may have great technical skills but be unaware of any aspect of adult learning characteristics. This type of training may be worse than no training at all (D. Lee, 1997).

Lack of Time

Time becomes a major constraint when teachers are expected to use computers in their classrooms. It takes time to learn to use the computer. Many researchers have acknowledged that effective computer training does not occur in days, but rather over months and years of experience. Teachers, already overburdened with work, find it nearly impossible to find time to learn to use new technology (Inoue, 1996-97).

Teachers who have taken the time to develop computer skills find that their time commitment has just begun. To effectively use computers in the classroom requires far more than just knowledge of how to run the computer. Teachers who use technology must also learn how to manage their classrooms differently and must adapt their curriculum to make use of new technology (Chen, 1989; Day, 1996).

Another time-consuming aspect of using computer technology is configuring hardware and software. If the school does not have a computer specialist, this job often falls to individual teachers. This job requires not only a higher degree of computer training, but also additional time to execute (Maddux, 1997).

Lack of Money

Even teachers with the best training in how to use computers in the classroom may not be able to actually implement their plan because many schools lack up-to-date equipment. Purchasing computer equipment is costly and maintaining it only adds to the monetary burden. Many schools that report having an adequate number of computers have computers that are outdated and incapable of running current software programs. Schools typically focus on the obvious costs of buying hardware without giving consideration to the costs associated with purchasing software, maintenance and repair, training and technical staffing, replacement and system upgrades, and telecommunication connections (Fabry & Higgs, 1997; Ritchie, 1996).

Resistance to Change

Although lack of finances is more often cited as the excuse, it is probable that attitudes and old habits are more often responsible for schools not being on the "cutting edge" of technology (Laabs, 1994). Some teachers are simply reluctant to embrace new technology. They may worry about how computers will change their working environment, fear embarrassment in having to learn a new skill, and some may even fear being replaced by the computer (Fabry & Higgs, 1997; Marcinkiewicz, 1994).

Hope (1998) has suggested that teachers may resist change because they do not have a vision of how technology can change education. These teachers may simply need someone to articulate the advantages of technology over what they are presently doing to accomplish their work.

Lack of Recognition

Sturdivant (1989) noted that no recognition or encouragement from the administration at district or school level and resentment from peers regarding the fact that they are doing too much are factors that may stand in the way of teachers using computer technology in the classroom. Outen (1994) suggested that lack of recognition by administration and peers for their extra effort causes some teachers to give up using computers even when they have started using them.

Some teachers desire "recognition" in the form of a monetary reward or stipend for their time and efforts in learning about computer technology (Outen, 1994). As previously discussed, funds are generally limited and many administrators and policymakers are reluctant to spend money on nontangible items.

Lack of Access

Several researchers mentioned that lack of easy access to computers may prohibit teachers from using computers (Farby & Higgs, 1997; Hope, 1998; Kellenberger, 1997). According to Farby, access is more than simply the availability of technology in a school. Access involves locating the proper amount and right types of technology where teachers and students can effectively use them. About one half of computers in schools are located in centralized computer labs, in media centers, or in teachers' offices. These may not be accessible to teachers and their students on a daily basis.

Computerphobia

Weil, Rosen, and Wagalter (1990) reported that computerphobia (due largely to being unfamiliar with computers, or having deficient typing skills, and past negative experience with mechanical devices) was a major factor contributing to nonuse of computers in the classroom. Bohlin and Hunt (1995) reported that anxiety, confidence, and attitudes were all important factors in determining volunatary behaviors. Anxiety, lack of confidence, and negative attitudes can interfere with one's willingness or ability to comfortably use computers. Teachers with negative attitudes toward computers are less likely to choose to use computers in their teaching.

Lack of Appropriate Software

Teachers may possess the skills necessary to effectively use computers in the classroom but lack appropriate software to fit their curriculum. In some disciplines, there is not an abundance of good software on the market. In other disciplines, there is a more than adequate selection of software–but budgetary constraints may prohibit the teacher from acquiring it (Hoffman, 1997).

Outdated Computer Knowledge

Even teachers who have invested time and energy in learning how to use computer technology in the classroom will eventually find that their knowledge is no longer current. Computer technology is changing so quickly that it is hard to keep knowledge current (K. Lee, 1997). Niederhauser (1996) pointed out that we must make the commitment to help teachers gain the skills and understanding to teach in an information age classroom. This is a difficult, time consuming, and expensive proposition.

Contributors to Successful Use of Technology

Wilson, Teslow, Cyr, and Hamilton (1995) conducted research that identified factors that contribute to teachers' successful use of computer technology. They found that when computers were abundantly available, when there was a strong computer coordinator, a supportive district and principal, and a shared commitment and vision of school reform using technology, that teachers were more likely to use computers in the classroom. They also found that continuing and thorough teacher training, allowing the teachers to take computers home, and user friendly systems, increased teachers' use of computers.

Ely (1990) found that when teachers were dissatisfied with the status quo and saw that things could be improved, they were more likely to agree to the use of computers in the classroom. He also reported that teachers who received some type of reward or incentive were more willing to adopt computer technology in the classroom, and that when teachers felt they were involved in the planning and implementation of technology in the classroom, they were more likely to support the plan.

There are four factors in the teaching environment that tend to encourage the use of computers: collegiality among computer users, resources available for staff development and computer coordination, smaller class sizes, and school support for using computers for meaningful activities (Natale, 1997).

Natale (1997) also reported that 51% of school teachers were self-motivated to use technology. Thirty-one percent of teachers were motivated by incentives and 13% were motivated by mandates that they use technology.

Characteristics of Effective Inservice Computer Training

Recognizing the need for teacher training is only part of the solution. Much thought and planning must go into the design of the training for it to be successful. Effective models of training are those that decrease anxiety, are highly individualized, are practical and hands-on, and occur in stages (McNamara & Pedigo, 1995).

Reducing Teacher Anxiety

It has been found that teacher anxiety is a determining factor in the lack of adoption of computer use in the schools (Woodrow, 1992). One key component of both preservice and inservice teacher training, therefore, must address the task of improving teacher attitudes toward computers by increasing their skill and comfort levels. Teachers who might otherwise be very excited about the use of technology in their classrooms too often suffer from anxiety and fear when it comes to the use of computers (Barker, 1994). Since computer usage among teachers is highly reliant on attitudes toward technology, improving teachers' comfort level with computers is key to increasing effective applications of computers in the classroom (McNamara & Pedigo, 1995).

Barker (1994) found that despite a strong desire to learn more about computers, teachers who did not feel adequately prepared to use computers effectively in their classrooms rarely used computers in the curriculum. As well as decreasing the amount of computer usage in the classroom, teacher attitudes toward computers can affect student achievement in technology. Students taught by a teacher with a positive outlook on computer usage demonstrated a higher level of achievement in technology.

In addition to a training session, teachers should be a part of a social network of computer users. The network can be comprised of experts who have already mastered the technology or a community of teacher-learners who combine their efforts and successes in learning the technology. This network offers additional support and training to teachers who might need it and helps to reduce anxiety (Becker, 1994).

Individualizing Instruction

Another aspect of effective computer instruction is individualizing training for teachers. Trainers should be sensitive to teachers' differing needs, abilities, and comfort levels (Gordon, 1995). Since teachers' time is very limited, they want to be instructed in areas that are valuable and of interest to them.

Therefore, training should be designed to meet teachers' individual needs. Care needs to be taken to ensure that groups are not too heterogeneous in terms of individual skill levels and the speed in which the teachers are able to acquire new skills. A heterogeneous class is much more challenging for the trainer and much less useful to the teachers taking the class (McNamara & Pedigo, 1995). It was also recommended that training occur on the school grounds to better adapt to teacher schedules and so that computer equipment actually owned by the school can be used (Gordon, 1995).

Addressing Application Potential

Teachers want to know how the training will help them both personally and professionally (Stecher & Solorzano, 1987). Piotrowski (1992) found that teachers want to know how to integrate computers into the existing curriculum so that they can use it with their students. Hence, training should be very useful in nature, offering suggestions that are pertinent to the teachers' subject areas and grade levels (Stecher & Solorzano, 1987). For this reason it has been recommended that training be conducted by fellow teachers who are experts in the field, rather than outsiders who are unfamiliar with classroom applications (McNamara & Pedigo, 1995).

Incorporating Hands-On Experience

Another component of training sessions that makes them valuable is hands-on experience with the computer (Barker, 1994). Sessions that are not largely comprised of talk, and thus allow for plenty of guided practice, are the most effective. The existence of written materials to go along with training sessions has also been noted as a helpful measure, since they free the trainee from extensive note taking during the sessions and allow him/her more time for exploration (Stecher & Solorzano, 1987).

Training in Stages

Another critical issue, which must be considered when planning training sessions, is that teachers acquire computer literacy in stages. The training session must be planned to meet the needs of teachers who are on different levels of achievement. Ehley (1992) proposed a model for the stages of literacy acquisition which include: (a) overcoming any fear of computers (b) using computers in daily activities, (c) using computers as professional tools, (d) identifying new ways to use computers, and (e) creating own computer applications. The stages progress from basic skills to more complex skills, thus allowing teachers to identify their needs and take advantage of training on an appropriate level. For training to be most effective, it is critical that teachers are provided some type of follow-up support after the training sessions (Gordon, 1995).

Computers in Education in the State of Utah

In the spring of 1990, Utah's legislature passed a law known as the Educational Technology Initiative. A primary goal of this legislation was to improve students' learning and promote the economic welfare of the state. The purpose of the legislation was to provide Utahns a world class education that would enable Utah's businesses to compete in the global economy. Computer technology was identified as the fundamental means of reaching these goals. To fund the proposal, a partnership that included the state's legislature, colleges, universities, public schools, and businesses was formed to raise revenues for the purchase of educational technology.

Utah's legislature, colleges, universities, businesses, and public schools invested approximately 120 million dollars in educational technology between the years 1990-91 and 1992-93. During the same years, more than 900 ETI partnerships were formed to support the promotion and development of technology in Utah schools. In 1994, Galvin and Sperry predicted that ETI funding would likely shift from investments in computer hardware and software to support for in-service and expanded administrative uses.

In 1993, Governor Leavitt, of the state of Utah, challenged educators in the state to make technology-delivered education a part of every student's educational experience. He also said that failure to prepare students for the technology-delivered world is like not teaching them to read.

A 1993 survey of computer use in Utah public school revealed that of 673 schools (kindergarten through 12th grade) 89% owned a local area network (LAN) but only 20%

had integrated learning systems (ILS) and 74% had CD-ROM drives (Technology in the USA 1994). These numbers appear to support the claim that technology was present in Utah schools. Unfortunately, what the survey did not reveal was how and how much this technology was actually used by classroom teachers.

Although the legislature had given financial support to school technology each year between 1990 and 1993, the money was allocated through supplemental funding. Beginning in 1993, however, lawmakers made technology a line item in the state budget. That funding paid for computer maintenance and replacement. Like other states, Utah still had weak spots in its educational technology program. Chief among them was teacher training (Natale, 1997).

By 1994, Utah's legislature had provided more than 30 million dollars to support the purchase of computer technologies in the state's schools (Galvin & Sperry, 1994). With these technologies in place there was an increasing concern about providing the inservice training necessary to support their adoption and utilization in the classroom. Senate Bill 21 (Educational Technology Initiative, 1994) allowed school districts to spend up to 25% of their ETI legislative funds for teacher inservice. This legislation was consistent with the emerging consensus in the literature about inservice and technology. Sudzina (1993), for example, argued that teaching is generally complicated through the use of technology in the classroom. To offset these problems, Sudzina concluded that both inservice and preservice education should place technology near the center of learning and curricula improvements.

In 1994, Galvin and Sperry predicted that investment in Utah's technological infrastructure was likely to take a turn in direction in the near future. Where the previous 3 years had seen investment in hardware and software, the question on the minds of educators and policymakers alike was the use of these computers. In this regard, more attention and funding was likely to be directed toward the inservice and preservice training of teachers in the technological areas.

The 1994 Utah Legislature allocated 9.05 million dollars to the Utah State System of Higher Education for the expanded development of technology at the universities and colleges in Utah. This money had the potential of benefiting the secondary system by educating preservice teachers in the use of computer technology. However, some viewed its direct impact on secondary schools as minimal because none of the money was being used to purchase hardware for those schools.

As of 1994, approximately 43 million dollars has been appropriated to school districts in the state of Utah to purchase computers and related equipment and to train teachers in their use. A report from the Beryl Buck Institute for Education (Mergendoller, Sacks, & Horan, 1994) indicated that the legislature believed that technology has the potential to increase student achievement and school functioning by changing the curriculum. The report further stated that technology in the schools would contribute to teachers' professional growth and help to create a more informed, capable, and productive workforce.

Mergendoller et al. (1994) reported that as a result of the ETI there had been "important changes" in student learning. The report also stated that teachers' use of computers was strongly correlated to their belief about computer effectiveness. It was found that teachers who were actively involved in the ETI doubled the time they spent using technology for instructional purposes.

Although ETI made a dramatic difference in the quantity and quality of hardware and software that was available in schools in the state of Utah, inservice training needs to be emphasized in order to realize the benefits of the investment that has been made in hardware and software.

Computer Use by Secondary Family and Consumer Sciences Education Teachers

Reports of studies conducted by the American Institute for Research in both 1970 and 1975 show that although computers were being used in many disciplines, there was no mention of use of computers for instructional purposes in FACS programs (Lotz-Kamin, 1986). That computers are being used within the FACS discipline has been documented by a number of researchers (Burkart, Muller & O'Neill, 1985; Campanis 1986; Capjack, 1993; Faircloth, Clawson & Godwin, 1985; Hicks-Evans, 1988; Lotz-Kamin, 1986; Martin & Lundstrom, 1988; Thorne, 1993). Burkart et al. (1985) stated that computers were the most dramatic facet of new technology to affect the FACS profession in recent years. The impact of computers has been felt in nearly every area of daily living and FACS professionals have been discussing and reporting on computer use for more than two decades.

Although there is potential for the use of computers in all subject matter areas within FACS, studies show that teachers are more likely to use computers in certain subject matters. The area most likely to utilize computers is food and nutrition (Burkart et al., 1985). Other areas that now have a variety of available programs include interior design, clothing construction, and consumer education (Faircloth et al., 1985).

Brady (1991) reported that nationally 90% of FACS teachers say they are self-taught in the use of computers, close to 80% have attended conferences and workshops on their own time, and nearly 60% have taken inservice courses offered by their district and/or school. Nationally, more than 80% of FACS teachers have a computer at home.

Studies on how computers are used in FACS classrooms disclose that home economists use computers in the same ways as other educators. These ways were discussed previously in the review of literature.

Johnson (1981) pointed out the possibility of computers making education a more interesting, active, and stimulating experience. If the goal of education, including all the subject areas of FACS, is to prepare students for life, then computers must be a part of that education. Computers have changed the skills that are required in the post-school world; therefore, computers must impact the way students are educated. If students are expected to function effectively in the 21st Century, which is dominated by technological innovations, then students need to know how to use and deal with computers (Diem, 1984).

Summary

Computers are prevalent in all schools and are being used in nearly all disciplines. Although computers are present in schools, many teachers are not using them or are not using them effectively because they lack an understanding of how to do so.

Much research has been done on computer training. Methods to increase the effectiveness of the training and increase teachers' use of computers in the classroom have been reported in the literature. At this stage what is most needed is application of the knowledge that has been gained about effective computer training.

CHAPTER III

METHODOLOGY

The methods and procedures used in this study are discussed in this chapter. The discussion is divided into four parts–a description of the population; a description of the respondents; a description of the questionnaire, its development, and administration; and the statistical analysis of the data.

Population

The target population for this research is secondary (7-12 grade) Family and Consumer Science (FACS) teachers in the state of Utah. A list of all current full-time secondary FACS teachers was obtained from the Utah State Office Education. At the time this research was conducted, there were approximately 446 secondary FACS teachers in the state of Utah.

Sample

The list of teachers received from the Utah State Office of Education was numbered from 1 to 446. A table of random numbers was used to produce a list of 340 unique numbers from the range of 1 to 446. This represented 76.2% of the population.

In May 1996, a letter (Appendix A) was sent to the 340 randomly selected FACS teachers requesting their participation in the study. They were asked to fill in a postcard (Appendix B) indicating their willingness to participate in the research. One hundred thirty-eight teachers returned the postcard. Of those, 112 indicated that they were willing to participate in the research and 26 indicated they would prefer not to participate. No reply to the postcard was received from 202 teachers. The questionnaire with a cover letter was mailed to the teachers who responded positively to the postcard (Appendix C). Those who did not respond negatively to the postcard were also sent a questionnaire with a cover letter again asking for their participation (Appendix D).

A few teachers responded to the postcard indicating they did not want to participate in the study but qualified their answer. For instance, several said they did not want to participate because they did not use computers. These teachers were sent a questionnaire with a cover letter (Appendix E) explaining that their participation was desired even though they did not use computers

Questionnaires were initially returned by 173 teachers. The low initial return rate may be due, in part, to the fact that the questionnaires were mailed in June 1996 and may have arrived at schools after teachers departed for summer vacation. In the fall of 1996, a follow-up letter and a second questionnaire were mailed to those teachers who had not responded to the first mailing (Appendix F). This resulted in 75 additional questionnaires being returned for a total of 248 respondents.

An effort was made to collect data from nonrespondents to determine if they were significantly different from respondents. Thirty teachers (approximately 30% of non-respondents) were randomly selected from the nonrespondents and were contacted by phone. Three of the 30 had moved; the other 27 all agreed to complete the questionnaire that was then mailed to them. All 27 did complete and return the questionnaire. This brought the total number of participants in the study to 275.

The respondents represented 80.0% of the random sample selected for the study and 61.7% of the population of secondary FACS teachers in the state of Utah.

Research Design

The design of this study is described as survey research. It employed a random sample for the purpose of data gathering. The unit of analysis was the individual.

The research attempted to assess the impact of computer training on the use of computers in the classroom by secondary FACS teachers in the state of Utah.

Data and Instrumentation

A three-part questionnaire was utilized to gather the data (Appendix G). The demographic section of the questionnaire was used to assess personal demographic data. The computer use component of the questionnaire was used to establish the respondent's access to and use of computers at school. The computer attitude survey was used to determine the respondent's attitude toward computers.

The first two parts of the questionnaire were developed by the researcher. The main objective of the questionnaire was to determine the impact of computer training on secondary FACS teachers in the state of Utah. Each item was written to measure a specific aspect of one of the research questions. The questions were closed or forced-choice because they are easy to answer, coding is not subject to interpretation, respondents classify themselves (thus avoiding misclassification), and they do not discriminate against the less talkative respondents. Types of forced choice response formats used included checklists, ranking, and multiple choice formats. For each question a broad range of response alternatives was provided. Where appropriate, the option "other (please specify)" was used to allow for unanticipated responses.

Instructions to the respondents were provided for each section of the questionnaire. Respondents were asked either to check appropriate boxes or rank items. Filter or contingency questions were used and were followed by inset questions and directions telling respondents which sections to go to next.

The questionnaire was reviewed by the FACS specialist for the state of Utah, a university English professor, a selected group of Utah State extension agents, faculty in the Department of Family and Consumer Sciences at Southern Utah University, and the researcher's dissertation committee. This resulted in minor revisions in wording on the questionnaire. The questionnaire was then informally tested by a group of non-secondary FACS professionals. This group included Utah State extension professionals and university FACS faculty.

The questionnaire was mailed by first class mail since research has shown that the return rate with this method is higher than when third class mail is used. One month after the questionnaires were mailed, a follow-up questionnaire with cover letter was mailed to those teachers who had not returned the original questionnaire. The tone of the letter indicated that it was assumed that they intended to return the original questionnaire and requested that they complete and mail it promptly. A second questionnaire was included with the letter.

A phone interview was conducted to gather data on the questionnaire from a random sample of 30 % of nonrespondents in order to determine if they were significantly different from respondents.

A third instrument, the Loyd and Gressard Computer Attitude Survey (CAS), was used to measure the respondents' attitudes toward computer use. This Likert-type instrument consists of 40 items regarding the respondents' attitudes toward computers and their use. This instrument usually takes less than 10 minutes to complete. Permission to use this instrument was obtained from B.H. Loyd and a copy of written permission is included in Appendix H.

The CAS measures three different concepts: computer anxiety, computer liking, and computer confidence. Loyd and Gressard (1984b) found the alpha reliability coefficients of the subscales were .86, .91, and .91 for each subscale, respectively. In 1993, Gardner, Discenza, and Dukes conducted research comparing four instruments used for measuring computer attitudes. They reported that the four scales they examined were all quite highly reliable and the same was true for content validity. They concluded that researchers could not go wrong using any of the scales. They did point out, however, that the CAS is becoming the measure of choice in research on computer attitudes. Thus, for this research the CAS was selected.

Statistical Analysis of the Data

Quantitative data were collected and descriptive statistics were applied to analyze central tendencies and frequencies. For those measures yielding mean scores, t tests were used. The independent variables were analyzed using correlations to determine relationships among the variables. Research questions and the statistical analysis used for each are summarized in Table 1.

In some instances, respondents failed to give answers to each question. In these cases, the question was treated as missing data and eliminated from statistical analysis; hence the differences observed in sample sizes by question.

Only data achieving the $p \leq .05$ level of significance are reported. This level of significance was chosen because of the small sample size and because this was an exploratory study.

Research Question One

Research question one asked: Is computer use (hours used, classes used in, how used, non-use, location of computer in school, type of computer) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

The first research question addressed the relationship between computer use and length of computer training, source of computer training, and type of computer training. The Pearson product-moment correlation statistical analysis was used to determine the correlation between computer use and length of training, and t tests were used to determine the relationship between computer use and source of computer training. One-way analysis of variance was used to determine the relationship between computer use and

Table 1

Research Questions and Data Analysis Applied

Question	Analysis
1. Is computer use related to (a) length of computer training, (b) source of computer training, and/or (c) type of computer training?	ANOVA t test correlation Chi-square
2. Are the computer attitude variables related to (a) length of computer training, (b) source of computer training, and/or (c) type of computer training?	ANOVA t test Correlation
3. Is computer use related to (a) demographic variables, (b) school characteristics, and/or (c) computer attitude variables?	ANOVA t test correlation Chi-square
4. Are computer attitude variables related to (a) demographic variables and/or (b) school characteristics?	ANOVA t test

the type of training. The chi-square was used to analyze the relationship between computer non-use, type of computer used, and location of computers with the length, source, and type of training. A 0.05 level of significance was used in all of the analyses.

Research Question Two

Research question two asked: Are the computer attitude variables (anxiety, confidence, liking) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

The second research question addressed the relationship between the computer attitude variables and the length, source, and type of computer training. The Pearson product-moment correlation statistical analysis was used to determine the correlation between the computer attitude variables and length of computer training, and t tests were used to analyze the relationship between the computer attitude variables and source of computer training. One-way analysis of variance was used to test the significance among groups for computer attitude variables and the type of computer class taken.

Research Question Three

Research question three asked: Is computer use (hours used, classes used in, how used, nonuse, location of computer in school, type of computer) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations), (b) school characteristics (grades taught, school enrollment, class size, number of preparations), and/or (c) computer attitude variables (anxiety, confidence, liking)?

The third research question addressed the relationship between computer use and demographic variables, school characteristics, and computer attitude variables. One-way analysis of variance, t tests, Pearson product-moment correlation, and chi-square were the statistics used.

Research Question Four

Research question four asked: Are computer attitude variables (anxiety, confidence, liking) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations) and/or (b) school characteristics (grades taught, school enrollment, class size, number of preparations)?

The fourth research question addressed the relationship between computer attitude variables and demographic variables and school characteristics. One-way analysis of variance was used to test the significance among groups, and t tests were used to test significance of two means. A 0.05 level of significance was used.

Summary

This research was designed to use inferential statistical analyses. Computerized methods of data analysis were used and the Statistical Package for the Social Sciences 7.5 (SPSS 7.5) was the software package used to accomplish the statistical processing of the data.

CHAPTER IV

RESULTS

The procedure and methodology for analyzing the data gathered from FACS teachers regarding use of computer technology were described in Chapter III. Chapter IV presents the analysis of the data.

The purpose of this research was to determine the extent of computer training of secondary FACS teachers in the state of Utah to determine if there is a relationship between teachers' computer training and their use of computers. Data were gathered through the use of a questionnaire that was sent to secondary FACS teachers in the state of Utah during the 1995-96 school year.

Of the 446 FACS teachers in the state of Utah, a random sample of 340 FACS teachers was selected using a random numbers table; this represented 76.2% of the population. This size sample was selected using the Sample Size Calculator (Creative Research Software) with a 95% confidence level. With a population of 446, it was determined that a sample size of 256 was needed. Anticipating a response rate of approximately 75%, it was estimated that the questionnaire should be sent to 340 FACS teachers.

Two hundred and forty-eight teachers responded to the mailed questionnaire (72.9% of sample). Phone calls were made to 27 (29.3% of nonrespondents) of the non-respondents who agreed to complete the questionnaire. Data from these 27 original non-respondents were compared to the original respondents on key data points. No statistically significant differences were determined; thus, the 27 were combined with the original sample. This brought the total number of respondents to 275 teachers. This represented 80.8% of the sample and 61.6% of the population.

Analysis of Research Question One

Research question one asked: Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Computer Use and Length of Training

The relationship between the computer use variables (hours used, number of classes in which the computer was used, student computer use, teacher computer use, user versus nonuser, location of the computer, and type of computer used) and length of training was analyzed using the Pearson correlation coefficient. The length of training ranged from 0 hours as the minimum to 374 hours as the maximum with a mean of 74.63. There was not a significant correlation between length of computer training and the number of hours per week FACS teachers used the computer, the use of the computer for student activities, computer use/nonuse, the location of the computer, nor the type of computer used (Table 2).

The relationship between the length of computer training and the number of classes in which the computer was used (computer use) were statistically evaluated using the Pearson correlation coefficient statistical technique. The sample size was 213 and the computer correlation coefficient, r, was .142. The SPSS output from this analysis indicated a probability, p, of .038 (Table 2), indicating a slight positive correlation between the length of computer training and the number of classes in which the computer was used. Pearson's correlation coefficient also revealed a significant positive correlation between the length of computer training and use of the computer for teacher tasks (p = .008) and length of computer training and the use of IBM-compatible computers (p = .013).

Table 2

Relationship Between Computer Use Variables and Length of Computer Training

	Length of computer training		
Variable	n	r	p
Hours used	214	0.989	0.192
Computer use	213	0.142	0.038*
Student	212	-0.977	0.266
Teacher	212	0.182	0.008*
User	275	0.118	0.051
Location	210	0.02	0.776
IBM compatible	212	0.17	0.013*
Mac	212	0.047	0.494

* $p < .05$.

Computer Use and Source of Training

To determine if the computer use variables were related to the source of computer training FACS teachers received, t tests were conducted. The data showed that there was no significant relationship between the source of computer training received and the hours per week the FACS teachers used the computer (hours used) (Table I-1, Appendix I). The number of classes in which teachers used a computer (computer use) was not significantly related to the type of training the teachers received. However, when a ratio of the classes in which a computer was used was divided by the total number of classes taught by a given teacher (ratio), the data show that teachers who had taken FACS computer classes were significantly more likely ($p = .026$) to use computers in their classrooms (Table 3).

In evaluating how computers were used in the classroom, the list of possible uses was divided into two lists based on how the computer was used, and two new variables, teacher use of computers and student use of computers, were created. Student use of computers included such uses as drill and practice, educational games, and tutorials.

Table 3

Computer Use by Source of Computer Training Using t-Test Analysis

Variable use	Type of training	n	Mean	SD	t	p
Ratio						
FACS class	None	180	0.5444	0.4225	-2.237	0.026*
	At least 1	33	0.7222	0.4047		
Student use						
FACS class	None	179	2.3296	3.7727	2.222	0.029*
	At least 1	33	1.3636	1.901		
Teacher use						
Other class	None	183	10.9945	5.0323	-2.552	0.011*
	At least 1	29	13.6207	5.8457		

* $p < .05$.

Teacher use of computers included such activities as grade tracking, materials generation, creating a web site, and inventory tracking. The results of the t tests showed there is a statistically significant difference ($p = .029$) in student computer use when the teacher had taken FACS workshops (Table 3). Also, teacher computer use was shown to be statistically significant when the FACS teacher had taken "other" computer classes ($p = .011$).

The chi-square statistic was used to determine if there was a significant difference between observed and expected frequencies of computer users and computer nonusers based on the source of computer training taken, the location of the computer within the school, and the type of computer they used (IBM-compatible or Macintosh). The chi-square statistic was selected because the categories were regarded as discrete and had only nominal values. The proportion of FACS teachers from the user group who took a college computer course was .46, whereas the proportion from the nonuser group taking a college computer course was .42. The difference in proportions was significant ($p = .031$) (Table 4).

There was no significant difference between the observed and expected frequencies of the location of the computer in the school and the source of training the teachers received (Table I-2) nor was there a significant difference between the type of computer used (IBM-compatible or Macintosh) and the type of training taken (Tables I-3 and I-4).

Computer Use and Type of Computer Training

The relationship between the computer use variables (hours used, classes used in, and how used) and type of computer training (show-and-tell, hands-on, programming, tutorial) was statistically analyzed using the one-way analysis of variance (ANOVA) statistical technique. The one-way ANOVA for this case was used to test the hypothesis that the means of each of the multiple groups were not significantly different from one another.

Data were collected and grouped according to the number of each workshop type

Table 4

Chi-Square, Expected, and Observed Frequencies of Nonuse by Source of Computer Training

Source of training	Nonuser Expected	Nonuser Observed	User Expected	User Observed	Value	Asymp sig
School class						
None	33.3	35	116.7	115	0.253	0.615
At least 1	27.7	26	97.3	99		
Total	61	61	214	214		
College class						
None	43.3	50	151.7	145	4.647	0.031 *
At least 1	17.7	11	62.3	69		
Total	61	61	214	214		
District class						
None	29.1	32	101.9	99	0.731	0.393
At least 1	31.9	29	112.1	115		
Total	61	61	214	214		
FACS class						
None	52.8	57	185.2	181	3.202	0.074
At least1	8.2	4	28.8	33		
Total	61	61	214	214		
Other class						
None	52.8	53	185.2	185	0.008	0.93
At least 1	8.2	8	28.8	29		
Total	61	61	214	214		

* $p < .05$.

each teacher had taken. In the ANOVA analysis, the computer use variables were the dependent variables while the type of computer workshop was the independent variable.

The computer use variables, hours used, number of classes in which the computer was used, and student use, were not significantly related to any of the four types of computer training (see Tables I-5, I-6, and I-7). The number of classes in which a computer was used divided by the total number of classes taught (ratio) was significantly related to both show-and-tell workshops (p = .022) and hands-on workshops (p = .018) (Table 5). Ratio was not significantly related to programming classes or tutorial classes (Table I-8). There was also a significant relationship (Table 6) between teacher computer use and both show-and-tell workshops (p = .048) and hands-on workshops (p = .001). There was not a significant relationship between teacher computer use and either programming or tutorial workshops (Table I-9).

The calculated significant F statistic indicated that the sample means were unequal but did not specify where the differences occurred. The Fisher least significant difference (LSD) test was used to determine the means contributing to the significance. One advantage of the LSD is that equal sample sizes are unnecessary. The LSD test was run at an alpha level of 0.05.

For the purpose of analysis, the responses related to show-and-tell workshops were divided into three groups. Group 1 (n = 88) consisted of teachers who had taken no show-and-tell workshops. Group 2 (n = 50) consisted of teachers who had taken one, while Group 3 (n = 75) was teachers who had taken two or more show-and-tell workshops.

For analysis of the data on hands-on workshops, the responses were categorized into four groups. Group 1 (n = 35) took no hands-on workshops, Group 2 (n = 45) took one hands-on workshop, Group 3 (n = 57) took two hands-on workshops, and Group 4 (n = 75) took three or more hands-on workshops.

Table 5

Analysis of Variance of Ratio by Type of Computer Workshop

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of variance for ratio by show-and-tell workshops					
Between groups	2	1.361	0.681	3.893	0.022*
Within groups	210	36.715	0.175		
Total	212	38.076			
Analysis of variance for ratio by hands-on					
Between groups	3	1.785	0.595	4.427	0.018*
Within groups	209	36.291			
Total	212	38.076			

* $p < .05$.

Table 6

Analysis of Variance for Teacher by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of variance for teacher by show-and-tell workshops					
Between groups	2	164.614	82.307	3.086	0.048*
Within groups	209	5573.853	26.669		
Total	211	38.076			
Analysis of variance for teacher by hands-on					
Between groups	3	414.037	138.012	5.391	0.001*
Within groups	208	5324.430	25.598		
Total	211	5738.467			

* $p < .05$.

In the analysis of the relationship between the number of classes in which computers were used divided by the total number of classes taught (ratio) and the number of show-and-tell workshops taken, the ANOVA statistic showed a significant relationship (p = .022, Table 5). The results of the LSD identified that a significant difference (p = .006) existed between FACS teachers who had taken two or more show-and-tell workshops and those who had taken just one show-and-tell workshop.

To analyze the relationship between ratio and number of hands-on workshops taken, the ANOVA statistic was used and a significant relationship was found (p = .018, Table 5). Ratio was the dependent variable and number of hands-on workshops was the independent variable with four levels. A post hoc LSD test was conducted to determine the location of the significance. The LSD test revealed that there was a significant difference between FACS teachers who had taken three or more hands-on computer workshops and both those who had taken only one hands-on workshop (p = .006). There was also a statistically significant difference between FACS teachers who had taken three or more hands-on computer workshops and those who had taken two hands-on workshops (p = .012).

The ANOVA for teacher by show-and-tell workshops revealed a significant relationship (p = .048, Table 6). The results of the LSD identified a significant difference existed between FACS teachers who had taken two or more show-and-tell workshops and those who had taken just one show-and-tell workshop (p = .024).

To analyze the relationship between use of the computer for teaching tasks ("teacher") and number of hands-on workshops taken, the ANOVA statistic was used, and a significant relationship was found ($p = .001$, Table 6). Teacher computer use was the dependent variable and number of hands-on workshops was the independent variable with four levels. The same process that was used to analyze teacher computer use and show-and-tell workshops was used. To determine the location of the significance, an LSD test was done. The LSD test revealed a significant difference between FACS teachers who had taken three or more hands-on computer workshops and both those who had taken no hands-on workshops ($p = .007$) and those who had taken one hands-on workshop ($p = .000$).

The chi-square statistic was used to analyze the difference between the observed and expected frequencies of type of computer training and computer use/nonuse, location of the computer, and type of computer used. Tables I-10, I-11, and I-12 show the results of the analysis. The proportion of FACS teachers who were not IBM-compatible users who received hands-on computer training was .79, whereas the proportion from the IBM-compatible user group who received hands-on computer training was .85. The difference in proportions was significant ($p = .024$) (Table 7).

Analysis of Research Question Two

Research question two asked: Are the computer attitude variables (anxiety, confidence, liking) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Table 7

Chi-Square, Expected, and Observed Frequencies of Type of Computer by Type of Computer Training

Type of training	Don't use IBM compatible Expected	Don't use IBM compatible Observed	Use IBM compatible Expected	Use IBM compatible Observed	Chi-square value	Asymp sig
Hands-on						
None	9.4	12	25.6	23		
1	12.1	18	32.9	27		
2	15.3	15	41.7	42		
3 or more	20.2	12	54.8	63		
Total	57	57	155	155	9.442	0.024*

* $p < .05$.

Computer Attitude Variables and Length of Computer Training

The data on computer anxiety and length of computer training were statistically evaluated using the Pearson correlation coefficient. The sample size was 273, and the computer correlation coefficient, r, was .305. The SPSS output from this analysis indicated a probability, p, of .000 (Table 8) indicating a very strong positive correlation between computer anxiety and length of computer training. (The anxiety variable was coded such that the higher the score, the lower the anxiety. Higher is better on all computer attitude variables: anxiety, confidence, and liking.) Therefore, the longer the training, the lower the anxiety.

Length of computer training and computer confidence were analyzed using the Pearson correlation coefficient. The sample size was 273 and the computer correlation coefficient, r, was .186. The SPSS output from this analysis indicated a probability, p, of

.002 (Table 8). This indicates a positive correlation between computer confidence and the length of computer training.

Computer liking and length of computer training were also analyzed using the Pearson correlation coefficient. The sample size was 273 and the computer correlation coefficient, r, was .228 ($p = .000$) (Table 8). This indicates a positive correlation between computer liking and length of computer training.

Table 8

Pearson Correlation Coefficients for Computer Attitude Variables and Length of Computer Training

Computer Attitude	Hours	N	r	p
Anxiety	r	273	0.305	0.000*
Confidence	p	273	0.186	0.002*
Liking	N	273	0.228	0.000*

* $p < .05$.

Computer Attitude Variables and Source of Training

The computer attitude variables relationship to source of computer training was analyzed using the t-test technique. The t test was used to test the hypothesis that the independent means of the two sample groups were different. Data related to the computer attitude variables were divided into groups based on the source of training. Group 1 represented teachers taking no class of that type, while Group 2 represented the teacher having taken one or more class of that type of training.

A comparison of the type of workshop taken and the computer attitude variable anxiety reveals several significant factors. Anxiety was significantly affected by three of the four sources of training (district class: t = -2.265, p = .024; college class: t = -2.495, p = .013; FACS class: t = -2.158, p = .032; and other class: t = -2.257, p = .025) (Table 9). Based on these results, it appears that computer classes from any source except the teacher's school are effective in decreasing anxiety.

A comparison of the type of workshop taken and computer confidence revealed that only school classes had a significant impact on the confidence of FACS teachers (t = -2.600, p = .010). Computer classes from all other sources did not have a significant impact on the confidence of the FACS teachers (Table 10).

A comparison of the type of workshop and computer liking shows that school classes (t = -2.448, p = .025), district classes (t = -2.160, p = .032), and college classes (t = -2-204, p = .028) significantly affect the computer liking of secondary FACS teachers in this study (Table 11).

Computer Attitude Variables and Type of Computer Training

The relationship between the computer attitude variables (anxiety, confidence, liking) and type of computer training (show-and-tell, hands-on, programming, tutorial) was statistically analyzed using the one-way ANOVA to test the hypothesis that the means of each of the groups were equal.

Data were collected and grouped according to the number of each workshop type each teacher had taken. In the ANOVA process, the computer attitude variables were the dependent variable, while the type of computer workshop was the independent variable.

Table 9

Computer Anxiety by Source of Computer Training

Variable	N	Mean	SD	t	p
Anxiety					
School class					
None	149	30.5772	4.9759	-1.816	0.07
At least 1	124	31.7258	5.4629		
District class					
None	131	30.3588	4.9801	-2.265	0.024*
At least 1	142	31.7817	5.3675		
College class					
None	193	30.5959	5.2314	-2.495	0.013*
At least 1	80	32.3125	5.0356		
FACS class					
None	236	30.8305	5.2864	-2.158	0.032*
At least 1	37	32.8108	4.5083		
Other class					
None	237	30.8228	5.2523	-2.257	0.025*
At least 1	36	32.9167	4.7109		

* $p < .05$.

Table 10

Computer Confidence by Source of Computer Training

Variable	N	Mean	SD	t	p
Confidence					
School class					
None	149	26.2282	2.9342	-2.6	0.01*
At least 1	124	27.1371	2.8034		
District class					
None	131	26.2977	2.8249	-1.884	0.061
At least 1	142	26.9577	2.9532		
College class					
None	193	26.5026	2.896	-1.224	0.222
At least 1	80	26.975	2.9208		
FACS class					
None	236	26.5805	2.9402	-0.869	0.386
At least 1	37	27.027	2.6821		
Other class					
None	237	26.5401	2.9015	-1.476	0.141
At least 1	36	27.3056	2.8866		

* $p < .05$.

Table 11

Computer Liking by Source of Computer Training

Variable	N	Mean	SD	t	p
Confidence					
School class					
None	149	29.0134	4.3774	-2.448	0.015*
At least 1	124	30.3145	4.368		
District class					
None	131	29.0076	4.4747	-2.16	0.032*
At least 1	142	30.1549	4.2979		
College class					
None	193	29.228	4.3922	-2.204	0.228*
At least 1	80	30.5125	4.3574		
FACS class					
None	236	29.428	4.4252	-1.674	0.095
At least 1	37	30.7297	4.2206		
Other class					
None	237	29.4388	4.3959	-1.595	0.112
At least 1	36	4.4325	4.4325		

* $p < .05$.

The first computer attitude variable, computer anxiety, was significantly related to three of the four types of computer training. Computer anxiety was decreased by FACS teachers' participation in show-and-tell workshops ($p = .001$) (Table 12), hands-on workshops ($p = .000$) (Table 13), and tutorial workshops ($p = .000$) (Table 14). Only 37 respondents had taken one programming workshop while 15 had taken two or more programming workshops. The number of participants having programming experience may have been too small to accurately measure the effect of programming classes.

The calculated significant F statistic indicated that the sample means are unequal but did not specify where the differences occur. In order to determine the location of the significance, the Fisher LSD test was used to identify which group means were different. The LSD test was run at an alpha level of 0.05.

Table 12

Analysis of Variance Statistic for Computer Anxiety in FACS Teachers When Grouped by Show-and-Tell Computer Workshops Taken

Source	df	Squares	Sum of squares	Mean F ratio	F prob
Between groups	2	371.594	185.797	7.113	0.001*
Within groups	270	7052.736	26.121		
Total	272				

* $p < .05$.

Table 13

Analysis of Variance Statistic for Computer Anxiety in FACS Teachers When Grouped by Hands-On Computer Workshops Taken

Source	df	Squares	Sum of squares	Mean F ratio	F prob
Between groups	3	694.538	231.513	9.254	0.000*
Within groups	269	6729.792	25.018		
Total	272				

* $p < .05$.

Table 14

Analysis of Variance Statistic for Computer Anxiety in FACS Teachers When Grouped by Tutorial Computer Workshops Taken

Source	df	Squares	Sum of squares	Mean F ratio	F prob
Between groups	2	443.398	221.699	8.575	0*
Within groups	270	6980.932	25.855		
Total	272				

* $p < .05$.

There were 120 teachers who had taken no show-and-tell computer workshops, 66 who had taken one, and 87 teachers who had taken two or more show-and-tell computer workshops. The results of the LSD identified that a significant difference existed between the anxiety of FACS teachers who had taken two or more show-and-tell workshops and those who had taken no show-and-tell workshops (p = .001) and those who had taken just one show-and-tell workshop (p = .003).

To analyze the relationship between computer anxiety and number of hands-on workshops taken, the ANOVA statistic was used. Anxiety was the dependent variable and number of hands-on workshops was the independent variable with four levels. Group 1 (n = 51) took no hands-on workshops, Group 2 (n = 61) took one hands-on workshop, Group 3 (n = 73) took two hands-on workshops, and Group 4 (n = 88) took three or more hands-on workshops. The same process that was used to analyze anxiety and show-and-tell workshops was used. To determine the location of the significance, an LSD test was done. The LSD test revealed that there was a significant difference in the computer anxiety between FACS teachers who had taken three or more hands-on computer workshops and those taking no hands-on workshops (p = .000), those taking one (p = .000) and those taking two hands-on workshops (p = .005). There was also a significant difference between teachers who took no hands-on workshops and those who took two hands-on workshops (p = .051)

Using the ANOVA statistic as above, computer anxiety was found to be statistically related to the number of tutorial workshops taken by FACS teachers. Two hundred respondents had taken no tutorial workshops, 30 had taken one, and 43 had taken two or more tutorial workshops. The post hoc LSD test showed that a significant difference existed between those who had taken two or more tutorial workshops and both those who had taken no tutorial workshops (p = .000) and those who had taken only one tutorial workshop (p = .013).

Computer confidence was significantly related to three of the four types of computer training (Table 15). The small number of teachers who participated in computer programming classes may account for the lack of significance between computer confidence and programming classes. The post hoc LSD test showed that a significant difference in computer confidence existed between FACS teachers who had taken two or more show-and-tell workshops and both those who had taken no show-and-tell workshops (p = .025) and those who had taken only one show-and-tell workshop (p = .025). The post hoc LSD test showed that significant differences existed between those who had taken three or more hands-on workshops, those who had taken no hands-on workshops (p = .005), and those who had taken only one hands-on workshop (p = .022). The post hoc LSD test also showed that significant difference existed between those who had taken two or more tutorial workshops and those who had taken no tutorial workshops (p = .000) and those who had taken only one tutorial workshop (p = .005).

Computer liking was also significantly related to three of the four types of computer training (Table 16). The post hoc LSD test showed that a significant difference in computer liking existed between FACS teachers who had taken two show-and-tell workshops and both those who had taken no show-and-tell workshops (p = .003) and those who had taken only one show-and-tell workshop (p = .034). The post hoc LSD test showed that significant differences existed between those who had taken two or more hands-on workshops and those who had taken no hands-on workshops (p = .019). There was also a significant difference between those who had taken three hands-on workshops and those who had taken no hands-on workshops (p = .001) and those who had taken only one hands-on workshop (p = .012). The post hoc LSD test also showed that significant difference existed between those who had taken two or more tutorial workshops and those who had taken no tutorial workshops (p = .001).

Analysis of Research Question Three

Research question three asked: Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) demographic

Table 15

Computer Confidence When Grouped by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Show-and-tell workshop					
Between groups	2	56.103	28.051	3.38	0.035*
Within groups	270	2240.718	8.299		
Total	272	2296.821			
Hands-on workshop					
Between groups	3	79.971	26.657	3.236	0.923*
Within groups	269	2216.849	8.241		
Total	272	2296.821			
Tutorial workshop					
Between groups	2	136.963	68.491	8.562	0.000*
Within groups	270	2159.838	7.999		
Total	272	2296.821			

* $p < .05$.

Table 16

Computer Liking When Grouped by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Show-and-tell workshop					
Between groups	2	56.103	28.051	3.38	0.035*
Within groups	270	2240.718	8.299		
Total	272	2296.821			
Hands-on workshop					
Between groups	3	79.971	26.657	3.236	0.023*
Within groups	269	2216.849	8.241		
Total	272	2296.821			
Tutorial workshop					
Between groups	2	136.963	68.491	8.562	0.000*
Within groups	270	2159.838	7.999		
Total	272	2296.821			

* $p < .05$.

variables (gender, age, income, degree, year of degree, membership in professional organizations), (b) school characteristics (grades taught, school enrollment, class size, number of preparations), and/or (c) computer attitude variables (anxiety, confidence, liking)?

Computer Use and Demographic Variables

To analyze the relationship between the computer use variables (hours, computer use, ratio, student, and teacher) and the demographic variables, the ANOVA statistic was used. Only one significant relationship was found among all the demographic variables and the computer use variables (Table 17). Nonsignificant comparisons are shown in Appendix I (Tables I-13 – I-17). Teacher computer use was found to be significantly related ($p = .037$) to the date of the last degree earned (Table 17). A post hoc LSD test

Table 17

Analysis of Variance for Teachers by Latest Degree

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Between groups	3	229.268	76.423	2.872	0.037*
Within groups	207	5508.779	26.612		
Total	210	5738.047			

* $p < .05$.

was conducted to determine the location of the significant relationship. The post hoc LSD test revealed that there was a significant difference between those teachers who used the computer for teaching tasks based on decade of college graduation. In this analysis, teachers were grouped by decade of graduation. FACS teachers who graduated prior to 1970 were significantly different from those who graduated in the 1980s ($p = .004$) and those graduating in the 1990s ($p = .024$).

The chi-square statistic was used to determine if there was a significant difference in computer use/nonuse based on demographic variables (Table I-18). There were no significant differences.

The chi-square statistic was used to determine if there was a significant difference related to the location of the computer by demographic variables (Table I-19). There were no significant differences.

The chi-square statistic was used to determine if there was a significant difference between the type of computer used based on demographic variables. The data showed there was a significant difference between income and IBM-compatible computer use ($p = .004$) (Table 18) and between income and Macintosh computer use ($p = .038$) (Table 19).

The chi-square analyses suggest that there is a relationship between income and use of IBM-compatible computers and similarly between income and use of Macintosh computers. Tables 18 and 19 reveal that the percentage of use for both the IBM-compatible and the Macintosh computers increases in direct proportion to the income; as the income increases, the percentage of use increases, with only one minor exception for each machine in the middle income bracket.

Computer Use and School Characteristics

To determine if there were any significant differences between computer use by school characteristics, t tests were conducted. The t tests showed that there was a significant difference between the number of classes in which the computer was used (computer use) and teaching grade 7 (p = .007), teaching grade 10 (p = .000), teaching grade 11 (p = .000), and teaching grade 12 (p = .000 (Table 20). It appears the higher the grade taught, the more likely the teacher was to use the computer in the classroom.

There was also a significant difference between student computer use (student) and teaching grade 8 (p = .020), teaching grade 10 (p = .019), teaching grade 11 (p = .018), and teaching grade 12 (p = .014) (Table 21).

Use of the computer for teaching tasks (teacher) was significantly different by teaching grade 11 (p = .013) and teaching grade 12 (p = .016) (Table 22). There were no significant differences between hours used and grade taught or ratio and grade taught (Tables I-20 and I-21).

Table 18

Chi-Square, Expected, and Observed Frequencies of Type of Computer (IBM-Compatible) by Demographic Variables

	Don't use IBM-compatible		Use IBM-compatible			Asymp
Income	Expected	Observed	Expected	Observed	Value	sig
Less than 30K	5.8	4	17.2	19		
30-40K	5.6	6	16.4	16		
40-50 K	7.6	15	22.4	15		
50-60 K	8.3	10	24.7	23		
60+ K	18.7	11	55.3	63		
Total	46	46	136	136	15.202	0.004*

* $p < .05$.

Table 19

Chi-Square, Expected, and Observed Frequencies of Type of Computer (Macintosh) by Demographic Variables

	Don't use Macintosh		Use Macintosh			Asymp
Income	Expected	Observed	Expected	Observed	Value	sig
Less than 30K	13	18	10	5		
30-40K	12.5	10	9.5	12		
40-50 K	17	12	13	18		
50-60 K	18.7	17	14.3	16		
60+ K	41.9	46	32.1	28		
Total	103	102	79	79	10.150	0.038*

* $p < .05$.

The means and the t value for grade 7 are each positive but less than one. Table 22 indicates a slight difference between those who do not use the computer for teaching tasks and those who do use the computer for teaching tasks. The differences are greater for grades 10, 11, and 12, and although the t value is negative due to the way the data was

Table 20

Computer Use by Grade Taught

Grade level	n	Mean	SD	t	p
Grade 7					
Don't teach	128	2.84	2.2846	2.715	0.007*
Do teach	82	1.98	2.2221		
Grade 8					
Don't teach	127	2.7	2.2759	1.536	0.126
Do teach	83	2.2	2.3046		
Grade 9					
Don't teach	104	2.46	2.1539	-0.27	0.788
Do teach	106	2.55	2.4344		
Grade 10					
Don't teach	91	1.84	1.5582	-3.816	0.000*
Do teach	119	3.02	2.6199		
Grade 11					
Don't teach	83	1.78	1.5543	-3.801	0.000*
Do teach	127	2.98	2.568		
Grade 12					
Don't teach	82	1.79	1.5614	-3.707	0.000*
Do teach	128	2.96	2.5638		

* $p < .05$.

entered for this analysis, the means are clearly larger for the teachers who do use the computer for these upper level classes.

The chi-square statistic was used to determine if there was a difference between computer use/nonuse based on the grade taught. There were no significant differences (Table I-22).

To analyze the relationship between the computer use variables (hours used, number of classes in which the computer was used, ratio, student computer use, and teacher computer use) and the school characteristics of school enrollment, class size, and number of preparations, the ANOVA statistic was used. The data showed that there was a

Table 21

Student Computer Use by Grade Taught

Grade level	n	Mean	SD	t	p
Grade 7					
Don't teach	128	1.83	3.1923	-1.956	0.052
Do teach	81	2.81	4.0593		
Grade 8					
Don't teach	127	1.75	3.086	-2.352	0.02*
Do teach	82	2.93	4.1448		
Grade 9					
Don't teach	103	1.73	2.981	-1.935	0.054
Do teach	106	2.68	4.0321		
Grade 10					
Don't teach	90	2.88	4.0275	2.371	0.019*
Do teach	119	1.71	3.1173		
Grade 11					
Don't teach	82	2.94	4.0775	2.393	0.018*
Do teach	127	1.74	3.1401		
Grade 12					
Don't teach	81	2.98	4.0895	2.49	0.014*
Do teach	128	1.73	3.1315		

* $p < .05$.

significant relationship ($p = .001$) between the number of classes in which the computer was used and the number of preparations (Table 23). There was, however, not a significant relationship between the number of classes in which a computer was used and school enrollment or size of the class (Table I-23).

The analyses showed no significant relationship between hours used (Table I-24), ratio (Table I-25), student computer use (Table I-26), or teacher computer use (Table I-27) and the three school characteristics.

The chi-square statistic was used to analyze the difference between the expected and observed frequencies of selected computer use variables (computer use/nonuse, location of the computer, and type of computer used) and selected school characteristic variables (school enrollment, class size, and number of preparations). The data revealed that there was a statistically significant difference ($p = .004$) between school enrollment and computer use (Table 24).

Table 22

Teacher Computer Use by Grade Taught

Grade level	n	Mean	SD	t	p
Grade 7					
Don't teach	128	11.6	5.3312	0.549	0.584
Do teach	81	11.1	5.0327		
Grade 8					
Don't teach	127	11.6	5.3371	0.858	0.392
Do teach	82	11	5.0123		
Grade 9					
Don't teach	103	11.4	4.9521	0.109	0.914
Do teach	106	11.4	5.4706		
Grade 10					
Don't teach	90	10.8	5.4051	-1.527	0.128
Do teach	119	11.9	5.0263		
Grade 11					
Don't teach	82	10.3	4.8749	-2.494	0.013*
Do teach	127	12.1	5.3113		
Grade 12					
Don't teach	81	10	4.9032	-2.431	0.016*
Do teach	128	12	5.2975		

* $p < .05$.

Table 23

Analysis of Variance for Computer Use by Number of Preparations

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Between groups	5	101.193	20.239	4.137	0.001*
Within groups	203	992.998	4.892		
Total	208	1094.191			

* $p < .05$.

It appears that the larger the school, the more likely the teacher is to use computers.

There was no significant difference between the location of the computer within the school based on the selected school characteristics (Table I-28). There was a significant difference between the type of computer used based on school enrollment (IBM-compatible, $p = .017$; Macintosh, $p =.028$) (Tables 25 and 26).

At first, it may appear that one type of computer (IBM-compatible or Macintosh) may be used more based on school enrollment, but upon further study of the data, it was revealed that as school enrollment increased, so did the use of computers in general.

Table 24

Chi-Square, Expected, and Observed Frequencies for Cross-Tabulations of Nonuse by School Characteristics

School enrollment	Nonuser Expected	Nonuser Observed	User Expected	User Observed	Value	Asymp sig
Under 250	7.2	10	24.8	22		
250-499	3.6	7	12.4	9		
500-749	4.3	4	14.7	15		
750-999	5.2	10	17.8	13		
1000-1499	17.3	14	59.7	63		
1500-1999	13.5	6	46.5	54		
Total	51	51	176	176	17.594	0.004*

* $p < .05$.

Computer Use and Computer Attitude Variables

Only three of the five computer use variables showed significance with the computer attitude variables: anxiety, confidence and liking. Neither hours used nor student use showed any significance (Table I-29).

Table 25

Chi-Square, Expected, and Observed Frequencies, for Type of Computer (IBM-Compatible) by School Characteristics

School enrollment	Don't use IBM-compatible Expected	Don't use IBM-compatible Observed	Use IBM-compatible Expected	Use IBM-compatible Observed	Value	Asymp sig
Under 250	6.2	8	15.8	14		
250-499	2.5	3	6.5	6		
500-749	4.2	9	10.8	6		
750-999	3.6	5	9.4	8		
1000-1499	17.6	16	45.4	47		
1500-1999	14.8	8	38.2	45		
Total	49	49	126	126	13.806	0.017*

* $p < .05$.

Table 26

Chi-Square, Expected, and Observed Frequencies for Type of Computer (Macintosh) by School Characteristics

School enrollment	Don't use Macintosh Expected	Don't use Macintosh Observed	Use Macintosh Expected	Use Macintosh Observed	Value	Asymp sig
Under 250	12.3	10	9.7	12		
250-499	5	3	4	6		
500-749	8.4	4	6.6	11		
750-999	7.3	6	5.7	7		
1000-1499	35.3	39	27.7	24		
1500-1999	29.7	36	23.3	17		
Total	98	98	77	77	12.569	0.028*

* $p < .05$.

When computer anxiety was correlated with the computer use variables, a Pearson's product-moment correlation revealed a significant correlation between anxiety and three of the five computer use variables: number of classes in which the computer was used ($r = .229$, $p = .001$), ratio ($r = .183$, $p = .008$), and teacher computer use ($r = .225$,

$p = .001$) (Table 27). When computer confidence was correlated with the computer use variables, a Pearson's product-moment correlation revealed a significant correlation between the number of classes in which a computer was used ($r = .138$, $p = .046$), ratio ($r = .176$, $p = .011$), and teacher computer use ($r = .189$, $p = .006$) (Table 27). When computer liking was correlated with the computer use variables, a Pearson's product-moment correlation revealed a significant correlation between the number of classes in which a computer was used ($r = .187$, $p = .006$), ratio ($r = .201$, $p = .003$), and teacher computer use ($r = .200$, $p = .004$) (Table 27).

Higher computer use by teachers, teacher use of the computer for teaching tasks, and a high ratio of classes taught to classes in which the computer is used all correlate with increased computer confidence and liking (Table 27). They are all also correlated with decreased computer anxiety.

To determine if the computer attitude variables were related to computer use/nonuse, the type of computer used, and the location of the computer in the school, t tests were conducted. Anxiety was found to be significantly related to whether a teacher was a computer user or a computer nonuser ($p = .004$) (Table 28). Teachers who used computers had significantly lower computer anxiety. Anxiety was also significantly related to the location of the computer ($p = .043$). Those teachers whose only access to a computer was in their own classroom had significantly lower computer anxiety than those teachers who had computer access only in a central location within the school.

Computer confidence was found to be significantly related to whether a teacher was a computer user or a computer nonuser ($p = .024$) (Table 29). Teachers who consider

Table 27

Computer Use Variables and Computer Attitude Variables

Variables	Anxiety	Confidence	Liking
Computer use			
Pearson corr	0.229	0.138	0.187
Sig (2-tail)	0.001*	0.046*	0.006*
N	211	211	211
Ratio			
Pearson corr	0.183	0.176	0.201
Sig (2-tail)	0.008*	0.011*	0.003*
N	211	211	211
Teacher			
Pearson corr	0.225	0.189	0.2
Sig (2-tail)	0.001*	0.006*	0.004*
N	210	210	210

* $p < .05$.

Table 28

Computer Anxiety by Computer Use Variables

Variable	n	Mean	SD	t	p
Anxiety					
Nonuser	61	29.4262	5.0513		
User	212	31.5802	5.1855	-2.875	0.004*
In Classroom only	112	31.4732	5.3574		
In central location only	21	28.9524	4.0801	2.045	0.043*

* $p < .05$.

themselves computer users have significantly higher computer confidence that teachers who do not use computers.

Computer liking was found to be significantly related to whether a teacher was a computer user or a computer nonuser ($p = .008$) (Table 30). Teachers who use computers had a significantly higher computer liking score than teachers who do not use computers.

Table 29

Computer Confidence by Computer Use Variables

Variable	n	Mean	SD	t	p
Nonuser	61	25.9016	2.8326		
User	212	26.8538	2.8983	-2.272	0.024

* $p < .05$.

Table 30

Computer Liking by Computer Use Variables

Variable	n	Mean	SD	t	p
Liking					
Nonuser	61	28.2951	4.8865		
User	212	29.9811	4.2044	-2.659	0.008*
In classroom only	112	30.0982	4.3267		
In central location only	21	27.6667	4.2582	2.369	0.019*

* $p < .05$.

Computer liking was also significantly related to the location of the computer in the school ($p = .019$). Teachers who had access to a computer in their own classroom had significantly higher computer liking scores than teachers who had access to a computer only in a central location within the school.

Analysis of Research Question Four

Research question four asked: Are computer attitude variables (anxiety, confidence, liking) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations) and/or (b) school characteristics (grades taught, school enrollment, class size, number of preparations)?

Computer Attitude Variables and Demographic Variables

The relationship between the computer attitude variables (anxiety, confidence, liking) and the demographic variables (age, income, highest degree, latest degree, and professional organizations) was statistically analyzed using the one-way ANOVA statistical technique. The one-way ANOVA for this case was used to test the hypothesis that the means of each of the groups were not different.

The data on the computer attitude variable, anxiety, are summarized in Table I-30. The results show that there is a significant difference in computer anxiety among selected FACS teachers in the state of Utah when they are grouped by year of last college degree ($p = .000$) (Table 31). A post hoc LSD test revealed that significant differences in computer anxiety exist between teachers who graduated after 1980 and those who graduated prior to 1980. All LSD tests were significant at the $p = .001$ level.

The results of the one-way ANOVA on computer confidence and the demographic variables is reported in Table I-31. The results show that there is a significant difference in computer confidence among Utah FACS teachers when grouped by year of last college degree ($p = .004$) (Table 32). A post hoc LSD test revealed that significant differences in computer confidence exist between those teachers who graduated after 1980 and those who graduated prior to 1980 with those graduating most recently having a higher computer confidence. All LSD tests were significant at the $p = .001$ level.

Analysis of the data on computer liking and the demographic variables using one-way ANOVA is summarized in Table I-32. Results show that there is a significant difference in computer liking among Utah FACS teachers when they are compared by year of last degree (p = .000) (Table 33). A post hoc LSD test revealed that significant differences in computer liking exist between FACS teachers who graduated after 1980 and those who graduated prior to 1980 with those graduating after 1980 more strongly liking the computer than those who graduated before 1980. All LSD tests were significant at the p = .001 level.

Computer Attitude Variables and School Characteristics

The relationship between the computer attitude variables (anxiety, confidence, liking) and school characteristics (school enrollment, class size and number of preparations)

Table 31

Analysis of Variance for Anxiety by Latest Degree

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Between groups	3	229.268	76.423	2.872	0.037*
Within groups	207	5508.779	26.612		
Total	210	5738.047			

* $p < .05$.

Table 32

Analysis of Variance for Confidence by Latest Degree

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Between groups	3	111.179	37.06	4.556	0.004*
Within groups	267	2171.655	8.134		
Total	270	2282.834			

* $p < .05$.

Table 33

Analysis of Variance for Liking by Latest Degree

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Between groups	3	420.558	140.186	7.741	0.0000*
Within groups	267	4835.324	18.11		
Total	210	5738.047			

* $p < .05$.

was statistically analyzed using one-way ANOVA. The one-way ANOVA for this case was used to test the hypothesis that the means of each of the multiple groups were not significantly different.

The results of the analysis (Tables I-33 to I-35) show that none of the school characteristic variables were statistically different by any of the computer attitude variables.

To analyze the relationship between the computer attitude variables and the grades taught, t tests were conducted. The data showed that there was no significant relationship between the grade taught and the computer attitude variables. These data are summarized in Tables I-36 to I-38.

Descriptive Data

The data on variables were separated into the following general areas: demographics, school characteristics, computer use, source of computer training, type of computer training, and computer attitude variables.

Demographic Variables

Table 34 summarizes the number of responses, mean, standard deviation, minimum, and maximum responses for demographic variables.

Much of the data was analyzed based on computer use/nonuse. Table 35 summarizes those data based first for total sample, then based on whether the respondent used a computer in the capacity as a secondary FACS teacher.

Gender

The sample was largely female (98.9%). Since the survey was conducted among secondary FACS teachers, who are predominately female, no comparisons were made on the basis of gender.

Age

The age of the participants ranged from under 30 to over 60. Nearly half of the subjects (n = 126 or 46.2%) were between the ages of 40 and 49.

Income

The question relating to income had an 84% percent response rate. (The following statement preceded the income item on the questionnaire: "Only summary data will be used for analysis of the following information. If you choose not to answer this question, please complete the remainder of the survey and return it.") The largest number of respondents indicated that their total household income was over $60,000 ($n$ = 91; 33.1%). It is assumed that these respondents live in a home with more than one income since the average salary for a secondary school teacher in the state of Utah during the 1995-96 school year was $30,495 (Mathews, 1998).

Highest Degree Earned

Thirty-eight respondents (14%) had only a bachelor's degree. One-hundred and seventy-six respondents (64.7%) had additional hours beyond a bachelor's degree, but had

Table 34

Descriptive Data for Demographic Data

Demographic variable	N	Mean	SD	Minimum	Maximum
Personal demographic variables					
Gender	273	1.01	0.10	1	2
Age	273	2.78	0.93	1	5
Income	231	5.61	1.43	2	7
Highest degree	272	2.23	0.88	1	4
Last degree	273	5.74	0.99	4	7
Membership in professional organizations	146	1.85	0.90	1	3
Computer class required for last degree	265	0.37	0.63	0	1
Computer literacy	262	2.41	0.52	1	4
Computer training	269	2.55	0.74	1	3
Home computer	273	0.85	0.38	0	2
Use of home computer:					
Word processing	274	0.82	0.38	0	1
Financial/record keeping	274	0.36	0.49	0	1
Games	274	0.51	0.52	0	1
Internet services	274	0.26	0.48	0	1
Education	274	0.50	0.50	0	1
Other	274	0.10	0.30	0	1
Number of computer workshops attended	275	2.16	1.59	0	6
Computer user	275	0.78	0.42	0	1

* $p < .05$.

Table 35

Descriptive Data on Demographic Variables

Demographic variable	Total sample N	Total sample %	Computer users N	Computer users %	Computer nonusers N	Computer nonusers %
Gender						
Male	3	1	3	1	0	0
Female	270	99	210	99	60	100
Age						
Under 30	23	8	16	8	7	11.5
30 - 39	74	27	61	29	13	21.3
40 - 49	126	46	102	48	24	39.3
50 - 59	40	15	27	13	13	21.3
60+	10	4	6	3	4	6.6
Income						
Under $14,999						
$15,000 - $19,999	2	1	2	1	0	0
$20,000 - $29,999	26	11	21	12	5	10.4
$30,000 - $39,999	28	12	22	12	6	12.5
$40,000 - $49,999	39	17	31	17	8	16.7
$50,000 - $59,999	45	20	33	18	12	25
$60,000 or more	91	39	74	40	17	35.4
Highest degree earned						
Bachelors	38	14	30	14	8	13.3
Bachelors + hours	176	65	131	62	45	75
Masters	16	6	13	6	3	5
Masters + hours	42	15	38	18	4	6.7
Last degree						
1960s or before	32	12	21	10	11	18.3
1970s	82	30	62	29	20	33.3
1980s	84	31	72	34	12	20
1990s	75	28	58	27	17	28.3
Membership in professional organizations						
UAFCS/AAFCS	71	26	57	27	14	22.9
UATFACS/NATFACS	26	10	19	9	7	11.4
Other	49	18	41	19	8	13.1
Computer literacy						
None	2	1	1	1	1	1.7
Minimal	152	58	105	52	47	78.3
Above average	106	41	96	48	10	16.7
Superior	2	1	0	0	2	3.3

(table continues)

Demographic variable	Total sample N	Total sample %	Computer users N	Computer users %	Computer nonusers N	Computer nonusers %
Computer class required for last degree						
yes	93	35	76	37	17	29.8
No	172	65	132	64	40	70.2
Computer training						
had training	40	15	31	15	9	15.8
Self-taught	41	15	27	13	14	24.6
Both	185	70	154	73	34	59.6
Use of						
Internet services	66	24	53	25	13	21.3
Education	138	50	114	54	24	39.3
Other	271	10	20	9	7	11.5
Home computer						
Yes	229	84	182	85	47	79.7
No	44	16	32	15	12	20.3
Number of workshops attended						
0	43	16	28	13	15	24.6
1	58	21	44	21	14	23
2	68	25	52	24	16	26.2
3	69	25	60	28	9	14.8
4	10	4	8	4	2	3.3
5	10	4	7	3	3	4.9
6	17	6	15	7	2	3.3

* $p < .05$.

not earned a master's degree. Sixteen respondents (5.9%) held a master's degree, and 42 (15.4%) of those had additional hours beyond the master's.

Last Degree Earned

Nearly 90% of the respondents received their latest college degree after 1970. They were fairly evenly split between the 1970s (n = 82 or 30%), the 1980s (n = 84 or 30.8%), and the 1990s (n = 75 or 27.5%). Only 32 (11.7%) respondents earned their most recent college degree prior to 1970.

Membership in Professional Organizations

Nearly 26% (n = 71) of respondents belong to the state and national professional organizations, Utah/American Association of Family and Consumer Sciences; and nearly 10% (n = 26) belong to the Utah/National Association of Teachers of Family and Consumer Sciences. Nearly 18% of respondents (n = 49) indicated they belong to "other" professional organizations.

Computer Class Required for Last Degree

Most of the respondents (65.3%) were not required to take a computer class during their college training. Over 34% (n = 92) of respondents were required to take a computer class as a requisite for at least one of their college degrees. A large number (n = 198 or 72.5%) of respondents graduated prior to 1990 when the practice of requiring some computer literacy came into common practice in colleges and universities.

Computer Literacy

Fifty-eight percent of respondents (n = 152) rated their computer literacy as "minimal," while just over 40% (n = 106) indicated their computer literacy was "above average." Only two respondents (0.8%) rated their computer literacy as "superior," and less than 1% of respondents (n = 2) rated their computer literacy as "none."

The two respondents who rated their computer literacy as "superior" also indicated they did not use a computer in their role as FACS teachers (therefore were considered nonusers for this study). One of the two wrote a note on the questionnaire indicating she did have a computer for her use ("i.e., word processing, grading, internet, e-mail, etc., but I would kill to have computers to use in my classroom"). Therefore, as "user" has been used in this study, this respondent would be classified as a user. The other respondent who indicated she was a nonuser with "superior" computer literacy gave no indication as to why she made those responses. It may be assumed that she also had no access to computers at school.

Computer Training

Nearly 15% of respondents (n = 40) indicated they had taken computer training and another 15% (n = 41) indicated they were self-taught. Nearly 70% of respondents (n = 188) indicated they had bought computer training and were self-taught.

Home Computer and Length of Ownership

Nearly 84% of respondents (n = 229) indicated they had a computer in their home. The majority (90.4%) of those with computers in their homes have owned their computer for 10 years or less.

How Home Computers are Used by Respondents

Eighty-two percent of respondents (n = 225) use computers for word processing; 35% (n = 96) use them for finance; 50% (n = 136) use them for games; 24% (n = 66) use them to access the Internet; 50% (n = 138) use them for education; and 10% (n = 27) use them for "other" purposes.

Number of Workshops Attended

Nearly 85% of respondents (n = 232) indicated that they had taken at least one computer workshop. Forty-three respondents (15.6%) indicated they had attended no computer workshops. Most respondents had taken from one to three workshops (n = 195 or 70.9%). Over 13% of respondents (n = 37) had attended four or more workshops.

School Characteristics

Table 36 summarizes the number of responses, mean, standard deviation, and minimum and maximum responses for school characteristic variables.

Data on school characteristics for the total sample and for computer users/nonusers are summarized in Table 37.

Community Type

Respondents in this research were largely urban (46.5%) and metropolitan (20%), but nearly 34% were rural.

Table 36

Descriptive Data for School Characteristic Variables

School characteristic variables	N	Mean	SD	Minimum	Maximum
Type of community	258	2.14	0.73	0	3
Teach 7th grade	270	0.40	0.49	0	1
Teach 8th grade	270	0.42	0.49	0	1
Teach 9th grade	270	0.53	0.50	0	1
Teach 10th grade	270	0.56	0.50	0	1
Teach 11th grade	270	0.59	0.49	0	1
Teach 12th grade	270	0.60	0.49	0	1
School enrollment	262	5.59	1.87	2	8
Typical class size	270	3.87	0.98	2	5
Number of preparations per year	269	4.02	1.63	2	7
Computer available at school	269	0.98	0.15	0	1

* $p < .05$.

Grades Taught

Respondents in this research were somewhat more likely to teach Grades 9-12 than Grades 7 or 8.

School Enrollment

Two thirds of teachers teach in a school with an school enrollment over 1,000 (n = 171, 68.7%). One third teach in schools with school enrollments under 1,000 and approximately 12% teach in schools with a school enrollment under 250 students.

Class Size

Over 42% of teachers usually teach classes with between 26 and 30 students. Thirteen percent (n = 36) regularly teach classes with 20 or fewer students and 28% (n = 77) teach classes with over 30 students.

Number of Preparations

Three preparations is the number of different preparations taught by the largest cohort of teachers (27.1%) who participated in this research. However, over 50% of the teachers teach four to seven different preparations with nearly 12% of respondents teaching seven or more different preparations each year. Only 20% (n = 53) teach two preparations daily.

Computer Availability at School

Nearly all (98%, n = 263) of respondents have access to a computer at school.

Table 37

School Characteristics Based on Use

School characteristics	Total sample N	%	Computer users N	%	Computer nonusers N	%
Type of community						
Metropolitan	51	19.8	38	19.0	13	22.4
Urban	120	46.5	95	47.5	25	43.1
Rural	87	33.7	67	33.5	20	34.5
Grades taught						
7th	109	40.4	82	38.9	27	45.8
8th	113	41.9	83	39.3	30	50.8
9th	142	52.6	106	50.2	36	61.0
10th	150	55.6	119	56.4	31	52.5
11th	159	58.9	127	60.2	32	54.2
12th	162	60.0	129	61.1	33	55.9
School enrollment						
100 - 249	32	12.2	22	10.8	10	16.9
250- 499	16	6.1	9	4.4	7	11.9
500 - 749	19	7.3	15	7.4	4	6.8
750 - 999	23	8.8	13	6.4	10	16.9
1000 - 1499	77	29.4	63	21.0	14	23.7
1500 - 1999	60	22.9	54	26.6	6	10.2
2000 - 2499	35	13.4	27	13.3	8	13.6
Typical class size						
Less than 20	36	13.1	27	12.8	9	15.3
21 - 25	41	14.9	32	15.2	9	15.3
26 - 30	116	42.2	89	42.2	27	45.8
30+	77	28.0	63	29.9	14	23.7
Number of preparations per year						
2	53	19.7	40	19.0	13	22.0
3	73	27.1	59	28.1	14	23.7
4	49	18.2	37	17.6	12	20.3
5	35	13.0	28	13.3	7	11.9
6	27	10.0	20	9.5	7	11.9
7 or more	32	11.9	26	12.4	6	10.2
Computer availability at school						
Yes	263	97.8	209	99.1	54	93.1
No	6	2.2	2	0.9	4	6.9

* $p < .05$.

Computer Use

The data on computer use are summarized in Table 38.

Number of Classes in Which a Computer Is Used (Computer Use)

The average teacher used the computer in more than two classes. There were 52 teachers who did not use the computer in any class; there were 10 teachers who used the computer in seven or more classes.

Number of Classes Taught

The number of classes taught by an individual teacher during the school year ranged from zero to 15. (It is assumed that those teaching no FACS classes were either in administration or misunderstood the question.) Most teachers taught four different preparations during the school year.

Table 38

Descriptive Statistics for Computer Use Variables

Variable	N	Mean	SD	Minimum	Maximum
Computer use	213	2.27	2.29	0	14
Classes taught	213	4.40	2.83	0	15
Hours used	214	3.78	6.17	0	25
Hours	275	74.63	63.51	0	374
Teacher use of computer	212	11.35	5.25	0	30
Student use of computer	212	2.18	3.56	0	25
Ratio	213	0.57	.42	0	1
Location of computer	210	1.80	0.94	0	3

* $p < .05$.

Hours Used

Hours used was a measurement of the total of all the hours per week a teacher used the computer in their capacity as a FACS teacher. One hundred and eight teachers said that in a typical week they do not use the computer at all; an additional 61 teachers who classified themselves as nonusers also did not use the computer in the classroom. Of the teachers who did use the computer in their role as a FACS teacher, 11 used it only 1 hour per week while six teachers used a computer for more than 25 hours a week.

Hours of Computer Training

"Hours" was a measurement of the total number of hours FACS teachers spent in computer workshops. The average teacher spent over 74 hours in computer workshops with the lowest number of hours spent in workshops being zero (n = 41) and the highest number of hours spent in computer training being 374 hours.

Use of Computer for Teaching Tasks (Teacher)

The list of uses of the computer was divided into two categories, with part of the list including tasks that involved the teacher in tasks more directly related to preparing for teaching and managing the teaching environment. Teachers spent an average of more than 11 hours per week using the computer for teaching tasks.

Use of Computer for Tasks More Directly
Involving Students (Student)

The other half of the list of computer uses included those tasks that were more likely to involve both the teacher and the student in the use of the computer. Teachers spent an average of just over two hours a week using the computer with their students. This type of computer use was much less frequent than the use of the computer for teaching tasks.

Ratio

A variable was created by dividing the number of classes in which a computer was used by the total number of classes taught; this variable was called "ratio." Ratio was created to alleviate the problem of comparing the number of classes in which a computer was used between teachers who had only one or two preparations with those who had as many as seven or more different preparations.

Location of Computer in School

Most FACS teachers responding to the questionnaire teach in schools in which they have access to a computer only in their own classroom (no central computer lab is available for their use). Twenty-one teachers have computer access only in a central location within the school while 74 teachers have access to computers in both their classroom and in a central location. Two teachers indicated they have no computer access in their school.

Source of Computer Training

All respondents were asked to indicate the number of computer workshops in which they had participated. For each workshop in which they participated, they were asked to identify its source. They were asked to check one of the following: college class, school inservice, district inservice, FACS workshop, or "other" workshop. The data on source of computer training are summarized in Table 39.

The most common source of computer training was district workshops. One hundred forty-four teachers (52.4 %) took a district sponsored computer class. This was followed closely by school sponsored workshops (n = 125; 45.5%). College computer classes were taken by 80 of the respondents (29.1%). FACS sponsored and "other" sponsored workshops had the smallest school enrollment among FACS teachers with only 37 respondents taking each type of workshop.

Type of Computer Training

The data on type of computer training is summarized in Table 40.

Show-and-Tell

Show-and-tell workshops were the type of workshop second most likely to be taken by FACS teachers in the sample (n = 153).

Tutorial

Tutorial workshops were not attended frequently by FACS teachers in the sample. Only 73 FACS teachers indicated they had participated in a tutorial workshop.

Computer Attitude Variables

The computer attitude variables were measured using the Computer Attitude Scale developed by Loyd and Gressard (Appendix H). Computer anxiety is a measure of anxiety of or fear toward computers or learning about computers. Computer confidence measured

Table 39

Descriptive Statistics for Source of Computer Training

Variable	N	Mean	SD	Minimum	Maximum
School class	275	0.45	0.50	0	1
College class	275	0.29	0.46	0	1
District class	275	0.52	0.50	0	1
FACS class	275	0.13	0.34	0	1
Other class	275	0.13	0.3	0	1

* $p < .05$.

Table 40

Descriptive Statistics for Type of Computer Training

Variable	N	Mean	SD	Minimum	Maximum
Show-and-tell	275	.8727	.8640	0	2
Hands-on	275	1.7273	1.105	0	3
Tutorial	275	.4218	.7474	0	2
Programming	275	.2436	.5426	0	2

* $p < .05$.

the respondents' confidence in their ability to learn about or use computers. Computer liking was designed to measure the respondents' enjoyment or liking of computers and using computers.

Three scores were computed for each respondent, one score for each of the three subscales. The data were coded in such a way that high scores on all three scales corresponded to more positive reaction to computer: higher confidence and liking, and lower anxiety. The data on computer attitude variables are summarized in Table 41.

Table 41

Descriptive Data for Computer Attitude Variables

Variable	N	Mean	SD	Minimum	Maximum
Anxiety	273	31.10	5.22	14	40
Confidence	273	26.64	2.91	18	33
Liking	273	29.60	4.41	18	36

* $p < .05$.

CHAPTER V

SUMMARY AND DISCUSSION

The purpose of this study was to examine the impact of computer training on computer use and computer attitudes. The population was all secondary FACS teachers in the state of Utah during the 1995-96 school year. A random sample of 340 teachers was selected from the population using a table of random numbers. A total of 275 teachers eventually responded to the survey; this represents a response rate of 80.8% of the sample.

Research Questions

The research questions addressed in this research were the following:

Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Are the computer attitude variables (anxiety, confidence, liking) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS), and/or (c) type of computer training (none, show-and-tell, hands-on, authoring/programming)?

Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations), (b) school characteristics (grades taught, enrollment, class size, number of preparations), and/or (c) computer attitude variables (anxiety, confidence, liking)?

Are computer attitude variables (anxiety, confidence, liking) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations), and/or (b) school characteristics (grades taught, enrollment, class size, number of preparations)?

Methodological Limitations

The limitations acknowledged in this research are: (1) the subjects in this study were limited to secondary FACS teachers during the 1995-1996 school year; (2) the study addressed Utah public schools only.

The data collected for this study were self-reported and thus are subject to the errors of this technique.

This study did not attempt to address the issue of usefulness of computers in education.

Data Analysis

The data analysis for this study was done on SPSS. It included descriptive statistics, t tests, ANOVA, chi-square, and Pearson product-moment correlations. For description, frequencies were computed and for comparisons, t-tests were used. To find relationships among variables, Pearson's product-moment correlation and chi-square statistics were used. ANOVA was used to compare the means of different groups. A summary of the findings follows.

Summary of Research Findings

Question One

The data from research question one is summarized in Table 42.

Research question one asked: Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS, other), and/or (c) type of computer training (none, show-and-tell, hands-on, tutorial, authoring/programming)?

The analysis of data for research question one revealed that a positive correlation did exist between length of computer training and the number of classes in which teachers used computers. There was also a significant positive correlation between the length of computer training and how computers were used in the classroom. Specifically, teachers who spent more time in computer training were more likely to use the computer for tasks related to "teacher" function like recording grades, generating worksheets, and word processing.

The second significant finding related to research question one was that FACS teachers who participated in FACS computer training were likely to use the computer in more classes and for tasks that directly involved students. Teachers who had taken

Table 42
Summary of Data for Research Question One

Variables	Analysis	df	Test	p
Hours used by length of training	Correlation		0.089	0.192
Hours used by source of training				
College class	t test	212	0.036	0.971
School class	t test	212	0.144	0.886
District class	t test	212	-1.111	0.268
FACS class	t test	212	-0.158	0.874
Other class	t test	212	-1.242	0.215
Hours used by type of training			F-value	
Show-and-tell	ANOVA	2	0.129	0.879
Hands-on	ANOVA	3	0.580	0.629
Programming	ANOVA	2	0.733	0.482
Tutorial	ANOVA	2	0.533	0.587
Classes used in (computer use) by length of training	Correlation		0.142	0.038*
Classes used in (computer use) by source of training				
College class	t test	211	0.200	0.971
School class	t test	211	-1.627	0.105
District class	t test	211	-0.595	0.553
FACS class	t test	211	0.175	0.861
Other class	t test	211	-0.022	0.983
Classes used in (computer use) by type of training				
Show-and-tell	ANOVA	2	1.609	0.202
Hands-on	ANOVA	3	1.960	0.121
Programming	ANOVA	2	0.252	0.777
Tutorial	ANOVA	2	1.727	0.180
Classes used in (ratio) by length of training	Correlation		0.198	0.004*
Classes used in (ratio by source of training				
College class	t test	211	0.301	0.764
School class	t test	211	-1.438	0.152
District class	t test	211	0.294	0.769
FACS class	t test	211	-2.237	0.026*
Other class	t test	211	-0.153	0.878
Classes used in (ratio) by type of training				
Show-and-tell	ANOVA	2	3.893	0.022*
Hands-on	ANOVA	3	3.427	0.018*

(table continues)

Variables	Analysis	df	Test	p
Programming	ANOVA	2	1.607	0.203
Tutorial	ANOVA	2	1.513	0.223
How used by length of training				
Student	Correlation		-0.077	0.266
Teacher	Correlation		0.182	0.008*
How used by source of training				
Student				
College class	t test	210	-1.513	0.132
School class	t test	210	1.217	0.225
District class	t test	210	0.937	0.350
FACS class	t test	210	2.222	0.029*
Other class	t test	210	0.067	0.947
Teacher				
College class	t test	210	-1.739	0.083
School class	t test	210	-1.082	0.280
District class	t test	210	-0.337	0.736
FACS class	t test	210	-0.757	0.453
Other class	t test	210	-2.552	0.011*
How used by type of training				
Student				
Show-and-tell	ANOVA	2	0.696	0.500
Hands-on	ANOVA	3	1.965	0.120
Programming	ANOVA	2	1.109	0.332
Tutorial	ANOVA	2	0.756	0.471
Teacher				
Show-and-tell	ANOVA	2	3.086	0.048*
Hands-on	ANOVA	3	5.391	0.001*
Programming	ANOVA	2	0.180	0.836
Tutorial	ANOVA	2	2.634	0.074
Nonuse by length of training	Correlation		0.118	0.051
Nonuse by source of training				
College class	Chi-square	1	4.647	0.031*
School class	Chi-square	1	0.253	0.615
District class	Chi-square	1	0.731	0.393
FACS class	Chi-square	1	3.202	0.074
Other class		1	0.008	0.930
Nonuse by type of training	Chi-square			
Show-and-tell	Chi-square	2	5.384	0.068
Hands-on	Chi-square	3	4.790	0.188

(table continues)

Variables	Analysis	df	Test	p
Programming	Chi-square	2	1.952	0.377
Tutorial	Chi-square	2	1.140	0.566
Type of computer by length of training				
IBM-compatible	t test	210	-2.499	0.013*
Macintosh	t test	210	0.686	0.494
Type of computer by source of training				
IBM-compatible				
College class	Chi-square	1	1.187	0.276
School class	Chi-square	1	1.826	0.177
District class	Chi-square	1	3.083	0.079
FACS class	Chi-square	1	0.003	0.957
Other class	Chi-square	1	0.656	0.418
Macintosh				
College class	Chi-square	1	1.529	0.216
School class	Chi-square	1	0.079	0.779
District class	Chi-square	1	0.311	0.577
FACS class	Chi-square	1	1.810	0.179
Other class	Chi-square	1	0.013	0.911
Type of computer by type of training				
IBM-compatible				
Show-and-tell	Chi-square	2	1.694	0.429
Hands-on	Chi-square	3	9.442	0.024*
Programming	Chi-square	2	3.852	0.146
Tutorial	Chi-square	2	1.023	0.599
Macintosh				
Show-and-tell	Chi-square	2	3.866	0.145
Hands-on	Chi-square	3	3.224	0.358
Programming	Chi-square	2	0.610	0.737
Tutorial	Chi-square	2	0.939	0.625
Location of computer by source of training				
College class	Chi-square	3	3.725	0.293
School class	Chi-square	3	2.423	0.489
District class	Chi-square	3	0.585	0.900
FACS class	Chi-square	3	0.947	0.814
Other class	Chi-square	3	3.808	0.283
Location of computer by type of training				
Show-and-tell	Chi-square	6	11.038	0.087
Hands-on	Chi-square	9	8.150	0.519
Programming	Chi-square	6	7.027	0.318
Tutorial	Chi-square	6	3.626	0.727

*$p < .05$.

"other" computer classes were more likely to use the computer for "teacher" tasks. FACS teachers who had taken a college computer class were more likely to use a computer in their teaching than those who did not take a college class.

Taking a show-and-tell and/or a hands-on workshop appeared to increase the ratio of classes in which FACS teachers used computers. And taking either a show-and-tell and/or a hands-on workshop also increased the likelihood that FACS teachers would use the computer for "teacher" tasks.

Question Two

The data from research question two are summarized in Table 43.

Research question two asked: Are the computer attitude variables (anxiety, confidence, liking) related to (a) length of computer training (none, short, medium, long), (b) source of computer training (none, school, district, FACS, other), and/or (c) type of computer training (none, show-and-tell, hands-on, tutorial, authoring/programming)?

The analysis of data for research question two revealed that there was a statistically significant difference in computer anxiety based on the source of computer training. Computer classes offered by districts, colleges, FACS, and "other" were all effective in reducing computer anxiety among secondary FACS teachers in this study. There was not a significant difference in computer anxiety based on classes offered by individual schools.

Taking a computer class from their school was not related to a significant difference in teachers' computer anxiety. There was, however, a significant difference in

Table 43

Summary of Data for Research Question Two

Variables	Analysis	df	Statistic	p
Anxiety by length of training	Correlation		0.305	0.000 *
Anxiety by source of training			t value	
College class	t test	271	-2.495	0.013 *
School class	t test	271	-1.816	0.070
District class	t test	271	-2.265	0.024 *
FACS class	t test	271	-2.158	0.032 *
Other class	t test	271	-2.257	0.025 *
Anxiety by type of class			F value	
Show-and-tell	ANOVA	2	7.113	0.001 *
Hands-on	ANOVA	3	9.254	0.000 *
Programming	ANOVA	2	1.148	0.319
Tutorial	ANOVA	2	8.575	0.000 *
Confidence by length of training	Correlation		0.186	0.002 *
Confidence by source of training			t value	
College class	t test	271	-1.224	0.222
School class	t test	271	-2.600	0.010 *
District class	t test	271	-1.884	0.060
FACS class	t test	271	-0.869	0.386
Other class	t test	271	-1.481	0.145
Confidence by type of class			F value	
Show-and-tell	ANOVA	2	3.380	0.035 *
Hands-on	ANOVA	3	3.235	0.023 *
Programming	ANOVA	2	0.335	0.713
Tutorial	ANOVA	2	8.562	0.000 *
Liking by length of training	Correlation		0.228	0.000 *
Liking by source of training			t value	
College class	t test	271	-2.204	0.028 *
School class	t test	271	-2.448	0.015 *
District class	t test	271	-2.160	0.032 *
FACS class	t test	271	-1.674	0.095
Other class	t test	271	-1.585	0.120 *
Liking by type of class			F value	
Show-and-tell	ANOVA		4.682	0.010 *
Hands-on	ANOVA		4.588	0.004 *
Programming	ANOVA		1.484	0.229
Tutorial	ANOVA		5.309	0.005 *

*$p < .05$.

computer confidence based on taking a school computer class.

The analysis of data revealed that there was a significant difference in computer liking based on the source of computer training. School, district, and college classes all made a significant positive difference in teachers' computer liking in this study.

The data on computer attitude variables and type of workshop taken were analyzed using one-way ANOVA statistical technique. The analysis of data revealed that there was a statistically significant difference in computer anxiety, computer confidence, and computer liking among secondary FACS teachers in the state of Utah when grouped by type of computer workshop taken.

For the purpose of analysis, the responses related to show-and-tell workshops were divided into three groups. Group 1 consisted of teachers who had taken no show-and-tell workshops. Group 2 consisted of teachers who had taken one show-and-tell workshop, while Group 3 was teachers who had taken two or more show-and-tell workshops. The analysis of data revealed that there was a significant difference in computer anxiety between Group 1 and Group 3, and Group 2 and Group 3. There was also a significant difference in both computer confidence and computer liking between Group 1 and Group 3, and between Group 2 and Group 3.

The responses related to hands-on workshops were divided into four groups for the purpose of analysis. Group 1 consisted of teachers who had taken no hands-on workshops. Group 2 was teachers who had taken one; Group 3 was teachers who had taken two hands-on workshops while Group 4 consisted of teachers who had taken three or more hands-on computer workshops. The analysis of data revealed that there was a significant difference in computer anxiety between Group 1 and Group 2, between Group 2 and Group 4, and between Group 3 and Group 4. There was a significant difference in computer confidence between Group 1 and Group 4, and between Group 2 and Group 4. There was also a significant difference in computer liking between Group 1 and Group 3, between Group 1 and Group 4, and between Group 2 and Group 4 when grouped by hands-on workshops taken.

For the purpose of analysis, the responses related to tutorial workshops were divided into three groups. Group 1 consisted of teachers who had taken no tutorial workshops. Group 2 was teachers who had taken one; Group 3 was teachers who had taken two or more tutorial computer workshops. The analysis of data revealed that there was a significant difference in computer anxiety between Group 1 and Group 3, and between Group 2 and Group 3. There was also a significant difference in computer confidence between Group 1 and Group 3, and between Group 2 and Group 3. There was also a significant difference in computer liking between Group 1 and Group 3.

The relationship between length of training and the three computer attitude variables (computer anxiety, computer confidence, and computer liking) was analyzed using the Pearson product-moment correlation method. The analysis revealed that a positive correlation did exist between the three computer attitude variables (computer anxiety, computer confidence, and computer liking) and length of training among secondary FACS teachers in the state of Utah.

Question Three

Research question three asked: Is computer use (hours used, classes used in, how used, nonuse, location of computer, type of computer) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organization), (b) school characteristics (grades taught, enrollment, class size, number of preparations), and/or (c) computer attitude variables (anxiety, confidence, liking)?

Analysis using chi-square revealed that there was a significant relationship between computer use and grades taught. In lower grades, a greater number of computer programs were used; while in higher grades, fewer programs were used. The assumption is that computer use in lower grades tends to be more exploratory, introducing multiple programs to students while in upper grades computer use is more specific, teaching specific programs in detail. This assumption is consistent with the finding that in upper grades teachers used fewer programs but used them in more classes.

The data from research question three are summarized in Table 44.

Chi-square analysis also revealed a significant relationship between use of the computer for teacher tasks and grades taught. The data revealed that teachers used the computer more for teaching tasks in upper than in lower grades.

Chi-square analysis also revealed a significant relationship between the number of classes in which a computer was used and grades taught. It appears that the higher the grade taught, the more likely the teacher was to use the computer.

The analysis of data revealed that there was a statistically significant difference in

Table 44

Summary of Data for Research Question Three

Variables	Analysis	df	Value	p
Hours used by age	ANOVA	4	0.837	0.503
Hours used by income	ANOVA	4	0.163	0.957
Hours used by highest degree	ANOVA	3	1.093	0.353
Hours used by latest degree	ANOVA	3	1.034	0.379
Hours used by professional organization	ANOVA	2	1.815	0.168
Hours used by school enrollment	ANOVA	5	0.451	0.812
Hours used by class size	ANOVA	3	0.926	0.429
Hours used by number of preparations	ANOVA	5	1.454	0.207
Hours used by 7th grade	t test	209	0.462	0.644
Hours used by 8th grade	t test	209	-0.769	0.433
Hours used by 9th grade	t test	209	-0.929	0.354
Hours used by 10th grade	t test	209	-1.044	0.298
Hours used by 11th grade	t test	209	-0.826	0.410
Hours used by 12th grade	t test	209	-1.264	0.208
Hours used by anxiety	Correlation		0.046	0.509
Hours used by confidence	Correlation		0.013	0.850
Hours used by liking	Correlation		0.035	0.616
Computer use by age	ANOVA	4	1.264	0.285
Computer use by income	ANOVA	4	0.550	0.700
Computer use by highest degree	ANOVA	3	1.367	0.254
Computer use by last degree	ANOVA	3	2.460	0.064
Computer use by professional organizations	ANOVA	2	0.254	0.776
Computer use by school enrollment	ANOVA	5	0.137	0.984
Computer use by class size	ANOVA	3	1.110	0.346
Computer use by number of preparations	ANOVA	5	4.137	0.001
Computer use by 7th grade	t test	208	2.715	0.007
Computer use by 8th grade	t test	208	1.536	0.126
Computer use by 9th grade	t test	208	-0.270	0.788
Computer use by 10th grade	t test	208	-0.407	0.000*
Computer use by 11th grade	t test	208	-4.192	0.000*
Computer use by 12th grade	t test	208	-4.103	0.000*
Computer use by anxiety	Correlation		0.229	0.001*
Computer use by confidence	Correlation		0.138	0.046*
Computer use by liking	Correlation		0.187	0.006*
Ratio by age	ANOVA	4	0.621	0.648

(table continues)

Variables	Analysis	df	Value	p
Ratio by income	ANOVA	4	0.740	0.566
Ratio by highest degree	ANOVA	3	1.043	0.374
Ratio by last degree	ANOVA	3	0.838	0.475
Ratio by professional organizations	ANOVA	2	0.928	0.399
Ratio by school enrollment	ANOVA	5	0.920	0.470
Ratio by class size	ANOVA	3	0.532	0.661
Ratio by number of preparations	ANOVA	5	1.336	0.250
Ratio by 7th grade	t test	208	1.161	0.247
Ratio by 8th grade	t test	208	0.788	0.431
Ratio by 9th grade	t test	208	0.932	0.352
Ratio by 10th grade	t test	208	-0.311	0.778
Ratio by 11th grade	t test	208	-0.170	0.865
Ratio by 12th grade	t test	208	-0.311	0.756
Ratio by anxiety	Correlation		0.183	0.008*
Ratio by confidence	Correlation		0.176	0.011*
Ratio by liking	Correlation		0.201	0.003*
Student use by age	ANOVA	4	0.851	0.494
Student use by income	ANOVA	4	1.326	0.262
Student use by highest degree	ANOVA	3	1.221	0.303
Student use by latest degree	ANOVA	3	1.176	0.320
Student use by professional organizations	ANOVA	2	0.164	0.849
Student use by school enrollment	ANOVA	5	0.829	0.531
Student use by class size	ANOVA	3	1.022	0.389
Student use by number of preparations	ANOVA	5	0.316	0.903
Student use by 7th grade	t test	207	-1.956	0.052
Student use by 8th grade	t test	207	-2.352	0.020*
Student use by 9th grade	t test	207	-1.935	0.054
Student use by 10th grade	t test	207	2.371	0.019*
Student use by 11th grade	t test	207	2.393	0.018*
Student use by 12th grade	t test	207	2.490	0.014*
Student use by anxiety	Correlation		-0.012	0.862
Student use by confidence	Correlation		-0.028	0.682
Student use by liking	Correlation		0.003	0.962
Teacher use by age	ANOVA	4	0.681	0.606
Teacher use by income	ANOVA	4	0.637	0.636
Teacher use by highest degree	ANOVA	3	0.977	0.404
Teacher use by latest degree	ANOVA	3	2.872	0.037*
Teacher use by professional organizations	ANOVA	2	0.591	0.556

(table continues)

Variables	Analysis	df	Value	p
Teacher use by school enrollment	ANOVA	5	0.062	0.997
Teacher use by class size	ANOVA	4	1.146	0.332
Teacher use by number of preparations	ANOVA	5	0.296	0.915
Teacher use by 7th grade	t test	207	0.549	0.584
Teacher use by 8th grade	t test	207	0.858	0.392
Teacher use by 9th grade	t test	207	0.109	0.914
Teacher use by 10th grade	t test	207	-1.527	0.128
Teacher use by 11th grade	t test	207	-2.494	0.013*
Teacher use by 12th grade	t test	207	-2.431	0.016*
Teacher use by anxiety	Correlation		0.225	0.001*
Teacher use by confidence	Correlation		0.189	0.006*
Teacher use by liking	Correlation		0.200	0.004*
Nonuse by age	Chi-square	4	6.804	0.147
Nonuse by income	Chi-square	4	1.345	0.854
Nonuse by highest degree	Chi-square	3	5.223	0.156
Nonuse by latest degree	Chi-square	3	6.066	0.108
Nonuse by professional organizations	Chi-square	2	1.200	0.549
Nonuse by school enrollment	Chi-square	5	17.594	0.004*
Nonuse by class size	Chi-square	3	0.954	0.812
Nonuse by number of preparations	Chi-square	5	1.236	0.941
Nonuse by 7th grade	Chi-square	1	0.912	0.340
Nonuse by 8th grade	Chi-square	1	2.510	0.113
Nonuse by 9th grade	Chi-square	1	2.149	0.143
Nonuse by 10th grade	Chi-square	1	0.278	0.598
Nonuse by 11th grade	Chi-square	1	0.675	0.411
Nonuse by 12th grade	Chi-square	1	0.521	0.471
Nonuse by anxiety	t test	271	-2.875	0.004*
Nonuse by confidence	t test	271	-2.272	0.024*
Nonuse by liking	t test	271	-2.447	0.016*
IBM by age	Chi-square	4	4.282	0.369
IBM by income	Chi-square	4	15.202	0.004*
IBM by highest degree	Chi-square	3	6.888	0.076
IBM by latest degree	Chi-square	3	2.812	0.421
IBM by professional organizations	Chi-square	2	0.544	0.762
IBM by 7th grade	Chi-square	1	5.472	0.019*
IBM by 8th grade	Chi-square	1	2.587	0.108
IBM by 9th grade	Chi-square	1	0.073	0.787
IBM by 10th grade	Chi-square	1	2.115	0.146

(table continues)

Variables	Analysis	df	Value	p
IBM by 11th grade	Chi-square	1	3.381	0.066
IBM by 12gh grade	Chi-square	1	2.883	0.090
IBM by school enrollment	Chi-square	5	13.806	0.017*
IBM by class size	Chi-square	3	1.123	0.771
IBM by number of preparations	Chi-square	5	1.081	0.956
IBM by anxiety	t test	208	-1.275	0.204
IBM by confidence	t test	208	-1.120	0.264
IBM by liking	t test	208	-1.273	0.204
Macintosh by age	Chi-square	4	5.703	0.222
Macintosh by income	Chi-square	4	10.150	0.038*
Macintosh by highest degree	Chi-square	3	7.585	0.055
Macintosh by latest degree	Chi-square	3	2.575	0.462
Macintosh by professional organizations	Chi-square	2	1.624	0.444
Macintosh by 7th grade	Chi-square	1	2.896	0.089
Macintosh by 8th grade	Chi-square	1	1.002	0.317
Macintosh by 9th grade	Chi-square	1	1.418	0.234
Macintosh by 10th grade	Chi-square	1	1.601	0.206
Macintosh by 11th grade	Chi-square	1	1.338	0.247
Macintosh by 12th grade	Chi-square	1	1.278	0.258
Macintosh by school enrollment	Chi-square	5	12.569	0.028*
Macintosh by class size	Chi-square	3	2.268	0.519
Macintosh by number of preparations	Chi-square	5	2.008	0.848
Macintosh by anxiety	t test	208	-1.233	0.219
Macintosh by confidence	t test	208	-0.566	0.572
Macintosh by liking	t test	208	-0.787	0.432

*$p < .05$.

the number of classes in which computers were used among FACS teachers in the state of Utah when grouped by the number of preparations. For the purpose of analysis, the responses related to number of preparations were divided into six groups. Group 1 consisted of teachers who had one or two preparations; Group 2 was teachers who had three preparations; Group 3 was teachers who had four preparations; Group 4 had five preparations; Group 5 had six preparations; while Group 6 consisted of teachers who had seven or more different preparations. Significance was shown to be between Group 1 and Group 4, between Group 1 and Group 5, between Group 1 and Group 6, between Group 2 and Group 6, and between Group 3 and Group 6. Generally, as the number of preparations increases, the number of classes in which a computer is used increases. However, this may be a circular effect because if they teach fewer classes, they have fewer classes in which to use computers (Table 45).

Table 45

ANOVA for Computer Use by Number of Preparations

Group	Number of preps	# classes in which computer is used: 1	2	3	4	5	6
1	1 to 2				.009	.026	.000
2	3						.005
3	4						.002
4	5						
5	6						
6	7+						

A chi-square analysis showed that there was a significant relationship between the type of computer used and the enrollment in the school. At first, it appeared the type of computer (IBM-compatible or Macintosh) used in the school was based on school enrollment, but upon further study of the data, it was revealed that as school enrollment increased, so did the use of any brand of computer.

The analysis of data revealed that a positive correlation did exist between the ratio of classes in which a teacher used computers and computer anxiety. The data on computer anxiety were coded such that the higher the score, the lower the anxiety. The data also revealed a positive correlation between the ratio of classes in which a computer was used and both computer confidence and computer liking.

The analysis of data revealed that a positive correlation did exist between the teacher use of computers for teaching tasks and computer anxiety. There was also a positive correlation between teacher use of computers for teaching tasks and both computer confidence and computer liking.

The analysis of data also revealed that there was a statistically significant difference in teacher use of computers for teaching tasks such as materials generation and inventory tracking by FACS teachers in the state of Utah when grouped by the date of the last degree earned. For purposes of analysis, the responses were divided into four groups. Group 1 consisted of teachers who graduated in the 1960s or earlier. Group 2 consisted of teachers who graduated in the 1970s. Group 3 was teachers who graduated in the 1980s, and Group 4 consisted of teachers who graduated in the 1990s. Significance was shown between Group 1 and Group 3, and between Group 1 and Group 4, thus between those graduating in the 1960s and both the 1980s and the 1990s.

The analysis of data revealed that there was a statistically significant difference in computer anxiety, computer confidence, and computer liking based on the amount of time teachers spent using a computer.

Question Four

Are computer attitude variables (anxiety, confidence, liking) related to (a) demographic variables (gender, age, income, degree, year of degree, membership in professional organizations), and/or (b) school characteristics (grades taught, enrollment, class size, number of preparations)?

The data from research question four are summarized in Table 46.

Table 46

Summary of Data for Research Question Four

Variables	Analysis	df	Value	p
Anxiety by age	ANOVA	4	1.557	0.186
Anxiety by income	ANOVA	4	0.965	0.427
Anxiety by highest degree	ANOVA	3	2.094	0.101
Anxiety by latest degree	ANOVA	3	7.353	0.000
Anxiety by professional organization	ANOVA	2	1.67	0.192
Anxiety by 7th grade	t test	266	1.815	0.071
Anxiety by 8th grade	t test	266	1.824	0.069
Anxiety by 9th grade	t test	266	0.284	0.777
Anxiety by 10th grade	t test	266	-0.272	0.786
Anxiety by 11th grade	t test	266	-0.738	0.461
Anxiety by 12th grade	t test	266	-0.463	0.644
Anxiety by school enrollment	ANOVA	5	0.758	0.581
Anxiety by class size	ANOVA	3	1.173	0.320
Anxiety by number of preparations	ANOVA	5	1.868	0.100
Confidence by age	ANOVA	4	1.263	0.285
Confidence by income	ANOVA	4	2.069	0.086
Confidence by highest degree	ANOVA	3	2.606	0.052
Confidence by latest degree	ANOVA	3	4.556	0.004*
Confidence by professional organization	ANOVA	2	0.189	0.828
Confidence by 7th grade	t test	266	0.791	0.430
Confidence by 8th grade	t test	266	-0.083	0.934
Confidence by 9th grade	t test	266	-0.494	0.622
Confidence by 10th grade	t test	266	0.041	0.967
Confidence by 11th grade	t test	266	-0.631	0.529
Confidence by 12th grade	t test	266	-0.375	0.708
Confidence by school enrollment	ANOVA	5	1.415	0.220
Confidence by class size	ANOVA	3	0.229	0.876
Confidence by number of preparations	ANOVA	5	1.767	0.120

(table continues)

Variables	Analysis	df	Value	p
Liking by age	ANOVA	4	1.624	0.169
Liking by income	ANOVA	4	1.166	0.327
Liking by highest degree	ANOVA	3	1.911	0.128
Liking by latest degree	ANOVA	3	7.741	0.000*
Liking by professional organization	ANOVA	2	1.512	0.224
Liking by 7th grade	t test	266	0.641	0.522
Liking by 8th grade	t test	266	0.965	0.335
Liking by 9th grade	t test	266	-0.585	0.559
Liking by 10th grade	t test	266	-0.013	0.989
Liking by 11th grade	t test	266	-0.733	0.464
Liking by 12th grade	t test	266	-0.313	0.754
Liking by school enrollment	ANOVA	5	1.254	0.285
Liking by class size	ANOVA	3	0.576	0.631
Liking by number of preparations	ANOVA	5	1.732	0.127

*$p < .05$.

Research question four was statistically analyzed using t tests and analysis of variance. The analysis revealed that a significant correlation did exist between all three computer attitude variables (anxiety, confidence and liking) and the date of last degree earned. The more recent the degree, the higher computer confidence and computer liking and the lower the computer anxiety. This was anticipated since teachers who graduated more recently were more likely to have taken a computer class as a requirement for graduation.

Summary

There were significant results in each of the areas investigated. FACS teachers in the state of Utah who participated in computer training from any source and in nearly any form had significantly lower computer anxiety and significantly higher computer liking. It was also found that FACS teachers who had participated in computer training workshops were more likely to use the computer in their classroom in a variety of ways to enhance their productivity and to engage students in computer experiences.

Conclusions

Based on the research findings of this study, the following conclusions were reached:

1. The longer the computer training, the more likely teachers were to use computers in the classroom.

2. The longer the computer training, the more likely teachers were to use computers for tasks such as recording grades, generating materials, and inventory tracking.

3. Teachers who participated in FACS-sponsored workshops were more likely to use computers in their classroom and to use computers for tasks that directly involved students in the use of computers.

4. Teachers who took a college computer class were more likely to use computers in the classroom.

The type of computer class taken was related to classroom computer use. Taking a show-and-tell workshop and/or a hands-on workshop appeared to increase the likelihood that teachers would use the computer for such tasks as recording grades, generating materials, and inventory tracking.

In general, taking a computer class reduced teachers' computer anxiety. School, district, and college classes all made a significant positive difference in teachers' computer liking. Taking a school computer class increased teachers' computer confidence.

Taking hands-on, show-and-tell, or tutorial computer workshops increased teachers' computer confidence and liking, and decreased computer anxiety.

1. Length of training was positively related to increases in teachers' computer confidence and liking and decreases in computer anxiety.

2. FACS teachers in the state of Utah use computers more frequently in higher grades.

3. Secondary FACS teachers in the state of Utah use a greater number of computer programs in lower grades than in higher grades.

4. FACS teachers in larger schools are more likely to use computers than FACS teachers in smaller schools.

5. The higher the proportion of classes in which computers were used, the higher the teachers' computer confidence and liking and the lower their computer anxiety.

6. The more recent the college degree, the higher the teachers' computer confidence and liking and the lower the teachers' computer anxiety.

Recommendations

I found this research interesting because I had some preconceived ideas of what I would find. I had assumed that I would find a practical significance between computer training and positive computer attitudes and between computer training and computer use. Although the data did show that there is a statistically significant relationship between many of the variables (Tables 42, 43, 44, 46), there is a lack of practical significance. This is disappointing to me, and would undoubtedly change how this research would be conducted if I were to begin this research again.

One major problem encountered with the statistical results is that although they show a significant relationship between many variables, they do nothing to indicate cause and effect. Rephrasing the research questions to focus on variables that would identify motive for participating in computer training would prove very instructive. It would be helpful to know if FACS teachers took computer workshops because they like computers, because they are required to use them and are desperate to learn how, or because the training was mandatory.

Another interesting finding was that district, college, and FACS computer classes increased computer liking but not computer confidence, while school computer classes increased computer confidence but not computer liking. It would be interesting to know what differences in those types of training produced the varying results. It could be that teachers who receive school training receive that training from peers who are readily available to answer future questions, thus providing a sense of security or "confidence."

Although in some instances the statistics do not appear to provide any practical significance, the fact that a relationship has been established for this specific population can be useful for the planning of computer training. At this point in the history of computer use in education, the issue appears to be about the type, length, and source of computer training, not whether training should take place. Working on the assumption that computer training will take place, the findings of this research indicate that the longer the training received, the more likely FACS teachers are to use computers in a number of ways. This appears to be supported by the fact that those teachers who received computer training in the form of a college class were more likely to use computers in the classroom; this source of training was assumed to be the longest of the various sources.

Along the same line, teachers who had taken a college computer class also had more positive computer attitudes. It might prove helpful to those providing inservice computer training to FACS teachers to examine the methods used in college classes to determine if there is something in addition to the length of time spent that might positively influence computer attitudes.

It was also instructive that the type of computer class did not appear to matter – simply taking a computer class increased computer liking and confidence and reduced anxiety. From a practical point of view, this is useful information because FACS educators in the state of Utah can provide the most convenient form of training in each circumstance and still assume that it will have a positive effect, albeit small.

The fact that teachers in large schools were more likely to use computers than teachers in small schools also has practical significance. One of the major disadvantages of teaching in a rural school (the assumption being made here is that small schools are also rural schools) is the lack of community resources. With the advent of the Internet, there is a vast assortment of information and "virtual" experiences to be had via a computer. Emphasis should be placed on educating FACS teachers, particularly those from rural schools, about the resources available (at no or low cost) on the Internet.

Recommendations for Further Study

While this research answers several questions not previously addressed in the FACS research on computers, it raises others. As a result of this study, several recommendations may be made for further research. Computer technology is an area that is changing so rapidly that one measure cannot be accurate for any length of time. However, research such as this can serve as a baseline to clarify trends and movement. One recommendation following this research is a follow-up study to explore the relationship between additional demographic variables and computer use and computer attitudes. For instance, it would be interesting to know if income or home ownership of computers is related to computer use and computer attitudes.

A second recommendation is that research be conducted to determine the influence of content-specific versus general computer training. In other words, are FACS teachers more likely to use computers in their professional roles and/or have more positive computer attitudes if they received training that is specific to their discipline?

A third recommendation would be to examine cause and effect in the relationship between computer use and computer training. Further analysis of the data is needed to determine if the computer training in which the FACS teachers in the study participated was voluntary or mandatory. One possibility would be to compare the 37 teachers who indicated they took a college computer class as a requirement for graduation to the rest of the sample to see if there are significant differences between those two groups. Knowing if the training was voluntary would help in determining motivation that relates to attitude.

The fourth, and final, recommendation would be to examine the cause-and-effect relationship between computer use and computer attitudes. An in-depth study should be conducted to determine which comes first, positive attitude toward computers or computer use.

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APPENDICES

Appendix A. Letter Requesting Participation

SOUTHERN UTAH UNIVERSITY
Cedar City, Utah 84720
(801) 586-1979
Home Economics

May 16, 1996

Dear Family and Consumer Sciences Education Teacher,

A study on the extent of computer integration into secondary Family and Consumer Sciences Education (FACS) classrooms in the state of Utah is being conducted to better understand the effect of computer training on classroom computer use. As a FACS teacher you are in the unique position of being able to personally report on the use or non-use of computers in your classroom.

The information gathered as a result of this research will benefit the field of Family and Consumer Sciences in several ways. First, by identifying the needs of current FACS teachers, inservice training can be developed to meet those specific needs. Second, by identifying the subjects you feel are most in need of computer integration, curriculum can be developed with that end in mind. Third, of indirect benefit to you, this information will be shared with colleges and universities in the state so they can better prepare preservice FACS teachers.

All information gathered will be held in strictest confidence. The questionnaires are numbered for tracking purposes only and no reference to any individual or specific school will be reported.

The questionnaire will be sent during June and needs to be returned promptly. It should take only a few minutes of your time to complete the three part questionnaire.

Please complete the enclosed self-addressed, stamped post card indicating whether or not you would be willing to participate in this study and return it immediately. Please be sure to indicate the address to which you would like to have the questionnaire sent. If you chose to participate, you can expect to receive a questionnaire sometime in June.

We know that your time is extremely valuable but would sincerely appreciate your help. Your positive response will help the success of this research. Thank you for your assistance.

Sincerely,

Cynthia Wright
Associate Professor of Home Economics
Southern Utah University
Cedar City, UT 84720

Renee Hyer
State Specialist
Family and Consumer Sciences Education
Utah State Office of Education

Learning Lives Forever.

Appendix B. Copy of Postcard

Dear Cindy,

___ I am willing to participate in a study of the impact of computer training on computer use in Family and Consumer Sciences.

___ I would prefer not to participate in a study of the impact of computer training on computer use in Family and Consumer Sciences.

Please send the questionnaire to me at the following address:

If you prefer to receive the questionnaire at a different address, please indicate the address below:

Name ______________________________

Street Address _________________________

City, State, Zip Code ______________________

I will be attending Applied Technology Conference in Logan in June? Yes ___ No ___

Appendix C. Cover Letter to Those Who Agreed to Participate in Study

SOUTHERN UTAH UNIVERSITY
Cedar City, Utah 84720
(801) 586-1979

Home Economics

June 27, 1996

Dear Family and Consumer Sciences Teacher,

Thank you for agreeing to participate in research regarding the use of computers in the FACS classrooms in the state of Utah. I anticipate the results of this study to be of benefit to all of us.

Enclosed please find the questionnaire and an envelope in which to return it.

> If you DO NOT use a computer please complete pages 1-4 (white) and page 5 (yellow).
>
> If you DO use computers please complete pages 1-4 (white) and pages 6-7 (pink).

I appreciate your taking time from your busy summer vacation to complete the enclosed questionnaire.

Thank you for responding promptly.

Cynthia Wright

Cynthia Wright
Associate Professor of Home Economics
Southern Utah University

Learning Lives Forever.

Appendix D. Cover Letter to Nonrespondents

SOUTHERN UTAH UNIVERSITY
Cedar City, Utah 84720
(801) 586-1979

Home Economics

June 27, 1996

Dear Family and Consumer Sciences Education Teacher,

About a month ago I sent a letter to you at school inviting you to participate in research regarding the use of computers in FACS classrooms in the state of Utah. Unfortunately I sent them late in the school year and since I haven't heard back from you, I assume that the letter did not arrive prior to the end of your school year. Therefore I am sending the questionnaire directly to your home in hopes that you will agree to participate in this research.

Enclosed please find the questionnaire and an envelope in which to return it.

> **If you DO NOT use a computer, please complete pages 1-4 (white) and page 5 (yellow).**
> **If you DO use computers, please complete pages 1-4 (white) and pages 6-7 (pink).**

Please take a few moments from your busy summer vacation to complete the enclosed questionnaire. All the information is strictly confidential. The forms are numbered for tracking purposes only and no reference will be made to any individual or specific institution.

Thank you for responding promptly.

Cynthia Wright
Associate Professor of Home Economics
Southern Utah University

Learning Lives Forever.

Appendix E. Cover Letter to Those Who Gave Qualified Response

SOUTHERN UTAH UNIVERSITY
Cedar City, Utah 84720
(801) 586-1979

Home Economics

June 27, 1996

Dear Family and Consumer Sciences Education Teacher,

Thank you for responding to the invitation to participate in research regarding the use of computers in FACS classrooms in the state of Utah. Although you indicated that you would choose not to participate, your response was qualified. Many of you mentioned that either you didn't use computers or that you would not be available during the month of June. I would appreciate your response when you arrive back in town and am anxious to hear from every teacher, not just those who use computers.

I have enclosed a questionnaire and an envelope in which it may be returned in the event you decide that you will participate in this research.

> If you DO NOT use a computer, please complete pages 1-4 (white) and page 5 (yellow).
> If you DO use computers, please complete pages 1-4 (white) and pages 6-7 (pink).

I would REALLY appreciate you taking a few moments from your busy summer vacation to participate. All the information is strictly confidential. The forms are numbered for tracking purposes only and no reference will be made to any individual or specific institution.

Thank you for responding promptly.

Cynthia Wright
Associate Professor of Home Economics
Southern Utah University

Learning Lives Forever.

Appendix F. Cover Letter for Follow-Up Questionnaire

September 1, 1996

Dear Family and Consumer Sciences Teacher,

Last spring I sent a postcard requesting your participation in a survey regarding computer use in FACS in the state of Utah. Unfortunately the postcards were not sent as soon as originally anticipated so you may not have received it before you left school for the summer. I attempted to locate you at home in the summer but apparently the address I had was incorrect. For that reason I am sending another questionnaire (and the original cover letter explaining the research being undertaken), hoping that you will complete and return it as soon as possible.

Thanks for your help in this research.

Sincerely,

Cynthia Wright
Associate Professor of Home Economics
Southern Utah University
Cedar City, UT 84720

Appendix G. Questionnaire

Demographic Information

Gender: ☐ Female ☐ Male

Age: ☐ Under 30 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ Over 60

Highest Earned Degree: ☐ Bachelor ☐ Bachelor + hours ☐ Masters ☐ Masters + hours ☐ Doctorate

Last degree earned: ☐ Before 1940 ☐ 1940's ☐ 1950's ☐ 1960's ☐ 1970's ☐ 1980's ☐ 1990's

Were any computer classes required for your last college degree? ☐ Yes ☐ No

In which professional organizations do you hold current membership?
☐ UAFCS/AAFCS ☐ UATFACS/NATFACS ☐ Other: ____________

How would you evaluate your personal computer literacy?
☐ None ☐ Minimal ☐ Above average ☐ Superior

Have you had any training in the use of a computer or are you self-taught?
☐ Had training ☐ Self-taught ☐ Both (had training but also self-taught)

Do you have a computer in your home? ☐ Yes ☐ No
If yes, how long have you had a computer? _____ months and/or _____ years
How long have you used a computer? _____ months and/or _____ years
How do you use your home computer? (Check as many as apply.)
☐ Word processing ☐ Financial/record keeping ☐ Games
☐ Internet services ☐ Education ☐ Other ____________

Number of computer workshops attended ________
For each workshop/class you have attended, please answer the following questions:

Workshop # 1

Who sponsored the workshop/class?
(Check only one.)
_____ College class
_____ School inservice
_____ District inservice
_____ FACS workshop
_____ Other ____________
Who taught the workshop/class?
_____ FACS professional
_____ Other
How long did the training last?
_____ Hours
_____ Days
What type of instruction was used?
(Check all that apply.)
_____ Show-and-tell
_____ Hands-on
_____ Programming
_____ Tutorial
_____ Other ____________
Approximate # of attendees?
_____
Number of instructors?
_____
Did you feel the training had practical application to your job?
_____ Yes
_____ No
Did you receive written materials?
_____ Yes
_____ No
Did you leave with usable materials?
_____ Yes
_____ No

Workshop # 2

Who sponsored the workshop/class?
(Check only one.)
_____ College class
_____ School inservice
_____ District inservice
_____ FACS workshop
_____ Other ____________
Who taught the workshop/class?
_____ FACS professional
_____ Other
How long did the training last?
_____ Hours
_____ Days
What type of instruction was used?
(Check all that apply.)
_____ Show-and-tell
_____ Hands-on
_____ Programming
_____ Tutorial
_____ Other ____________
Approximate # of attendees?
_____
Number of instructors?
_____
Did you feel the training had practical application to your job?
_____ Yes
_____ No
Did you receive written materials?
_____ Yes
_____ No
Did you leave with usable materials?
_____ Yes
_____ No

Workshop # 3

Who sponsored the workshop/class?
(Check only one.)
_____ College class
_____ School inservice
_____ District inservice
_____ FACS workshop
_____ Other ____________
Who taught the workshop/class?
_____ FACS professional
_____ Other
How long did the training last?
_____ Hours
_____ Days
What type of instruction was used?
(Check all that apply.)
_____ Show-and-tell
_____ Hands-on
_____ Programming
_____ Tutorial
_____ Other ____________
Approximate # of attendees?
_____
Number of instructors?
_____
Did you feel the training had practical application to your job?
_____ Yes
_____ No
Did you receive written materials?
_____ Yes
_____ No
Did you leave with usable materials?
_____ Yes
_____ No

Workshop # 4

Who sponsored the workshop/class?
(Check only one.)
____ College class
____ School inservice
____ District inservice
____ FACS workshop
____ Other ____________
Who taught the workshop/class?
____ FACS professional
____ Other
How long did the training last?
____ Hours
____ Days
What type of instruction was used?
(Check all that apply.)
____ Show-and-tell
____ Hands-on
____ Programming
____ Tutorial
____ Other ____________
Approximate # of attendees?
____
Number of instructors?
____
Did you feel the training had practical application to your job?
____ Yes
____ No
Did you receive written materials?
____ Yes
____ No
Did you leave with usable materials?
____ Yes
____ No

Workshop # 5

Who sponsored the workshop/class?
(Check only one.)
____ College class
____ School inservice
____ District inservice
____ FACS workshop
____ Other ____________
Who taught the workshop/class?
____ FACS professional
____ Other
How long did the training last?
____ Hours
____ Days
What type of instruction was used?
(Check all that apply.)
____ Show-and-tell
____ Hands-on
____ Programming
____ Tutorial
____ Other ____________
Approximate # of attendees?
____
Number of instructors?
____
Did you feel the training had practical application to your job?
____ Yes
____ No
Did you receive written materials?
____ Yes
____ No
Did you leave with usable materials?
____ Yes
____ No

Workshop # 6

Who sponsored the workshop/class?
(Check only one.)
____ College class
____ School inservice
____ District inservice
____ FACS workshop
____ Other ____________
Who taught the workshop/class?
____ FACS professional
____ Other
How long did the training last?
____ Hours
____ Days
What type of instruction was used?
(Check all that apply.)
____ Show-and-tell
____ Hands-on
____ Programming
____ Tutorial
____ Other ____________
Approximate # of attendees?
____
Number of instructors?
____
Did you feel the training had practical application to your job?
____ Yes
____ No
Did you receive written materials?
____ Yes
____ No
Did you leave with usable materials?
____ Yes
____ No

In what type of community is your school located?
☐ Metropolitan ☐ Urban ☐ Rural

Which grade(s) do you teach? (Check all that apply.)
☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

What is the total enrollment in your school?
☐ Under 100 ☐ 100-299 ☐ 250-499 ☐ 500-749 ☐ 750-999
☐ 1000-1499 ☐ 1500-1999 ☐ 2000-2499 ☐ 2500+

Approximately how many students do you have in each class?
☐ Less than 15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31+

How many different preparations do you teach each year?
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10+

Is there a computer available for your use in your school? ☐ Yes ☐ No
If yes, how long have you had access to a computer at school? ____ months and/or ____ years
How long have you used a computer at school? ____ months and/or ____ years

Only summary data will be used for analysis of the following information. If you choose not to answer this question, please complete the remainder of the survey and return it.

Total household Income:
☐ Under $14,999 ☐ $15,000-$19,999 ☐ $20,000-$29,999 ☐ $30,000-$39,999
☐ $40,000-$49,999 ☐ $50,000-$59,999 ☐ $60,000 or more

Please turn the page and complete the Computer Attitude Scale.

Computer Attitude Scale
(Loyd and Gressard, 1984)

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree
1. Computers do not scare me at all.	____	____	____	____
2. I'm no good with computers	____	____	____	____
3. I would like working with computers	____	____	____	____
4. I will use computers many ways in my life	____	____	____	____
5. Working with a computer would make me very nervous	____	____	____	____
6. Generally I would feel okay about trying a new problem on the computer	____	____	____	____
7. The challenge of solving problems with computers does not appeal to me.	____	____	____	____
8. Learning about computers is a waste of time.	____	____	____	____
9. I do not feel threatened when others talk about computers.	____	____	____	____
10. I don't think I would do advanced computer work	____	____	____	____
11. I think working with computers would be enjoyable and stimulating.	____	____	____	____
12. Learning about computers is worthwhile.	____	____	____	____
13. I feel aggressive and hostile towards computers.	____	____	____	____
14. I am sure I could do work with computers	____	____	____	____
15. Figuring out computer problems does not appeal to me	____	____	____	____
16. I'll need a firm mastery of computers for my future work.	____	____	____	____
17. It wouldn't bother me at all to take computer courses	____	____	____	____
18. I'm not the type to do well with computers	____	____	____	____
19. When there is a problem with a computer run that I can't immediately solve, I would stick with it until I have the answer	____	____	____	____
20. I expect to have little use for computers in my daily life	____	____	____	____
21. Computers make me feel uncomfortable.	____	____	____	____
22. I am sure I could learn a computer language.	____	____	____	____
23. I don't understand how some people can spend so much time working with computers and seem to enjoy it	____	____	____	____
24. I can't think of any way that I will use computers in my career.	____	____	____	____
25. I would feel at ease in a computer classroom.	____	____	____	____
26. I think using a computer would be very hard for me.	____	____	____	____
27. Once I start to work with the computer, I would find it hard to stop	____	____	____	____
28. Knowing how to work with computers will increase my job possibilities	____	____	____	____
29. I get a sinking feeling when I think of trying to use a computer	____	____	____	____

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree
30. I could get good grades in computer courses.	____	____	____	____
31. I will do as little work with computers as possible.	____	____	____	____
32. Anything that a computer can be used for, I can do just as well some other way..	____	____	____	____
33. I would feel comfortable working with a computer.	____	____	____	____
34. I do not think I could handle a computer course	____	____	____	____
35. If a problem is left unsolved in a computer class, I would continue to think about it later	____	____	____	____
36. It is important to me to do well in computer classes	____	____	____	____
37. Computers make me feel unesay and confused	____	____	____	____
38. I have a lot of self-confidence when it comes to working with computers	____	____	____	____
39 I do not enjoy talking with others about computers.	____	____	____	____
40. Working with computers will not be important to me in my life's work	____	____	____	____

If you do NOT use computers in your role as a Family and Consumer Sciences Education teacher, please turn the page and complete page 5 (yellow page).

If you DO use computers in your role as a Family and Consumer Sciences Education teacher, please turn to page 6 (pink pages).

If you DO NOT use a computer in your role as a FACS teacher, please answer the following questions:

What FACS classes do you teach? (Check all that apply.)

TLC	☐	Life skills	☐	Clothing construction	☐
Child development	☐	Life management	☐	Dynamics of clothing	☐
Child care I	☐	Teen living	☐	Fashion strategies	☐
Child care II	☐	Adult roles	☐	Fashion design	☐
Food for life	☐	Consumer economics	☐	Interior design	☐
Food and fitness	☐	Enterpreneurship	☐	Advanced interior design	☐
Food science/nutrition	☐	Young parents/grads	☐	Integrated FACS	☐
Food service/culinary arts	☐	Other: ____________	☐	Other: ____________	☐

Do you anticipate using a computer in the near future? ☐ Yes ☐ No

Which of the following factors are major contributors of your non-use of computers?
(Rank the top five influences with #1 being most influential.)

______ Lack of easily accessible computer(s)
______ Lack of encouragement from administration
______ Lack of support of students' parents
______ Lack of interest on my part
______ Lack of training and/or computer experience
______ Lack of time to spend on developing computer related lesson plans
______ Lack of related computer equipment (i.e., LCD projection panel)
______ Lack of appropriate software
______ Lack of incentive/reward for my efforts
______ Never thought of it
______ Other: ____

What factors might influence you to start using computers in your FACS classroom? (Check all that apply.)

☐ Additional computers
☐ Additional appropriate programs
☐ Inservice training
☐ Additional administrative support
☐ Other: ________________
☐ Computer(s) in my classroom
☐ Additional computer equipment (i.e., LCD panel)
☐ Additional pay (or other incentive/reward)
☐ Additional prep time
☐ Nothing would influence me to use computers

If inservice computer training were offered through the State Office of Education, would you attend?

Subject matter specific training (i.e., clothing, foods/nutrition)	☐ Yes	☐ No
Presentation software training (i.e., Powerpoint, Astound)	☐ Yes	☐ No
General use of computers (platform specific, i.e., IBM or Mac)	☐ Yes	☐ No

If yes to any of the above, which of the following would be of most interest to you? (Check only one.)

☐ 2 hour workshops
☐ Half day (4 hour) workshops
☐ 1 day workshops
☐ Friday nigh/Saturday workshops
☐ 3 day workshops
☐ 5 day workshops

In which of the following subject matter areas would you be most interested in receiving inservice training related to the use of computers? (Please check top five areas of interest.)

TLC	☐	Life skills	☐	Clothing construction	☐
Child development	☐	Life management	☐	Dynamics of clothing	☐
Child care I	☐	Teen living	☐	Fashion strategies	☐
Child care II	☐	Adult roles	☐	Fashion design	☐
Food for life	☐	Consumer economics	☐	Interior design	☐
Food and fitness	☐	Enterpreneurship	☐	Advanced interior design	☐
Food science/nutrition	☐	Young parents/grads	☐	Integrated FACS	☐
Food service/culinary arts	☐	Other: ____________	☐	Other: ____________	☐

Which of the following locations would be your personal preference for workshop attendance?
(Rank top three with #1 being the most desirable to you.)

_____ Logan _____ SLC _____ Provo _____ Cedar City _____ Uinta Basin _____ Blanding

If workshops were only held in Logan and Cedar City, would you still attend?
☐ Yes ☐ No

Thanks for your help in this research!

If you DO use a computer in your role as a FACS teacher, please answer the following questions:

Where is (are) the computer(s) located? (Check all that apply.)
☐ In my classroom ☐ In central location in school

What kind of computer and peripherals do you use at school? (Check all that apply.)

☐ IBM compatible	☐ Macintosh	☐ Other: ________
☐ Color monitor	☐ Color monitor	☐ Color monitor
☐ Printer	☐ Printer	☐ Printer
☐ CD ROM	☐ CD ROM	☐ CD ROM
☐ Internet	☐ Internet	☐ Internet

To which of the following computer peripherals do you have access? (Check all that apply.)
☐ VCR ☐ LCD projection panel ☐ Other: ________ ☐ Other: ________

Which of the following factors have significantly contributed to your use of computers in the classroom? (Check all that apply.)

☐ Easily accessible computer(s)	☐ Personal training and/or experience
☐ Encouragement from administrators	☐ Support from students' parents
☐ Personal interest or motivation	☐ Availability of related computer equipment
☐ Availability of appropriate software	☐ Release (or other) time to develop computer related lesson plans
☐ Desire to gain recognition for my program	☐ Additional pay (or other reward/incentives)
☐ Other: ________	☐ Other: ________

What FACS classes do you teach and in which of those classes do you use computers? (Check all that apply.)

	Teach	Use Computer	# Hours on Computer/Week		Teach	Use Computer	# Hours on Computer/Week
TLC	☐	☐	____	Life skills	☐	☐	____
Teen living	☐	☐	____	Life management	☐	☐	____
Adult Roles	☐	☐	____	Child development	☐	☐	____
Child care I	☐	☐	____	Child care II	☐	☐	____
Fashion strategies	☐	☐	____	Dynamics of clothing	☐	☐	____
Clothing construction	☐	☐	____	Fashion design	☐	☐	____
Food and Fitness	☐	☐	____	Food for life	☐	☐	____
Food science/nutrition	☐	☐	____	Food service/culinary arts	☐	☐	____
Interior design	☐	☐	____	Advanced interior design	☐	☐	____
Consumer economics	☐	☐	____	Enterpreneurship	☐	☐	____
Young parents/grads	☐	☐	____	Integrated FACS	☐	☐	____
Other: ________	☐	☐	____	Other: ________	☐	☐	____

Rank the five ways you most often use the computer(s) in your classroom. (Use #1 for most frequently used.)

____ Drill and practice	____ Tutorial	____ Simulation
____ Educational games	____ Computer programming	____ Demonstration
____ Word processing	____ Spread sheet/data base	____ Inventory tracking
____ Grade tracking	____ Non-educational games	____ Reference
____ Materials generation	____ Computer literacy	____ Authoring CAS
____ Surfing the net	____ Creating a web site	____ Other: ________

Approximately how many hours a week do you use a computer for school related activities?
☐ Less than 1 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10+ List approximate # of hours____

Approximately hour many hours a week do you use a computer for personal matters or pleasure?
☐ Less than 1 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10+ List approximate # of hours____

Approximately how many hours a week do your students use a computer in YOUR classroom?
☐ Less than 1 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10+ List approximate # of hours____

Please turn the page and continue.

Do you have input in the selection of computer equipment (hardware) for your classroom?
☐ Yes ☐ No ☐ Not applicable

Do you have input in the selection of computer programs (software) for your classroom use?
☐ Yes ☐ No ☐ Not applicable

If you do have a say in software purchasing decisions, which of the following has been most helpful to you in selecting software? (Check all that apply.)
☐ Pretesting the software
☐ Manufacturer's information
☐ Advertising
☐ Word of mouth
☐ Other: ________________
☐ Salesperson in store
☐ Catalogs
☐ Conventions, workshops
☐ Reviews in magazines/newsletters
☐ Other: ________________

How have software purchases for your classroom/department been funded? (Check all that apply.)
☐ ATE supply budgets (equipment)
☐ Solicited funds/donations (PTA)
☐ Your own pocket
☐ Other: ________________
☐ Grants (other special funding)
☐ School district budgets
☐ I don't know
☐ Other: ________________

What factors might influence you to start increase the use of computers in your FACS classroom? (Check all that apply.)
☐ Additional computers
☐ Additional appropriate programs
☐ Inservice training
☐ Additional administrative support
☐ Other: ________________
☐ Computer(s) in my classroom
☐ Additional computer equipment (i.e., LCD panel)
☐ Additional pay (or other incentive/reward)
☐ Additional prep time
☐ Nothing would influence me to increase my computer use

If inservice computer training were offered through the State Office of Education, would you attend?
Subject matter specific training (i.e., clothing, foods/nutrition) ☐ Yes ☐ No
Presentation software training (i.e., Powerpoint, Astound) ☐ Yes ☐ No
General use of computers (platform specific, i.e., IBM or Mac) ☐ Yes ☐ No

If yes to any of the above, which of the following would be of most interest to you? (Check only one.)
☐ 2 hour workshops
☐ Half day (4 hour) workshops
☐ 1 day workshops
☐ Friday nigh/Saturday workshops
☐ 3 day workshops
☐ 5 day workshops

In which of the following subject matter areas would you be most interested in receiving inserivce training related to the use of computers? (Please check top five areas of interest.)

TLC	☐	Life skills	☐	Clothing construction	☐
Child development	☐	Life management	☐	Dynamics of clothing	☐
Child care I	☐	Teen living	☐	Fashion strategies	☐
Child care II	☐	Adult roles	☐	Fashion design	☐
Food for life	☐	Consumer economics	☐	Interior design	☐
Food and fitness	☐	Enterpreneurship	☐	Advanced interior design	☐
Food science/nutrition	☐	Young parents/grads	☐	Integrated FACS	☐
Food service/culinary arts	☐	Other: ____________	☐	Other: ____________	☐

Which of the following locations would be your personal preference for workshop attendance?
(Rank top three with #1 being the most desirable to you.)
_____ Logan _____ SLC _____ Provo _____ Cedar City _____ Uinta Basin _____ Blanding

If workshops were only held in Logan and Cedar City, would you still attend?
☐ Yes ☐ No

Do you belong to a comptuter users group? ☐ Yes ☐ No
Would you be interested in joining a FACS user group? ☐ Yes ☐ No

Thanks for your time and effort in completing this survey!

Appendix H. Copy of Permission to Use Computer Attitude Scale

CURRY SCHOOL OF EDUCATION
DEPARTMENT OF EDUCATIONAL STUDIES

November 1, 1995

Cynthia Wright
Home Economics Department
Southern Utah University
Cedar City, UT 84720

Dear Ms. Wright:

In response to your inquiry, I am enclosing a copy of our survey of attitudes towards computers.

The survey is scored according to the following:

- For questions 1, 3, 4, 6, 9, 11, 12, 14, 16, 17, 19, 22, 25, 27, 28, 30, 33, 35, 36, 38 (Strongly Agree=4, Slightly Agree=3, Slightly Disagree=2, Strongly Disagree=1).
- For questions 2, 5, 7, 8, 10, 13, 15, 18, 20, 21, 23, 24, 26, 29, 31, 32, 34, 37, 39, 40 (Strongly Agree=1, Slightly Agree=2, Slightly Disagree=3, Strongly Disagree=4).

The questions are coded so that the higher the score, the more positive the attitude.

Four subscores can also be obtained from the questions.

- Anxiety: 1, 5, 9, 13, 17, 21, 25, 29, 33, 37
- Confidence: 2, 6, 10, 14, 18, 22, 26, 30, 34, 38
- Liking: 3, 7, 11, 15, 19, 23, 27, 31, 35, 39
- Usefulness: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

EDUCATIONAL EVALUATION EDUCATION PSYCHOLOGY EDUCATIONAL RESEARCH
INSTRUCTIONAL TECHNOLOGY SOCIAL FOUNDATIONS OF EDUCATION
RUFFNER HALL, UNIVERSITY OF VIRGINIA, 405 EMMET STREET, CHARLOTTESVILLE, VA 22903-2495
(804) 924-7471

Cynthia Wright
November 1, 1995
Page 2

Again, higher scores correspond to more positive attitude, e.g., a higher confidence score means more confidence and a higher anxiety score means *less* anxiety.

If you need any additional information about the scale, please contact me. Permission is granted for use of this scale.

Sincerely,

Brenda H Loyd

Brenda H. Loyd
Professor

Enclosure

SURVEY OF ATTITUDES TOWARD LEARNING ABOUT AND WORKING WITH COMPUTERS

Brenda H. Loyd and Clarice P. Gressard
University of Virginia

The purpose of this survey is to gather information concerning people's attitudes toward learning about and working with computers. It should take about five minutes to complete this survey. All responses are kept confidential. Please return the survey to your instructor when you are finished.

Please check the blank which applies to you.

1. Age: ( ) 22 or less ( ) 23-25 ( ) 26-30
   ( ) 31-35 ( ) 36-40 ( ) 41-45
   ( ) 46-50 ( ) 51-55 ( ) 55+

2. College level completed: ( ) 1st year ( ) 2nd year ( ) 3rd year ( ) 4th year
   ( ) Bachelors ( ) Masters ( ) Doctorate

3. Major area of study: ______________________________

4. Sex: ( ) Male ( ) Female

5. Experience with learning about or working with computers:
   ( ) 1 week or less ( ) 6 months to 1 year
   ( ) 1 week to 1 month ( ) 1 year or more
   ( ) 1 month to 6 months

   Briefly state the type of computer experience: ______________________

COMPUTER ATTITUDE SCALE

Below are a series of statements. There are no correct answers to these statements. They are designed to permit you to indicate the extent to which you agree or disagree with the ideas expressed. Place a check mark in the parentheses under the label which is closest to your agreement or disagreement with the statements.

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree
1. Computers do not scare me at all.	( )	( )	( )	( )
2. I'm no good with computers.	( )	( )	( )	( )
3. I would like working with computers.	( )	( )	( )	( )
4. I will use computers many ways in my life.	( )	( )	( )	( )
5. Working with a computer would make me very nervous.	( )	( )	( )	( )
6. Generally I would feel OK about trying a new problem on the computer.	( )	( )	( )	( )
7. The challenge of solving problems with computers does not appeal to me.	( )	( )	( )	( )
8. Learning about computers is a waste of time.	( )	( )	( )	( )
9. I do not feel threatened when others talk about computers.	( )	( )	( )	( )

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree
10. I don't think I would do advanced computer work.	( )	( )	( )	( )
11. I think working with computers would be enjoyable and stimulating.	( )	( )	( )	( )
12. Learning about computers is worthwhile.	( )	( )	( )	( )
13. I feel aggressive and hostile toward computers.	( )	( )	( )	( )
14. I am sure I could do work with computers.	( )	( )	( )	( )
15. Figuring out computer problems does not appeal to me.	( )	( )	( )	( )
16. I'll need a firm mastery of computers for my future work.	( )	( )	( )	( )
17. I wouldn't bother me at all to take computer courses.	( )	( )	( )	( )
18. I'm not the type to do well with computers.	( )	( )	( )	( )
19. When there is a problem with a computer run that I can't immediately solve, I would stick with it until I have the answer.	( )	( )	( )	( )
20. I expect to have little use for computers in my daily life.	( )	( )	( )	( )
21. Computers make me feel uncomfortable.	( )	( )	( )	( )
22. I am sure I could learn a computer language.	( )	( )	( )	( )
23. I don't understand how some people can spend so much time working with computers and seem to enjoy it.	( )	( )	( )	( )
24. I can't think of any way that I will use computers in my career.	( )	( )	( )	( )
25. I would feel at ease in a computer class.	( )	( )	( )	( )
26. I think using a computer would be very hard for me.	( )	( )	( )	( )
27. Once I start to work with the computer, I would find it hard to stop.	( )	( )	( )	( )
28. Knowing how to work with computers will increase my job possibilities.	( )	( )	( )	( )
29. I get a sinking feeling when I think of trying to use a computer.	( )	( )	( )	( )
30. I could get good grades in computer courses.	( )	( )	( )	( )
31. I will do as little work with computers as possible.	( )	( )	( )	( )
32. Anything that a computer can be used for, I can do just as well some other way.	( )	( )	( )	( )

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree
33. I would feel comfortable working with a computer.	( )	( )	( )	( )
34. I do not think I could handle a computer course.	( )	( )	( )	( )
35. If a problem is left unsolved in a computer class, I would continue to think about it afterward.	( )	( )	( )	( )
36. It is important to me to do well in computer classes.	( )	( )	( )	( )
37. Computers make me feel uneasy and confused.	( )	( )	( )	( )
38. I have a lot of self-confidence when it comes to working with computers.	( )	( )	( )	( )
39. I do not enjoy talking with others about computers.	( )	( )	( )	( )
40. Working with computers will not be important to me in my life's work.	( )	( )	( )	( )

Appendix I. Tables

Table I-1

Computer Use by Source of Training

Variable	n	mean	SD	t	p
Hours used					
School class					
None	115	3.8391	5.9141	0.144	0.886
At least 1	99	3.7172	6.4745		
District class					
None	99	3.2879	5.2587	-1.09	0.277
At least 1	115	4.2087	6.8448		
College class					
None	145	3.7931	6.2126	0.036	0.971
At least 1	69	3.7609	6.1097		
FACS class					
None	181	3.7541	6.0163	-0.158	0.874
At least 1	33	3.9394	7.0265		
Other class					
None	185	3.5757	5.9174	-1.242	0.215
At least 1	29	5.1034	7.5467		
Computer use					
School class					
None	114	2.2368	2.3208	-1.627	0.105
At least 1	99	2.7475	2.2422		
District class					
None	99	2.3737	2.1024	-0.595	0.553
At least 1	114	2.5614	2.4532		
College class					
None	144	2.4514	2.2024	-0.209	0.835
At least 1	69	2.5217	2.4888		
FACS class					
None	180	2.4833	2.3976	0.136	0.892
At least 1	33	2.4242	1.6399		
Other class					
None	184	2.4728	2.3398	-0.022	0.983
At least 1	29	2.4828	2.0111		
At least 1	29	2.1379	2.6285		

(table continues)

Variable	N	Mean	SD	t	p
Ratio					
School class					
None	114	0.5334	0.4396	-1.429	0.155
At least 1	99	0.6163	0.4025		
District class					
None	99	0.5811	0.4148	0.294	0.769
At least 1	114	0.564	0.4332		
College class					
None	144	0.578	0.4332	0.301	0.764
At least 1	69	0.5593	0.4062		
other class					
None	184	0.5702	0.4235	-0.153	0.878
At least 1	29	0.5832	0.4332		
How used (student)					
School class					
None	113	2.4513	4.0664	1.19	0.235
At least 1	99	1.8687	2.8666		
District class					
None	99	2.4242	3.698	0.937	0.35
At least 1	113	1.9646	3.438		
College class					
None	143	1.9231	3.4377	-1.513	0.132
At least 1	69	2.7101	3.7734		
other class					
None	183	2.1858	3.6926	0.067	0.947
At least 1	29	2.1379	2.6285		
How used (teacher)					
School class	113	10.9912	5.4943	-1.082	0.28
None	99	11.7677	4.8715		
At least 1					
District class					
None	99	11.2222	5.917	-0.343	0.732
At least 1	113	11.469	4.5357		
College class					
None	143	10.9231	5.1568	-1.739	0.083
At least 1	69	12.2464	5.2592		
FACS class					
None	179	11.257	5.3978	-0.628	0.53
At least 1	33	11.8788	4.1137		

Table I-2

Chi-square, Expected, and Observed Frequencies for Location of Computer by Source of Computer Training

Source of Training	Neither location		In classroom only		In central location only		In both locations			Asymp
	Expected	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Value	sig
School class										
none	1.1	2	60.8	59	11.3	13	39.8	39		
at least one	0.9	0	52.2	54	9.7	8	34.2	35		
Total	2	2	113.0	113	21.0	21	74.0	74	2.423	0.489
College class										
none	1.4	1	76.4	74	14.2	18	50.0	49		
at least one	0.6	1	36.6	39	6.8	3	24.0	25		
Total	2	2	113.0	113	21.0	21	74.0	74	3.725	0.293
District class										
none	0.9	1	51.7	52	9.6	8	33.8	35		
at least one	1.1	1	61.3	61	11.4	13	40.2	39		
Total	2	2	113.0	113	21.0	21	74.0	74	0.585	0.9
FACS class										
none	1.7	2	95.2	97	17.7	17	62.4	61		
at least one	0.3	0	17.8	16	3.3	4	11.6	13		
Total	2	2	113.0	113	21.0	21	74.0	74	0.947	0.814
Other class										
none	1.7	1	97.4	95	18.1	18	63.8	67		
at least one	0.3	1	15.6	18	2.9	3	10.2	7		
Total	2	2	113.0	113	21.0	21	74.0	74	3.808	0.283

Table I-3

Chi-square, Expected and Observed Frequencies for Type of Computer Used by Source of Computer Training

	Don't use IBM		Use IBM			Asymp
	Expected	Observed	Expected	Observed	Value	sig
School class						
None	30.7	35	83.3	79		
at least one	26.3	22	71.7	76		
Total	57.0	57	155.0	155	1.826	0.177
College class						
None	38.7	42	105.3	102		
at least one	18.3	15	49.7	53		
Total	57.0	57	155.0	155	1.187	0.276
District class						
None	26.3	32	71.7	66		
at least one	30.7	25	83.3	89		
Total	57.0	57	155.0	155	3.083	0.079
FACS class						
None	48.1	48	130.9	131		
at least one	8.9	9	24.1	24		
Total	57.0	57	155.0	155	0.003	0.957
Other class						
None	49.2	51	133.8	132		
at least one	7.8	6	21.2	23		
Total	57.0	57	57.0	155	0.656	0.418

Table I-4

Chi-square, Expected, and Observed Frequencies for Type of Computer (Macintosh) by Source of Computer Training

	Don't use Macintosh		Use Macintosh			Asymp
	Expected	Observed	Expected	Observed	Value	sig
School class						
None	64.0	65	50.0	49		
at least one	55.0	54	43.0	44		
Total	119.0	119	93.0	93	0.079	0.779
College class						
None	89.8	85	63.2	59		
at least one	38.2	34	29.8	34		
Total	119.0	119	93.0	93	1.529	0.216
District class						
None	55.0	53	43.0	45		
at least one	64.0	66	50.0	48		
Total	119.0	119	93.0	93	0.311	0.577
FACS class						
None	100.5	104	78.5	75		
at least one	18.5	15	14.5	18		
Total	119.0	119	119.0	93	1.810	0.179
Other class						
None	102.7	103	80.3	80		
at least one	16.3	16	12.7	13		
Total	119.0	119	93.0	93	0.013	0.911

Table I-5

ANOVA for Hours Used by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Hours Used by Show-and-tell					
Between Groups	2	9.916	4.958	0.129	0.879
Within Groups	211	8086.230	38.323		
Total	213	8096.146			
Analysis of Variance for Hours Used by Hands-on					
Between Groups	3	66.482	22.161	0.580	0.629
Within Groups	210	8029.664	38.236		
Total	213	8096.146			
Analysis of Variance for Hours Used by Programming					
Between Groups	2	55.863	27.931	0.733	0.482
Within Groups	211	8040.283	38.106		
Total	213	8096.146			
Analysis of Variance for Hours Used by Tutorial					
Between Groups	2	40.730	20.365	0.533	0.587
Within Groups	211	8055.416	38.177		
Total	213	8096.146			

Table I-6

ANOVA for Computer Use by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Compuse by Show-and-tell					
Between Groups	2	16.833	8.417	1.609	0.202
Within Groups	210	1098.275	5.230		
Total	212	115.108			
Analysis of Variance for Compuse by Hands-on					
Between Groups	3	30.510	10.170	1.960	0.121
Within Groups	209	1084.598	5.189		
Total	212	115.108			
Analysis of Variance for Compuse by Programming					
Between Groups	2	2.671	1.335	0.252	0.777
Within Groups	210	1112.437	5.297		
Total	212	115.108			
Analysis of Variance for Compuse by Tutorial					
Between Groups	2	18.043	9.022	1.727	0.18
Within Groups	210	1097.065	5.224		
Total	212	115.108			

Table I-7

ANOVA for Student Computer Use by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Student by Show-and-tell					
Between Groups	2	17.7	8.850	0.696	0.500
Within Groups	209	2657.489	12.715		
Total	211	2675.189			
Analysis of Variance for Student by Hands-on					
Between Groups	3	73.725	24.575	1.965	0.120
Within Groups	208	2601.464	12.507		
Total	211	2675.189			
Analysis of Variance for Student by Programming					
Between Groups	2	28.081	14.041	1.109	0.332
Within Groups	209	2647.107	12.666		
Total	211	2675.189			
Analysis of Variance for Student by Tutorial					
Between Groups	2	19.224	9.612	0.756	0.471
Within Groups	209	2655.065	12.708		
Total	211	2675.189			

Table I-8

ANOVA for Ratio by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Ratio by Show-and-tell					
Between Groups	2	1.361	0.681	3.893	0.022 *
Within Groups	210	36.715	0.175		
Total	212	38.076			
Analysis of Variance for Ratio by Hands-on					
Between Groups	3	1.785	0.595	4.427	0.018 *
Within Groups	209	36.291	0.174		
Total	212	38.076			
Analysis of Variance for Ratio by Programming					
Between Groups	2	0.574	0.287	1.607	0.203
Within Groups	210	37.503	0.179		
Total	212	38.076			
Analysis of Variance for Ratio by Tutorial					
Between Groups	2	0.541	0.27	1.513	0.223
Within Groups	210	37.536	0.179		
Total	212	38.076			

*$p < .05$.

Table I-9

ANOVA for Teacher Use of Computer by Type of Computer Training

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Teacher by Programming					
Between Groups	2	9.859	4.93	0.18	0.836
Within Groups	209	5728.608	27.41		
Total	211	5738.467			
Analysis of Variance for Teacher by Tutorial					
Between Groups	2	141.064	70.532	2.634	0.074
Within Groups	209	5597.403	26.782		
Total	211	5738.467			

Table I-10

Chi-square, Expected, and Observed Frequencies for Computer Nonuse by Type of Computer Training

Type of training	Nonuser Expected	Nonuser Observed	User Expected	User Observed	Value	Asymp sig
Show-and-tell						
None	27.1	33	94.9	89		
1	14.6	16	51.4	50		
at least 2	19.3	12	67.7	75		
Total	61	61	214	214	5.384	0.068
Hands-on						
None	11.3	16	39.7	35		
1	13.8	16.2	48.2	47		
2	16.2	16	56.8	57		
3 or more	19.7	14	69.3	75		
Total	61	61	214	214	4.79	0.188
Programming						
None	49.5	52	173.5	171		
1	8.2	5	28.8	32		
2 or more	3.3	4	11.7	11		
Total	61	61	214	214	1.952	0.377
Tutorial						
None	44.8	48	157.2	154		
1	6.7	5	23.3	25		
2 or more	9.5	8	33.5	35		
Total	61	61	214	214	1.14	0.566

Table I-11

Chi-square, Expected, and Observed Frequencies for Location of Computer by Type of Computer Training

Type of Training	Neither location		In classroom only		In central location only		In both locations			
	Expected	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Value	Sig
Show-and-tell										
none	0.8	0	46.8	45	8.7	12	30.7	30		
1	0.5	2	26.9	26	5	6	17.6	16		
at least 2	0.7	0	39.3	42	7.3	3	25.7	28		
Total	2	2	113	113	21	21	74	74	11.038	0.087
Hands-on										
none	0.3	1	18.3	16	3.4	4	12	13		
1	0.4	1	24.2	26	4.5	7	15.9	11		
2	0.5	0	30.1	30	5.6	5	19.7	21		
3 or more	0.7	0	40.4	41	7.5	5	26.4	29		
Total	2	2	113	113	21	21	74	74	8.15	0.519
Programming										
none	1.6	1	89.9	92	16.7	19	58.8	55		
1	0.3	1	17.2	14	3.2	1	11.3	16		
2 or more	0.1	0	5.9	7	1.1	1	3.9	3		
Total	2	2	113	113	21	21	74	74	7.027	0.318
Tutorial										
none	1.4	1	81.8	86	15.2	15	53.6	50		
1	0.2	0	12.9	11	2.4	3	8.5	10		
2 or more	0.3	1	18.3	16	3.4	3	12	14		
Total	2	2	113	113	21	21	74	74	3.626	0.727

Table I-12

Chi-square, Expected, and Observed Frequencies for Type of Computer (Macintosh) by Type of Computer Training

Type of training	Don't use Macintosh		Use Macintosh			Asymp
	Expected	Observed	Expected	Observed	Value	sig
Show-and-tell						
None	49.4	55	38.6	33		
1	28.1	29	21.9	21		
at least 2	41.5	35	32.5	39		
Total	119.0	119	93.0	93	3.866	0.145
Hands-on						
None	19.6	24	15.4	11		
1	25.3	22	19.7	23		
2	32.0	32	25.0	25		
3 or more	42.1	41	32.9	34		
Total	119.0	119	93.0	93	3.224	0.358
Programming						
None	94.9	97	74.1	72		
1	18.0	16	14.0	16		
2 or more	6.2	6	4.8	5		
Total	119.0	119	93.0	93	0.61	0.737
Tutorial						
None	85.9	89	67.1	64		
1	13.5	12	10.5	12		
2 or more	19.6	18	15.4	17		
Total	199.0	119	93.0	93	0.939	0.625

Table I-13

Hours Used by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Hours Used by Age					
Between Groups	4	127.778	31.944	0.837	0.503
Within Groups	207	7897.877	38.154		
Total	211	8025.655			
Analysis of Variance for Hours Used by Income					
Between Groups	4	25.227	6.307	0.183	0.957
Within Groups	178	6908.256	38.810		
Total	182	6933.483			
Analysis of Variance for Hours Used by Highest Degree					
Between Groups	3	125.182	41.727	1.093	0.353
Within Groups	208	7938.868	38.168		
Total	211	8064.05			
Analysis of Variance for Hours by Latest Degree					
Between Groups	3	118.160	39.387	1.034	0.379
Within Groups	209	7963.610	38.103		
Total	212	8081.77			
Analysis of Variance for Hours Used by Professional Organizations					
Between Groups	2	144.953	72.476	1.815	0.168
Within Groups	114	4553.167	39.940		
Total	116	4698.12			

Table I-14

Number of Classes in Which a Computer is Used by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Computer use used by Age					
Between Groups	4	26.514	6.628	1.264	0.285
Within Groups	206	1080.140	5.243		
Total	210	1106.654			
Analysis of Variance for Computer use by Income					
Between Groups	4	10.299	2.575	0.550	0.700
Within Groups	177	829.196	4.685		
Total	181	839.495			
Analysis of Variance for Computer use by Highest Degree					
Between Groups	3	21.537	7.179	1.367	0.254
Within Groups	207	1087.154	5.252		
Total	210	1108.691			
Analysis of Variance for Computer use by Latest Degree					
Between Groups	3	38.204	12.735	2.460	0.064
Within Groups	208	1076.626	5.176		
Total	211	1114.83			
Analysis of Variance for Computer use by Professional Organizations					
Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	2.926	1.463	0.254	0.776
Within Groups	113	649.996	5.752		
Total	115	652.922			

Table I-15

Ratio by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Ratio by Age					
Between Groups	4	0.448	0.112	0.621	0.648
Within Groups	206	37.118	0.180		
Total	210	37.566			
Analysis of Variance for Ratio Used by Income					
Between Groups	4	0.524	0.131	0.740	0.566
Within Groups	177	31.304	0.177		
Total	181	31.828			
Analysis of Variance for Ratio Used by Highest Degree					
Between Groups	3	0.560	0.187	1.043	0.374
Within Groups	207	37.006	0.179		
Total	210	37.566			
Analysis of Variance for Ratio by Latest Degree					
Between Groups	3	0.452	0.151	0.838	0.475
Within Groups	208	37.440	0.180		
Total	211	37.892			
Analysis of Variance for Ratio Used by Professional Organizations					
Between Groups	2	0.324	0.162	0.928	0.399
Within Groups	113	19.713	0.174		
Total	115	20.037			

Table I-16

Student Computer Use by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Student by Age					
Between Groups	4	42.582	10.646	0.651	0.494
Within Groups	205	2562.946	12.502		
Total	209	2605.528			
Analysis of Variance for Student by Income					
Between Groups	4	70.167	17.542	1.326	0.262
Within Groups	177	2342.141	13.232		
Total	181	2412.308			
Analysis of Variance for Student by Highest Degree					
Between Groups	3	45.661	15.220	1.221	0.303
Within Groups	206	2567.334	12.463		
Total	209	2612.995			
Analysis of Variance for Student by Latest Degree					
Between Groups	3	44.818	14.939	1.176	0.320
Within Groups	207	2629.694	12.704		
Total	210	2674.512			
Analysis of Variance for Student by Professional Organizations					
Between Groups	2	3.046	1.523	0.164	0.849
Within Groups	112	1039.945	9.285		
Total	114	1042.991			

Table I-17

Teacher Computer Use by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Teachers by Age					
Between Groups	4	71.800	17.950	0.681	0.606
Within Groups	205	5403.324	26.358		
Total	209	5475.124			
Analysis of Variance for Teacher by Income					
Between Groups	4	69.234	17.309	0.637	0.636
Within Groups	177	4806.244	27.154		
Total	181	4875.478			
Analysis of Variance for Teacher by Highest Degree					
Between Groups	3	77.903	25.968	0.977	0.404
Within Groups	206	5472.954	26.568		
Total	209	5550.857			
Analysis of Variance for Teacher Used by Professional Organizations					
Between Groups	2	32.211	16.106	0.591	0.556
Within Groups	112	3053.476	27.263		
Total	114	3085.687			

Table I-18

Chi-square, Expected, and Observed Frequencies for Computer Nonuse by Demographic Variables

Variable	Nonuser Expected	Nonuser Observed	User Expected	User Observed	Value	Asymp sig
Age						
Under 30	5.1	7	17.9	16		
30-39	16.5	13	57.5	61		
40-49	28.2	24	97.8	102		
50-59	8.9	13	31.1	27		
60+	2.2	4	7.8	6		
Total	61.0	61	212.0	212	6.804	0.147
Income						
Less than 30K	5.8	5	22.2	23		
30-40 K	5.8	6	22.2	22		
40-50K	8.1	8	30.9	31		
50-60 K	9.4	12	35.6	33		
60 K +	18.9	17	72.1	74		
Total	48.0	48	183.0	183	1.345	0.854
Highest degree						
Bachelor's	8.4	8	29.6	30		
Bachelor's + hours	38.8	45	137.2	131		
Master's	3.5	3	12.5	13		
Master's + hours	9.3	4	32.7	38		
Total	60.0	60	212.0	212	5.223	0.156
Latest degree						
Prior to 1970	7.0	11	25.0	21		
1970's	18.0	20	64.0	62		
1980's	18.5	12	65.5	72		
1990's	16.5	17	58.5	58		
Total	60.0	60	213.0	213	6.066	0.108
Professional organizations						
UAFCS/AAFCS	14.1	14	56.9	57		
UATFACS/NATFACS	5.2	7	20.8	19		
Other	9.7	8	39.3	41		
Total	29.0	29	117.0	117	1.2	0.549

Table I-19

Chi-square, Expected, and Observed Frequencies for Location of Computer by

Demographic Variables

Variable	Neither location		In classroom only		In central location only		In both locations			Asymp
	Expected	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Value	sig
Age										
Under 30	0.1	0	7.5	9	1.4	0	4.9	5		
30-39	0.6	0	32.8	32	6.2	5	21.4	24		
40-49	1.0	2	53.8	48	10.1	13	35.1	37		
50-59	0.3	0	14.5	18	2.7	2	9.5	7		
60+	0.1	0	3.2	5	0.6	1	2.1	0		
Total	2.0	2	112.0	112	21.0	21	73.0	73	10.981	0.531
Income										
Less than 30K	0.1	0	11.6	14	2.1	1	8.2	7		
30-40 K	0.1	0	11.1	11	2.0	1	7.8	9		
40-50K	0.2	0	15.8	16	2.8	4	11.2	10		
50-60 K	0.2	0	17.4	17	3.1	4	12.3	12		
60 K +	0.4	1	39.1	37	7.0	7	27.5	29		
Total	1.0	1	95.0	95	17.0	17	67.0	67	4.379	0.976
Highest degree										
Bachelor's	0.3	0	15.1	13	2.8	3	9.8	12		
Bachelor's + hours	1.3	2	70.0	72	13.1	17	45.6	39		
Master's	0.1	0	7.0	7	1.3	0	4.6	6		
Master's + hours	0.4	0	19.9	20	3.7	1	13.0	16		
Total	2.0	2	112.0	112	21.0	21	73.0	73	8.609	0.474
Latest degree										
Prior to 1970	0.2	0	11.3	13	2.1	4	7.4	4		
1970's	0.6	2	33.2	28	6.2	10	22.0	22		
1980's	0.7	0	38.0	40	7.1	6	25.1	25		
1990's	0.5	0	29.5	31	5.5	1	19.5	23		
Total	2.0	2	112.0	112	21.0	21	74.0	74	16.103	0.065
Professional organizations										
UAFCS/AAFCS			34.1	38	4.9	4	17.0	14		
UATFACS/NATFACS			11.6	10	1.7	2	5.8	7		
Other			24.3	22	3.5	4	12.3	14		
Total			70.0	70	10.0	10	35.0	35	2.268	0.687

Table I-20

Hours Used by Grades Taught

Variable	n	Mean	SD	t	p
Hours used					
Grade 7					
Don't teach	129	3.9845	6.4988	0.462	0.644
Do teach	82	3.5793	5.7195		
Grade 8					
Don't teach	128	3.5625	6.1756	-0.769	0.443
Do teach	83	4.2349	6.2447		
Grade 9					
Don't teach	105	3.4286	6.2155	-0.929	0.354
Do teach	106	4.2217	6.1822		
Grade 10					
Don't teach	92	3.3207	5.8326	-1.044	0.298
Do teach	119	4.2185	6.4613		
Grade 11					
Don't teach	84	3.3988	5.9657	-0.816	0.416
Do teach	127	4.1102	6.3524		
Grade 12					
Don't teach	82	3.1768	5.5240	-1.217	0.225
Do teach	129	4.2403	6.5762		

Table I-21

Student Computer Use by Grades Taught

Variable	n	Mean	SD	t	p
Student					
Grade 7	128	1.8281	3.1923	-1.956	0.052
Don't teach	81	2.8148	4.0593		
Do teach					
Grade 8	127	1.7480	3.0860	-2.352	0.020 *
Don't teach	82	2.9268	4.1448		
Do teach					
Grade 9	103	1.7282	2.9810	-1.935	0.054
Don't teach	106	2.6792	4.0321		
Do teach					
Grade 10	90	2.8778	4.0275	2.371	0.019 *
Don't teach	119	1.7059	3.1173		
Do teach					
Grade 11	82	2.9390	4.0775	2.393	0.018 *
Don't teach	127	1.7402	3.1401		
Do teach					
Grade 12	81	2.9753	4.0895	2.49	0.014 *
Don't teach	128	1.7266	3.1315		
Do teach					

Table I-22

Chi-square, Expected, and Observed Frequencies for Computer Nonuse by Grades Taught

Variable	Nonuser Expected	Nonuser Observed	User Expected	User Observed	Value	Asymp sig
Grade 7						
Don't teach	35.2	32	125.8	129		
Do teach	23.8	27	85.2	82		
Total	59.0	59	211.0	211	0.912	0.034
Grade 8						
Don't teach	34.3	29	122.7	128		
Do teach	24.7	30	88.3	83		
Total	59.0	59	211.0	211	2.51	0.113
Grade 9						
Don't teach	28.0	23	100.0	105		
Do teach	31.0	36	111.0	106		
Total	59.0	59	211.0	211	2.149	0.143
Grade 10						
Don't teach	26.2	28	93.8	92		
Do teach	32.8	31	117.2	119		
Total	59.0	59	211.0	211	0.278	0.598
Grade 11						
Don't teach	24.3	27	86.7	84		
Do teach	34.7	32	124.3	127		
Total	59.0	59	211.0	211	0.675	0.411
Grade 12						
Don't teach	23.6	26	84.4	82		
Do teach	35.4	33	126.6	129		
Total	59.0	59	211.0	211	0.521	0.471

Table I-23

ANOVA for Computer Use by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Compuse by Enrollment					
Between Groups	5	3.722	0.744	0.137	0.984
Within Groups	170	924.278	5.437		
Total	175	928			
Analysis of Variance for Compuse by Class Size					
Between Groups	3	17.510	5.837	1.110	0.346
Within Groups	206	1082.985	5.257		
Total	209	1100.495			

Table I-24

Hours Used by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Hours Used by Enrollment					
Between Groups	5	83.536	16.707	0.451	0.812
Within Groups	170	6292.293	37.013		
Total	175	6375.829			
Analysis of Variance for Hours Used by Class Size					
Between Groups	3	106.752	35.584	0.926	0.429
Within Groups	207	7957.184	38.441		
Total	210	8063.936			
Analysis of Variance for Hours Used by Number of Preparations					
Between Groups	5	276.944	55.389	1.454	0.207
Within Groups	204	7772.276	38.099		
Total	209	8049.22			

Table I-25

Ratio by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Ratio by Enrollment					
Between Groups	5	0.831	0.166	0.920	0.470
Within Groups	170	30.725	0.181		
Total	175	31.556			
Analysis of Variance for Ratio by Class Size					
Between Groups	3	0.287	9.551	0.532	0.651
Within Groups	206	36.986	0.189		
Total	209	37.273			
Analysis of Variance for Ratio by Number of Preparations					
Between Groups	5	1.177	0.235	1.336	0.250
Within Groups	203	35.759	0.176		
Total	208	36.936			

Table I-26

Student Computer Use by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Student Enrollment					
Between Groups	5	54.871	10.974	0.829	0.531
Within Groups	169	2237.723	13.241		
Total	174	2292.594			
Analysis of Variance for Student by Class Size					
Between Groups	3	38.802	12.934	1.011	0.389
Within Groups	205	2621.935	12.790		
Total	208	2660.737			
Analysis of Variance for Student by Number of Preparations					
Between Groups	5	20.619	4.124		
Within Groups	202	2635.208	13.046	0.316	0.903
Total	207	2655.827			

Table I-27

Teacher Computer Use by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Teacher by Enrollment					
Between Groups	5	8.406	1.661	0.062	0.997
Within Groups	169	4551.171	26.930		
Total	174	4559.577			
Analysis of Variance for Teacher by Class Size					
Between Groups	3	93.063	31.021	1.146	0.332
Within Groups	205	5550.975	27.078		
Total	208	5644.038			
Analysis of Variance for Teacher by Number of Preparations					
Between Groups	5	40.043	8.009	0.296	0.915
Within Groups	202	5473.476	27.096		
Total	207	5513.519			

Table I-28

Chi-square, Expected, and Observed Frequencies for Location of Computer by School Characteristics

Variable	Neither location Expected	Neither location Observed	In classroom only Expected	In classroom only Observed	In central location only Expected	In central location only Observed	In both locations Expected	In both locations Observed	Value	Asymp sig
Enrollment										
Under 250	0.1	0	12.3	13	1.9	4	7.6	5		
250-499	0.1	0	5.0	5	0.8	0	3.1	4		
500-749	0.1	0	8.4	7	1.3	1	5.2	7		
750-999	0.1	1	7.3	6	1.1	0	4.5	6		
1000-1499	0.4	0	34.2	37	5.3	2	21.2	22		
1500-1999	0.3	0	29.7	29	4.6	8	18.4	16		
Total	1.0	1	97.0	97	15.0	12	60.0	60	24.505	0.057
Class size										
20 or less	0.1	0	14.5	13	2.7	4	9.7	10		
21-25	0.2	0	17.2	21	3.2	0	11.4	11		
26-30	0.4	0	47.2	44	8.9	13	31.5	31		
31+	0.3	1	32.2	33	6.1	4	21.4	22		
Total	1.0	1	111.0	111	21.0	21	74.0	74	10.147	0.339
Number of Preparations										
1 or 2	0.2	0	21.6	20	4.1	8	14.2	12		
3	0.3	0	30.7	33	5.8	1	20.2	23		
4	0.2	1	19.9	20	3.8	3	13.1	13		
5	0.1	0	15.1	12	2.9	5	9.8	11		
6	0.1	0	10.8	11	2.0	1	7.1	8		
7	0.1	0	12.9	15	2.4	3	8.5	6		
Total	1.0	1	111.0	111	21.0	21	73.0	73	17.693	0.279

Table I-29

Computer Use Variables and Computer Attitude Variables

	Anxiety	Confidence	Liking
	Hours used	Hours used	Hours used
Pearson Corr	0.046	0.013	0.035
Sig (2-tail)	0.509	0.85	0.616
N	212	212	212
	Student	Student	Student
Pearson Corr	-0.012	-0.028	0.003
Sig (2-tail)	0.862	0.682	0.962
N	210	210	210

Table I-30

Computer Anxiety by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of variance for Anxiety by Age					
Between Groups	4	169.635	42.409	1.557	0.186
Within Groups	266	7247.413	27.246		
Total	270	7417.048			
Analysis of Variance for Anxiety by Income					
Between Groups	4	105.786	26.446	0.965	0.427
Within Groups	224	6138.546	27.404		
Total	228	6244.332			
Analysis of Variance for Anxiety by Highest Degree					
Between Groups	3	169.638	56.546	2.094	0.101
Within Groups	266	7184.025	27.008		
Total	269	7353.663			
Analysis of Variance for Anxiety by Professional Organizations					
Between Groups	2	89.472	44.736	1.670	0.192
Within Groups	142	3803.866	26.788		
Total	144	3893.338			

Table I-31

Computer Confidence by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Confidence by Age					
Between Groups	4	42.764	10.691	1.263	0.285
Within Groups	266	2251.797	8.465		
Total	270	2294.561			
Analysis of Variance for Confidence by Income					
Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	66.344	16.586	2.069	0.086
Within Groups	224	1795.472	8.016		
Total	228	1861.816			
Analysis of Variance for Confidence by Highest Degree					
Between Groups	3	65.137	21.712	2.606	0.052
Within Groups	266	2215.826	8.33		
Total	269	2280.963			
Analysis of Variance for Confidence by Professional Organizations					
Between Groups	2	2.944	1.472	0.189	0.828
Within Groups	142	1107.084	7.796		
Total	144	1110.028			

Table I-32

Computer Liking by Demographic Variables

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Anxiety by Enrollment					
Between Groups	5	104.937	20.987	0.758	0.581
Within Groups	220	6090.621	27.685		
Total	225	6195.558			
Analysis of Variance for Anxiety by Class Size					
Between Groups	3	94.956	31.652	1.173	0.320
Within Groups	264	7123.563	26.983		
Total	267	7218.519			
Analysis of Variance for Anxiety by Number of Preparations					
Between Groups	5	247.765	49.553	1.868	0.100
Within Groups	261	6924.310	26.530		
Total	266	7172.075			

Table I-33

Computer Anxiety by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Anxiety by Enrollment					
Between Groups	5	104.937	20.987	0.758	0.581
Within Groups	220	6090.621	27.685		
Total	225	6195.558			
Analysis of Variance for Anxiety by Class Size					
Between Groups	3	94.956	31.652	1.173	0.320
Within Groups	264	7123.563	26.983		
Total	267	7218.519			
Analysis of Variance for Anxiety by Number of Preparations					
Between Groups	5	247.765	49.553	1.868	0.100
Within Groups	261	6924.310	26.530		
Total	266	7172.075			

Table I-34

Computer Confidence by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Confidence by Enrollment					
Between Groups	5	57.948	11.590	1.415	0.220
Within Groups	220	1801.327	8.188		
Total	225	1859.275			
Analysis of Variance for Confidence by Class Size					
Between Groups	3	5.784	1.928	0.229	0.876
Within Groups	264	2225.992	8.432		
Total	267	2231.776			
Analysis of Variance for Confidence by Number of Preparations					
Between Groups	5	72.693	14.539	1.767	0.120
Within Groups	261	2147.913	8.230		
Total	266	2220.606			

Table I-35

Computer Liking by School Characteristics

Source	df	Sum of squares	Mean squares	F ratio	F prob.
Analysis of Variance for Liking by Enrollment					
Between Groups	5	125.098	25.020	1.254	0.285
Within Groups	220	4389.345	19.952		
Total	225	4514.443			
Analysis of Variance for Liking by Class Size					
Between Groups	3	33.907	11.302	0.576	0.631
Within Groups	264	5179.537	19.619		
Total	267	5213.444			
Analysis of Variance for Liking by Number of Preparations					
Between Groups	5	167.377	33.475	1.732	0.127
Within Groups	261	5043.275	19.323		
Total	266	5210.652			

Table I-36

Computer Anxiety by Grades Taught

Variable	n	Mean	SD	t	p
Anxiety					
Grade 7					
Don't teach	159	31.673	4.852		
Do teach	109	30.505	5.620	1.815	0.071
Grade 8					
Don't teach	155	31.690	4.894		
Do teach	113	30.522	5.542	1.824	0.069
Grade 9					
Don't teach	126	31.294	4.969		
Do teach	142	31.113	5.406	0.284	0.777
Grade 10					
Don't teach	119	31.101	5.073		
Do teach	149	31.275	5.314	-0.272	0.786
Grade 11					
Don't teach	111	30.919	5.128		
Do teach	157	31.395	5.257	-0.738	0.461
Grade 12					
Don't teach	108	31.019	5.145		
Do teach	160	31.319	5.249	-0.463	0.644

Table I-37

Computer Confidence by Grades Taught

Variable	n	Mean	SD	t	p
Confidence					
Grade 7					
Don't teach	159	26.7799	2.9201		
Do teach	109	26.4954	2.8533	0.791	0.430
Grade 8					
Don't teach	155	26.6516	3.0549		
Do teach	113	26.6814	2.6635	-0.083	0.934
Grade 9					
Don't teach	126	26.5714	3.0343		
Do teach	142	26.7465	2.7661	-0.494	0.622
Grade 10					
Don't teach	119	26.6723	2.7156		
Do teach	149	26.6577	3.0331	0.041	0.967
Grade 11					
Don't teach	111	26.5315	2.7063		
Do teach	157	26.7580	3.0200	-0.631	0.529
Grade 12					
Don't teach	108	26.5833	2.7176		
Do teach	160	26.7188	3.0098	-0.375	0.708

Table I-38

Computer Liking by Grades Taught

Variable	n	Mean	SD	t	p
Confidence					
Grade 7					
Don't teach	159	29.8113	4.2294		
Do teach	109	29.4587	4.6934	0.641	0.522
Grade 8					
Don't teach	155	29.8903	4.3418		
Do teach	113	29.3628	4.5239	-0.083	0.934
Grade 9					
Don't teach	126	29.5000	4.4231		
Do teach	142	29.8169	4.4253	-0.585	0.559
Grade 10					
Don't teach	119	29.6639	4.4764		
Do teach	149	29.6711	4.3874	-0.013	0.989
Grade 11					
Don't teach	111	29.4324	4.5159		
Do teach	157	29.8344	4.3557	-0.733	0.464
Grade 12					
Don't teach	108	29.5648	4.4873		
Do teach	160	29.7375	4.3848	-0.313	0.754

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