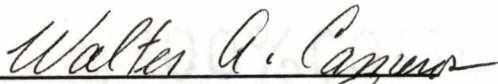
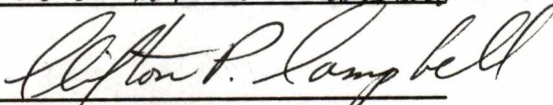
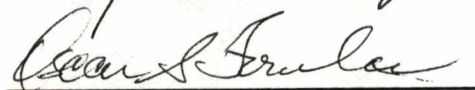


To the Graduate Council:

I am submitting herewith a dissertation written by Saeed T. Molla entitled "A Comparison of College Students' Attitudes Toward Computers." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.


John I. Matthews, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:


Vice Provost
and Dean of The Graduate School

A COMPARISON OF COLLEGE STUDENTS'
ATTITUDES TOWARD COMPUTERS

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Saeed T. Molla

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ABSTRACT

The purpose of this study was to compare college students' attitudes toward using personal computers at the beginning and end of a computer course by age, sex, marital status, educational level, and experience.

A questionnaire containing 40 statements about students' attitudes and perceptions toward computers was developed. Forty-four students enrolled in three introductory computer classes at the University of Tennessee in Knoxville during the Winter quarter of 1987 completed the questionnaires at the beginning and end of the quarter. The data were collected and then analyzed using t-tests to determine whether there was a significant difference in students' attitudes.

The findings of the study relating to students' attitudes toward using computers were:

1. There was no change in the overall student attitudes between the beginning and end of the term.

2. Age, sex, marital status, educational level, and experience in using computers did not significantly influence the overall attitudes of students.

It was concluded that an introductory course does not significantly change students' attitudes about using computers.

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CHAPTER I

INTRODUCTION

The continuous technological advancements and changes are playing an important role in everyone's life. The future promises that more changes are on the way. These changes are affecting the way people perform their jobs as well as the way they play, communicate with each other, and learn. As they take place in any society, the attitudes of people become of concern.

Computers are at the top of the list of the technological changes that have taken place in society during the past 10 years. They are becoming a major part of the life people lead. Brod (1984) stated that the "rapid computerization of our society has created an enormous and sudden need to adapt to new lifestyles, relationships, and routines" (p. 22). Education is responding well to help individuals cope with this matter and learn to use computers.

The expansion in the use of computers in education has increased since the introduction of the small and inexpensive microcomputers (Hoot & Hayslip, 1983). College students are among those people who are becoming aware of the need to learn about computers. Baumgarte (1984) indicated that "the computer's presence will be felt even more keenly in the years to come" (p. 2). People are

scrambling to learn to use computers because they are realizing that using them is becoming an important matter for career advancement as they move toward the future. Most college and university departments are responding to this demand by offering courses to help people in various fields learn how to use computers.

The introduction of computers has generated mixed feelings among people. Eason and Damodaran (1981) stated that:

The computer is something few can ignore and most have strong attitudes toward. For some people the spirit of technological advance, invention and discovery is deeply exciting and the computer is a device of intrigue and wonderment. For others it is a little-understood device which threatens their way of life, taking away jobs, removing the human element of life and replacing it with the inhuman (p. 133).

In higher education, students responded differently to them. Hocking (1985) stated that "The entrance of computers into higher education has been met with praise and condemnation" (p. 19). Some students welcomed their presence in the classroom and quickly became acquainted with them. Others were uncomfortable with computers and resisted using them unless they had to.

Students and educators will be challenged by the learning process. Students will have to prepare themselves to cope with this technological device and become successful using it. Educators will need to better

understand the students that they are dealing with, to be able to provide them with the necessary knowledge and skills and help them survive in the computer world.

The continuous presence of computers in higher education has resulted in concern about students' attitudes toward them which, many agree, should not be ignored. This is to assure the success of those students in learning about computers and interacting with them easily and successfully.

Statement of the Problem

Students at the university level have feelings of uncertainty toward using personal computers. Some students have difficulty adjusting to them and feel uncomfortable using one. There is minimal evidence indicating the effects students' attitudes have on their learning success with computers. Such evidence is needed by computer educators before they modify their instructional programs to include positive attitude building in computer applications.

Purpose of Study

The purpose of this study was to investigate the attitudes and perceptions of college students toward using personal computers and determine, if attitudes and related anxieties change during the course of instruction. To

accomplish this purpose, the following objectives were established: (a) to determine attitudinal differences by age, sex, marital status, educational level, and experience in using computers; and (b) to better understand the reaction of those students toward computers for the purpose of later prescribing positive attitude reinforcement experiences.

Theoretical Basis of Problem

There appears to be a close relationship between a positive attitude about doing a task and successful completion of that task. Clement (1981) stated that "The attitudes of participants in any activity are important to its success" (p. 28). If this is so, the level of anxiety felt by students as they experience learning to use computers may directly cause a similar level of poor performance in this learning process.

Merchant and Sullivan (1982-83), and Johnson and White (1980) indicated that older people are unfamiliar with computers since they grew up not being part of the computer revolution. As a result, they fear computers and resist using them, while younger people are more comfortable using them.

Research seems to point out that, in the past, the involvement of women with computers has been limited. Many women did not have as much interest in using computers as

men did. Wilder, Mackie, and Cooper (1985); Dambrot, Watkins-Malek, Silling, Marshall, and Garven (1985); and Vredenburg, Flett, Krames, and Pliner (1984) found that more women had negative attitudes toward computers because they were afraid of computers and less comfortable using them.

Single persons may have different reactions toward using computers than those who are married. Brod (1984), and Starker (1983) believed that the involvement of married people with computers created problems among family members, therefore, they may try to avoid getting involved with using computers for the purpose of keeping their relationship with their spouses problem free. As a result, single people may be more positive in their attitudes toward computers than married ones.

The level of education is another factor that may influence the attitudes of an individual toward using computers. Dickerson and Gentry (1983) believed that a person with more education has a better understanding of the applications of computers.

Hirschman (1980), Dickerson and Gentry (1983), and Wilder, Mackie, and Cooper (1985) found that previous experience with computers was a contributing factor to attitudes toward using computers. Chen (1986) indicated that interest in computers is caused by experience with them.

Research Hypotheses

The following hypotheses were used to investigate the study and give direction to it:

1. Students will have more anxiety about using personal computers before taking a computer course than after.
2. Younger students will be more positive in their attitudes toward using personal computers than older students.
3. Male students will be more positive in their attitudes toward using personal computers than female students.
4. Single students would be more positive in their attitudes toward using personal computers than married students.
5. Graduate students will be more positive in their attitudes toward using personal computers than undergraduate students.
6. Experienced students will be more positive in their attitudes toward using personal computers than inexperienced students.

These research hypotheses will be tested using their null form. The null-hypothesis will be rejected when $p \leq 0.05$, meaning the difference between the means is significant.

Importance of Study

It is evident that computers are changing attitudes in society. Their role has expanded to many fields. As a result, higher education is helping people become familiar with computers and prepare them for the future. In doing so, understanding the attitudes of those people becomes necessary in order for educators to provide quality education in the field. Studying students' attitudes toward computers will aid in identifying the negative ones and taking the appropriate measures to correct them for the sake of building positive attitudes in each individual.

People's attitudes toward computers should be considered as a factor which contributes to their success in learning to use computers. As personal computers become available and essential in the educational field, students' attitudes toward computers must be well understood. Rubin (1983) stressed the importance of fully understanding the interaction with computers by stating that:

Our attitudes about computers are too varied and complex to be thrown into two hoppers labeled computerphobic and normal. People have all sorts of reasons for being less than enthusiastic about computers. Rather than starting with the assumption that people who are unenthusiastic are abnormal, looking at some of the basic attitudes people have toward computers may help us to understand why they feel the way they do (p. 55).

Feedback will help in discovering the strengths and weaknesses in the learning experience of each student in

using personal computers. The result of this study may serve as a tool for evaluating programs used to provide computer instruction and determine whether changes are needed.

It is very important for educators to take a serious look at the students' attitudes toward computers. They must be able to make a successful connection between the two and build confidence in each individual to use computers.

Assumptions

The study was based on the following assumptions:

1. Students expressed their real attitudes toward computers.
2. The instrument was a valid measure of attitudes.
3. Participants in the study responded to the questionnaire based on their attitudes toward computers in general and not to a specific type of computer.
4. The time allowed for the study was sufficient.

Limitations

The study was limited to those students enrolled in the introductory computer classes offered in the College of Education at the University of Tennessee, Knoxville. The responses were limited to those students who were

willing to participate in the study at the beginning and the end of the quarter.

Definition of Terms

For the purpose of the study, the following terms were defined:

Attitudes - are feelings and beliefs about computers, interests in computers, fear of computers, willingness to use computers, and confidence in using them.

Computer - personal or desk-top computer.

Older Students - college students who are over 28 years of age.*

Younger Students - college students who are 28 years of age or younger.*

*This age was determined according to the mean age of undergraduate and graduate students enrolled in the College of Education at the University of Tennessee, Knoxville.

Summary of Procedure

The study was conducted to analyze the attitudes of college students toward computers. In order to meet the objectives of the study, a questionnaire containing 40 items was administered to 44 students who were enrolled in

three introductory computer classes during the 1987 Winter quarter. The instrument was completed by those students at the beginning and at the end of the quarter.

Organization of the Study

The study contains five chapters:

Chapter I includes the introduction, statement of the problem, purpose of the study, theoretical basis of the problem, research hypotheses, importance of the study, assumptions, limitations, definition of terms, summary of procedures, and organization of the study.

Chapter II includes the review of related literature and research relevant to the study.

Chapter III describes the methods and procedures used to develop the instrument, gather the data, and analyze the collected data.

Chapter IV contains the presentation and analysis of data.

Chapter V includes the summary, findings, conclusions, and recommendations.

CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCH

The literature review for this study concentrated on five areas: (a) getting to know computers, which emphasizes the importance of computers in today's society, and includes first-time exposure to computers; (b) factors affecting attitudes toward computers, including educational level, age, experience, and marriage; (c) fear of computers which also discusses resistance to computers, confidence and willingness to continue using them; (d) interest in using computers, suggesting what happens when people become very involved with them; and (e) attitudes of both males and females toward computers and why people react the way they do.

Getting to Know Computers

People seem to be realizing the importance and the need to learn how to use computers. As a result, there are more people striving to meet this need by familiarizing themselves with computers in order to live in today's society and survive in tomorrow's. As time passes, one finds out that more organizations are including computers as part of the process to carry out their work.

Computers are becoming a big part of people's lives. They are in homes, cars, banks, shops, and schools.

Learning to use them is essential to performance in a high technology world. As one moves toward the future, the interaction with computers seems to become a daily routine. People are becoming aware of the fact that in order to be productive in their society, they would have to be knowledgeable about computers (D'Souza, 1985).

Almost every piece of literature emphasized the importance of computers in today's society. Sanders (1984) indicated that it is possible some day, probably sooner than expected, computer literacy will become as important as obtaining a high school degree. Anderson (1983) believed that learning to use computers was equally important as learning to drive an automobile. Lenkway (1986) regarded it as essential as learning to read and write. According to Rubin (1983), people were even being convinced that they were abnormal if they did not have any interest in using computers.

Educational institutions around the world are providing instruction to those wanting to learn about computers. Colleges and universities are offering computer classes for those who desire to expand their knowledge in this field. Educators have been preparing to help each student meet the challenge of this technological device. Norton (1983) stressed the importance of education in preparing students for the future by stating that:

As a society, we are moving from the old to the new, and are caught between a predominantly industrialized era and a new, emerging order. Amid the trials of the present, the restructuring of society proceeds unrelentingly, and the educational system will have to adjust to meet the needs of those who must function in the new information environment (p.16).

According to Turkle (1980), one should no longer think of computer education as if it was only limited to those who want to be experts in the field, but for everyone who needs to become a part of a world full of computers and feel comfortable using them. Computers are no longer dominated by science and technical fields, but are virtually entering almost every sector in society. Learning to use them is becoming a survival skill for some people and getting adjusted to them is a problem that many face and will have to deal with.

Stepping into the Computer World

As usage of the computer expands, people who do not know how to use one eventually become aware of the situation and start thinking about learning to use computers. Anderson (1983) indicated that many people want to learn to use computers. They try to become comfortable using them, but realize that they are discouraged as they begin. They notice that there is a lot to be learned and find it hard to continue. They get confused and do not know where to start. They feel that they will not be able to

understand anything and may make fools of themselves. They make judgements about computers before they even get near one. These feelings can prevent a person from getting involved with computers. Berner (1984) said that "say the word 'computer,' and people react with love, hate, fear, excitement, technocratic arrogance, and profit-lust. These emotional reactions form our vision and prevent us from seeing the machine itself, and what it can do for us" (p. 6).

Rubin (1983) agreed that computers might not be easy to use for the first time and might make beginners feel they are out of control. That feeling, however, could be changed if those people would be patient and take more time to learn about using computers. They should not make the mistake of thinking they have to know everything about computers to be able to use them, or to assume that the learning process will take all their time. Charp (1983) said that "not everyone will need to be a computer specialist to succeed" (p. 140). Anderson (1983) compared this situation to driving a car and indicated that some people tend to believe that they need to know how a car works in order to drive it. That knowledge eventually will be gained as a person becomes more comfortable and interested. People should keep that thought in mind. They need to invest some time to become comfortable with

using computers in order to avoid the intimidation created by all of the wild assumptions made.

Using a Computer for the First Time

Kiesler, Sproull, and Eccles (1983) believed that working with computers for the first time could be a "humiliating" and frightening experience. Beginners should be encouraged to continue using them and not to feel that way, especially females, because they tend to feel uncomfortable around computers. Anderson (1983), in his analogy with learning to drive, suggested that it is a natural feeling toward such a powerful device.

Turkle (1980) believed that "people often take a particular way of relating to the computer, that is, they take their personal sense of what is important, interesting, and valuable about computers, and generalize it into beliefs about 'computers in general'" (p. 21). Turkle talked to 25 college students who were taking their first computer course to understand their feelings toward learning how to use computers. Some of those students started the learning process believing that computers were complicated devices. Others, who had some knowledge of computers, felt that they were easy. Almost 50 percent of the class viewed the computer as a number cruncher and generalized that belief for all computers.

Using computers for the first time is not one of the most pleasant experiences for many people. Baumgarte (1984) said that is normal; beginners will have to realize that frustration is a part of the learning. First effort to use computers may not be successful and should not be taken personally. A person should try again, make mistakes, and learn from them rather than quitting after the first attempt. Sproull, Kiesler, and Zubrow (1984) described the first interaction with computers as a shocking experience which creates a feeling of confusion. In a study they conducted to compare college students' reaction toward computer classes with other courses, they found that those students felt that they were learning useful and important skills, but more than two-thirds of them expressed anger toward computing and almost one-half just wanted to put forth little effort to help them pass the course. They limited their involvement with computers due to the negative feelings they have developed toward them. More than three-fourths of those students felt out of control when they first used the computer. Many described it as a frightening experience because they were not sure of what they were doing.

Factors Affecting Attitudes Toward Computers

Educational Level

It is more likely that people with more education will be more knowledgeable and may view life from a different angle. They may be in a position where they realize that taking advantage of technological advancement such as the computer is necessary to compete in today's society. Dickerson and Gentry (1983) indicated that the more a person is educated, the more positive they are toward computers.

Age

Many older adults find it difficult to function in a society where the importance of computers increases by the day. Merchant and Sullivan (1982-83) indicated that those people are finding themselves in a position where they are scrambling to become computer literate at a time when computers are affecting the way they do their jobs. With mixed feelings, they are going back to colleges to learn to use computers. Some of them are returning with curiosity and eagerness to find out about this magical device that has fascinated many people including their children. Others are fearful and would like to avoid computers but have no choice in the matter because they are seeing computers storming many jobs.

Research and literature point out that many older people who are frightened of advanced technology are resisting computers, while younger ones are becoming a part of it. According to Charp (1983), computer resistance is still obvious among those people who grew up not being involved in the "computer revolution." Many of them are ignorant in this field and need help to accept and use computers. This unfamiliarity with computers may cause older persons to react negatively to them. Johnson and White (1980) stated that:

The computer terminal is a device largely unfamiliar to older individuals. This familiarity might best be considered a cohort different between current generations of students and former generations of students (p. 358).

Kiesler, Sproull, and Eccles (1983, p. 42) believed that familiarizing people with computers at an earlier age is a contributing factor in "developing computer efficacy" which can be useful in encouraging people to use computers more often and get involved with them as they grow older. The younger generation may favor the world of computing and react to it differently than the older ones because they have already made their first step earlier in their lives by getting involved with computers. Kiesler and colleagues pointed out that "small advantages in skills at an early age can develop into great difference later in life" (p. 48).

According to MacKenzie (1983), today's generation is not missing anything about computers because they are getting comfortable with them. They are being exposed to computers in high schools and many are even required to be computer literate in order to graduate. They face similar requirements in most colleges. MacKenzie pointed out that some colleges are asking students to purchase computers. So, it is the older persons who are not adjusted to computers and until they accept them and familiarize themselves with them, they will remain that way.

Experience

Hirschman (1980), and Dickerson and Gentry (1983) stressed the importance of experience by indicating that any previous knowledge or experience an individual may have about a product such as the computer can be a factor in the adoption of that product. It allows one to become familiar and more comfortable with computers and as a result, react to them in a more positive way. In Chen's (1986) study, it was indicated that interest in computers is caused by experience with them.

Experience with computers may be an important factor in reducing fears of them. A study was conducted by Rafaeli (1986) to measure attitudes toward using computers. One of the conclusions about the study was that those people with more experience in using computers

reacted positively toward them than those who were not familiar with them. In a study done by Wilder, Mackie, and Cooper (1985) to measure attitudes toward computers, experience was a major factor that contributed to the attitudes of students who participated in the study. It was found that those who were exposed to computers in high school expressed a more relaxed and comfortable feeling toward them than those who avoided that experience.

Whether the experience one has had previously is good or bad, the attitudes will be affected. A bad experience with computers may cause a person to live in fear of them. Chamberlin (1983) stated that "sometimes, the phobia is simply an outcome of an earlier frightening experience the person may have had" (p. 50). That would be difficult to deal with unless the cause for that unpleasant experience is found and cured. A good or enjoyable experience may reduce or prevent that fear. Video games can initiate people's interest in computers. A person who previously played with them may feel at ease interacting with computers. Turkle (1984) suggested that the experience of playing video games is more than the physical contact a person makes with the machine. It allows the player to live in a world of computers that control those games and develop a relationship with them which can serve as a bridge to enter that culture. According to Turkle (1984),

Video games are a window onto a new kind of intimacy with machines that is characteristic of the nascent computer culture. The special relationship that players form with video games has elements that are common to interaction with other kinds of computers (p. 66).

Whatever kind of experience people may have had, using computers will influence the way they feel about them.

Marriage

Single people may react differently to the acceptance of computers entering their lives than married ones who have families to care about since both fear an obsession of computers can affect the individual's relationship with others. Fear of computers may cause a person to be under a lot of stress trying to overcome this fear. It would be hard for a spouse to cope with a partner going through that emotional stage. Brod (1984) stated that "To be married to a technostress sufferer, male or female, is to experience emotional isolation" (p. 103). As a result, a person may resist this form of technology in order to keep a marital relationship going and free of intrusions that may be caused by trying to adjust to computers. Attitudes may also be influenced by the thought of loneliness once the computer becomes a major part of life. Starker (1983) believed that the attachment to computers may lead to miscommunication between couples when either one of them

becomes addicted to using computers. They may end up fighting over not spending enough time with each other.

Brod (1984) pointed out that the attraction to computers may lead a heavily involved person to pursue a career in the field. The computer becomes the center of attention and top priority. Married individuals may fail to relate to their spouses and some may even view spouses as computers. At that stage, marital affairs are not taken into consideration by the one who became highly interested in using computers. The spouse then feels neglected and becomes violent or threatens to end the relationship. Some marriages have enough problems and do not need computers to cause more. Brod (1984) said that:

When the computer enters our lives and begins to exert tugs and strains on our relationships, it is thus entering a tumultuous environment. As if there were not already enough obstacles in our path toward intimacy, the computer adds yet another" (p. 103).

Vast amounts of literature revealed stories about all of those spouses who disappeared in a world of computers where their partners felt left out and became jealous of this device. As a result of the spouses' attitudes toward using computers, many relationships did not survive while some suffered until help was sought from counselors. Those stories may affect the way a person involved in a marital relationship reacts to computers. When people know or find out that using computers can put their

marriages in jeopardy, their attitudes toward computers may depend on their willingness to risk their relationship. It is more likely that they will react to them in this way where the marriage is a top priority or try to balance their lives based on that priority. Avoiding and resisting the computer for the sake of keeping a marriage problem free may not be the wiser attitude toward such an important device, but on the other hand reacting with too much enthusiasm may not be an appropriate one either. So, marriage can be a factor in determining how married persons differ in their attitudes toward computers than those who are not married. Single students may not have that thought in mind since they do not have to worry about it, at least for now.

Fear of Computers

The fear of computers is increasing as people scramble to learn about using them. Curley (1983) believed that it is a worldwide feeling which is growing with the increase of computer usage. As people realize that computers can almost do anything including talking, they are often frightened whenever they come in contact with the machines. Curley went on to state that "Computers, unlike most other machines, represent a direct and highly personal threat to the average person" (p. 80).

They can make an easy going person very frustrated using them.

The existence of computers can create undesirable feelings among people, feelings of fear that can take place in public or private. They can make it hard for a person to learn how to use a computer (Murphy, 1983). Computers are fairly new and as usual, the reaction to something new can pose a threat. Turkle (1984) indicated that their presence can bring up mixed feelings of excitement and fear. With such a strange and powerful device, many people are fearful.

Wrege (1982) pointed out the tremendous capability of the machine to perform different functions has created a sense of intimidation among many people. Marton (1983) interpreted "new" as change which many people are not in favor of. Learning to use computers will require changes in habits and beliefs to become adjusted to them. Brod (1984) who described this fear and tension caused by technology as "technostress" says that it "is not simply an expression of our resistance to change. It is a reaction to the content of that change" (p. 23).

The threat and fear of computers has created many similar terms that describe this feeling. One of them is "cyberphobia" which has been described by Anderson (1983), Curley (1983) Goldfield (1983), Rice (1983), and Wrege (1982) as the fear, threat, mistrust, intimidation, and

resistance of computers. Other terms have become titles to many articles, books, conferences, and research papers, such as: computer fear, computer tension, computer resistance, computer anxiety, and a more common one is computerphobia.

Computerphobia

The term computerphobia means a negative feeling that a person develops when faced with using computers. Marton (1983) defined computerphobia as "an irrational, often visceral unease suffered when faced with working with a computer" (p. 141). Clement (1981) viewed it as the cause for a person to be hesitant to accept computers or completely repel them. Jay (1981) saw it as a part of "technophobia" which is caused by the fast technological advancements. According to Chamberlin (1983), technophobia is the fear of any part of technology and particularly when a computer is involved.

Computerphobia usually occurs in the form of rejection to computers where people get frustrated to a point that they are unable to touch one. They tend to avoid talking about computers or associating with people who use them. They always feel threatened by this form of technology (Jay, 1981). Computerphobia is a serious problem and should be dealt with carefully by finding out

how and why a person develops it. Understanding it is a major step in solving the problem.

There are many factors that may cause a person to develop computerphobia. Weinberg and Fuerst (1984) listed some of those reasons:

1. Unwillingness to give authority to a machine. People usually want to be in control of what they are doing, they feel that control can be lost when they are using computers and anything can happen if a wrong key is pressed accidentally.

2. Bad memories from the past about computers. Undesirable experience where the computer was the cause may be remembered for sometime. People keep these experiences in mind and develop negative feelings toward any computer they come in touch with.

3. Intimidation by computer teachers who could not communicate to those people needing to learn how to use computers. They may end up hating computers and staying away from them.

4. Fear of computer takeover. Another reason that makes people become afraid of computers is the feeling of losing their jobs to computers. That way, the computer is seen as a threat to one's career and future.

5. Intimidation by technological advancements in general may be responsible for computerphobia.

6. Fear of damaging or causing harm to the computer. When beginners have the chance to use computers, they tend to feel that pressing the wrong key or making a mistake would blow up the device.

7. Fear of thinking that the computer will prove that a person made a mistake. It is not allowing the computer to show the person up. This feeling may result in avoiding using computers.

8. Fear of looking stupid. A person may be computer illiterate and not want people to know.

9. Fear of computers because many claim that they are not friendly machines and blame them for making errors.

Brod (1982) explained this situation by stating that:

Computer operators often suffer from what I call the tyranny of errors: the feeling that they lack the skills to control errors frustrates them, and this frustration, in turn, is converted into the feeling that the machine is too sensitive to use for anything but simple problems and assignments (p. 755).

Curley (1983) agreed with Weinberg and Fuerst (1984) that people often hear about how computers not only control their lives but can actually replace them or eliminate their jobs. Jay (1981) also believed that the feeling of being replaced by a device such as the computer is an indication of negative attitudes toward it.

Fear of technology may intimidate some people from using computers. Brod (1982) who referred to this type of fear as "technostress" defined it as "a condition resulting from the inability of an individual or organization to adapt to the introduction and operation of new technology" (p. 754). Those people may view the computer as a complex device since it is a part of technology. Jay (1981) described this fear as the feeling of being "slave" to technology. The cause for feeling that way is blamed on the person for failing to keep up to date with technology.

Some people would stay away from computers to avoid the embarrassment of looking stupid since they are not familiar with using them. Denying ignorance only makes it hard for a person to know anything about computers. One has to admit their lack of knowledge by actually spending time learning to use computers and asking for help when needed. It is natural that one may make a mistake, but that is part of the learning process (Rubin, 1983).

Resistance to Computers

The literature indicated that the computer like any other technological advancement has its share of rejections. Some people avoid them and some try to convince themselves that they can live without them. They may be able to do so for some time, but not for long,

because computers are finding their way into almost every part of society. Simon (1983) said that is normal, people have always reacted that way. With the computer, they may feel that it is just another invention. Rubin (1983) pointed out that not everyone is enthusiastic about the development and growth of computers because there are people who believe that they have no need for learning to use them and as a result, they are not motivated to even think about them. Those people end up avoiding computers. Leo (1980) implied that those who resist computers, believe that their presence in society is intended to take jobs away from people, invade their privacy, cheat them, and cause World War III.

The resistance to computers was described by Brod (1982) as a behavior where a person is incapable of adjusting to technology. The drawback from using computers makes it evident that the person does not want to have anything to do with them. This resistance can be costly and understanding it is very important. People who are just beginning to use computers with some resistance can develop certain attitudes that will stay with them for a while. Turkle (1980) stated that "people often have stronger feelings about computers than they know" (p. 15). These feelings can get out of control some times and can force a person to behave in a strange way. Brod (1982), Leo (1980), Rubin (1983) and Wrege (1982) described

situations about people who resisted using computers and were put into positions that required using one. The result of those negative attitudes, and discomfort with them, forced these people to physically abuse the machine for the purpose of not having to use it. That will not solve the problem. Sabotaging computers does not mean the end of seeing them or the solution to resisting them. Leo (1980) said that "everyone will accept computers, because there is no alternative" (p. 97). "How to Conquer Fear of Computers" (1982) stressed the importance thinking of computers as valuable tools rather than resisting them because learning to use them is becoming very essential. Schwandt and Wiederanders (1985) believed that the computer is a powerful and a valuable device that should not be ignored.

Confidence in Using Computers

According to Murphy (1983), there are people who do not have confidence in themselves and are convinced that it is hard for them to learn how to use a computer.

Murphy stated that:

Some people, when exposed to computers for the first time, tell themselves that it is too complex a subject, that they can never master an advanced technological tool like a computer (p. 78).

Rubin (1983) warned people about making the mistake in judgment or believing that it is impossible to use computers before allowing them to prove themselves. Learning to use one must be taken a step at a time to master the machine and become confident. Diamantis (1982) said the advantage of learning step by step is that people learn more and as they become more knowledgeable, they will feel more comfortable and want to know more.

Fear and intimidation of computers prevent many people from building the confidence they need to use them. It is important that people get rid of this fear which started to sound like a disease. As the spread of computers becomes noticeable, it is evident that avoiding them is becoming almost impossible. Fearing them will only dim the light on a bright future. So, the only way to deal with this "monster," as some view it, is to face it. Anderson (1983) said that "the only way to conquer fear of computers is to get to know them. My advice to the timid: sit in front of one as soon as possible" (p. 118). To overcome fear of computers, one must meet this challenge and become comfortable using computers to be able to get the most out of them.

Heller and Bower (1983) suggested several steps that may be taken to be comfortable with computers and eliminate the negative attitudes that may stand in the way:

1. People should believe in their mental ability and have confidence in themselves that it is possible to conquer this fear.

2. Fears must be listed and recognized to be able to deal with them. Once a fear is known, a solution may be found for it.

3. The cause for this fear of computers must be identified to find the source of the problem.

4. Abilities about using computers must be expressed and not ignored. Everyone has certain capabilities.

5. The lists of fears and abilities should be compared. That way, people may find out that they are capable of doing something that they fear. In turn that would motivate them to build confidence and get rid of that particular fear.

6. Finding someone to be supportive may help along the way. This person may be a friend, a classmate, or a teacher who can give some kind of encouragement.

7. Easing into the learning process may reduce the frustration of computers. One should learn to take it easy and not worry about things such as programming, but should be concerned with becoming familiar with the device itself at first.

8. Playing games on the computer is a step which can take some of the pressure off.

9. Rushing into an advanced course will only make the situation worse. One should register for an introductory class.

Rubin (1983) agreed with Heller and Bower that rushing into a programming class without knowing that it is not needed to be a computer user may frighten many beginners.

Diamantis (1982-83) believed that it would be a good idea for people to sit alone sometimes and learn to use computers to avoid embarrassment when mistakes are made. Diamantis also suggested talking to people who own computers about their experience.

Willingness to Continue Using Computers

Research indicated that getting more involved with computers and becoming interested in them would reduce the fear of using them. Palmer (1983) pointed out that students do not necessarily need to be very knowledgeable about computers to continue using them, after completing a computer course, as long as they can maintain some interest in them. So in order for students to build positive attitudes toward using computers, they must be motivated to become at least computer literate. Baumgarte (1984) believed that the willingness of students to continue using computers after finishing a computer course was an indication of the success in teaching those students to become interested in them.

Students' willingness to keep using computers may also be due to the experience they get in a computer class. In Sproull, Kiesler, and Zubrow's (1984) study, it was found that two-thirds of college students interviewed about their experience with computers felt that using computers required more time than they had anticipated. But those who took the time to get the most out of this experience were pleased. More than 50 percent of those students were proud of the outcome of their interaction with computers whenever it was a successful one. Some of them were happy to be given an assignment that allowed them to use the computer again. Others did not feel that computers were for them even though they were excited about the potential of computers and their affect on society. Weinberg and Fuerst (1984) indicated that miscommunication between students and the teacher may cause students to become confused, which would lead them to dislike computers and stay away from them. Clement (1981) also believed that teachers' attitudes can affect how students interact with computers. Negative attitudes may cause students to take their frustration out on the equipment and discontinue using computers.

Interest In Using Computers

There are those who welcome computers with open arms and minds. They are the ones who develop a special

relationship with them. They talk about computers, use them, enjoy them, and make them a part of their lives. Some take the opportunity and learn to use computers and become interested in them. Others go beyond that to a point where that enjoyment turns into an addiction. Addiction, or mania, can be costly if not controlled.

Starker (1983) described computer addiction as "Microcomputer Mania" which mostly occurs with people between the age of 18 and 50. It starts at a stage where people's attitudes toward computers shift to the positive side. They become interested in purchasing all kinds of computer magazines and spend some time looking through them. They find out where all the computer stores are and visit them frequently. They also use many computer terms in their conversations. Then they start spending money in buying equipment and software. That is when they begin to withdraw from family, friends, and activities they used to do. Their sleeping habits become disturbed. They come under a lot of stress and start having problems with some members of the family with which they live. Weinberg and Fuerst (1984) referred to this situation, which is the opposite of fear of computers, as "Computerphrenia." It is notable with people who are having difficulty relating to others, so they get interested in computers to avoid that contact. Toris (1984) said that they are "socially

anxious persons who fear human interaction" (p. 5). To them, computers are everything rather than just a tool.

Those who react with positive attitudes toward using computers can find themselves in a serious problem if they do not put limits to their interaction with computers. They can waste lots of time working on something useless through using computers. They may break up their marriage or relationship when using computers becomes their main activity. Stress from using computers can lead them into mental or emotional illness. That is when educators must step in and draw the borderline (Starker, 1983; Dusen and Finlayson, 1983).

Students should be taught to build positive attitudes toward using computers, but should be warned not to go to such extremes where misusing them becomes an obsession. Through his personal experience, Gandalf (1980) stated that:

The computer is a modifier of personalities. It is highly addictive. People who gain this addiction for a period of several months tend never to give it up. And the symptoms are very sad (p. 63).

Gandalf labeled them as "Hackers" who are intelligent people. They spend most of their time using computers and associating with those who are highly interested in computers. They gradually lose interest in anything else that is not directly related to computers. In school,

they accept low grades in noncomputer classes. They change their usual daily life to suit their addiction, by limiting their eating and sleeping habits. Their personalities change to a point where only other hackers can understand them or communicate with them.

Ingber (1981) described them as "computer addicts," who can sit in front of computers as if they were glued to them. They sit for hours creating their own programs and games and running them. They do not think about anything else but computers. They may drop out of other classes and stay away from people except from others who became like them. They live in their own world and spend most of their time at university computer centers or wherever computers are available. Whenever they are asked to complete an assignment in a computer course, they try to make it complicated and sophisticated to show their superiority in the field. Zimbardo (1980) said that those people are members of a group fascinated and obsessed with using computers.

According to Chamberlin (1983), those people are members of the "Technomania" who are enthusiastic and excited about using technology, especially computers. They have no fear of computers and would like to use them in their daily lives. They desire to be taught, treated, and entertained by them. Brod (1984) referred to them as "Technocentered people" who get their pleasure out of

operating and mastering computers. They do not feel that they are forced to use them, but see it as an attachment to the machine. They become isolated and uptight whereas once they were sociable and relaxed individuals.

Males' Attitudes Versus Females' Attitudes Toward Computers

There are many people who believe that the world of computers are dominated by men. That notion has caused many to be concerned about the future of women in an era when the acceptance of computers becomes a must for everyone who desires to function properly in a world full of technological advancements. The research and literature concerning attitudes toward computers indicated that there are more men than women attracted to computers and enjoying them.

Wilder, Mackie, and Cooper (1985) found out in their study, when they asked college students which group was using computers more, both males and females indicated in their responses that men were the ones who use them the most. The study reported that even though the attitudes of both groups were mostly positive, women did not feel as comfortable as men when they had to use computers and rated themselves to be less knowledgeable in the area of computing.

Research indicates that more men than women use computers whether it is at home, school, or in a game room.

Manning (1984) pointed out that a poll conducted by USA Today found that almost three men to one woman use computers at home. Kiesler, Sproull, and Eccles (1983) blame the absence of females in arcades and computer stores where workers and customers are mostly men on the unfamiliarity of most women with computers since they do not feel comfortable with them. They stated that "The culture of computing is overwhelmingly male" (p. 42). Dusen and Finlayson (1983) estimated that 90 percent of computer buyers were males.

Sanders (1984) explained some of the attitudes that prevented most women from getting involved with computers as follows:

1. Computers are associated with math, which many girls feel is a male activity.
2. Computers are seen as machines, and therefore, male. Girls have less experience than boys with machines, and are more afraid than boys of making mistakes and breaking the machine.
3. Computers are considered unfeminine because mostly boys use them. (p. 32)

Women tend to develop some form of anxiety when it comes to using computers, because some of them view the computer as a device that only calculates arithmetic problems. In turn, they associate that with mathematics. Many of them feel that mathematics is for men. Other women may develop this negative attitude toward computers when they hear how difficult it is for a woman to

understand them. These feelings can keep many women outside this field and prevent them from learning about it (Winkle and Mathews, 1982).

Dambrot, Watkins-Malek, Silling, Marshall, and Garven (1985) conducted a study to compare the attitudes toward and involvement with computers of both males and females. They found that more women had negative attitudes toward computers because they feared them more than men did. Women felt that computers were difficult to use and were intimidated by them while more men enjoyed using them and agreed that they save time. That led to less involvement by women with computers. The study also indicated that more men had completed a computer class.

According to a study by Vredenburg, Flett, Krames, and Pliner (1984), both males and females stressed the need for computers in today's society, but there were more men favoring them and intending to buy them. When those students were asked to imagine the computer as a person and label it as a male or female, almost all of them viewed it as a man. More males also reported to have used computers before and also were taking a computer class at the time, while women were afraid of using them and felt that other women feared them, too.

Jackson and Yamanaka (1985) administered a study titled "Measuring Women's Attitudes, Goals, and Literacy Toward Computers and Advanced Technology" to a number of

women ranging from the age of 19 to 49 years. They found that women with high technical goals had a high enjoyment level of computers. Those women continue to use computers because they enjoy them. When they were asked to compare their knowledge of computers to other women, they rated themselves as being less knowledgeable. They also felt that men were more computer literate than women. The study showed that some women did not consider the computer to be a valuable device, but saw it as an enemy. Others expressed some interest in learning to use computers but felt that their illiteracy in this field stood in the way, they were ashamed of the fact that they did not know much about them.

One can trace this male-computer relationship to childhood, when boys had some kind of love affair with video games. Kiesler, Sproull, and Eccles (1983) believed that boys outnumbered girls in arcade rooms and spend many hours with other boys playing games and challenging those machines. That experience may serve later in life as the first step into the computer culture. Kiesler and colleagues stated that "Boy's earlier familiarity and ease with computer games, we fear, may put girls at a disadvantage when they try to enter the computer world" (p. 48). Gelder (1985) agreed that video games may encourage users to become involved with computers later in life, but there were two things that kept many females away from those

games. Most video games contain violence which may frighten sensitive women; however, competition is a major part of playing. Males usually do not mind the challenge by the games or by others playing them.

Heller and Bower (1983) indicated some of the main reasons that discourage some women to use computers by listing ten types of fears:

1. Computers are unfeminine.
2. You need to know math to use a computer.
3. You have to know how to program to use a computer.
4. You have to be a mechanical whiz to use a computer.
5. Computers are for "real men" only.
6. If you press the wrong button, the computer blows up.
7. The computer will go beserk.
8. The computer will control you.
9. You'll lose your job to a computer.
10. You'll make humiliating mistakes. (pp. 14-28).

Weinberg and Fuerst (1984), and "If Women Don't Go Into Computers" (1982) indicated that another reason for discouraging women from using computers may be blamed on parents who only urge their boys to get involved with computers because they feel that it is more appropriate for boys to use computers. The fact is, it is equally important for both males and females to be encouraged to develop interest in using computers. Jackson and Yamanaka (1985), and Kiesler, Sproull, and Eccles (1983) believed that paying more attention to helping women conquer their fear of computers and encouraging them to learn to use

computers is needed. This encouragement will allow women to take advantage of computers and secure their future. Sanders (1986, p. 23) suggested that educators must do all they can to "close the computer gender gap" by attracting more women to use computers; Kolata (1984) described a university doing that by offering a course called "Computers Without Fear" where 75 percent of the students were women. This course helped them to overcome their anxiety of computers. Kolata indicated that many of those students signed up for another computer class after they finished that one.

Women usually like to do things that other women enjoy doing. Gelder (1985) explained why not too many women react positively to the use of computers. Until recently, most educational institutions introduced computers in classes such as math, which is not a favorite subject to many women. Curley (1983) indicated that while math is one of the subjects most feared by people, one should not worry about that when using computers because a person does not need to be a mathematician to operate one. Even if a person needs to work on math problems, computers can make it easier to do so.

Weinberg and Fuerst (1984) suggested that once women realize that more women are becoming interested in using computers and enjoying them, the fear and resistance among them would fade away.

The macho image may keep many men from admitting their fear of computers. Men usually have the attitude of "I am not afraid of anything." In a way that may help in building self-confidence and allow them to struggle inside to prove that they are not intimidated by computers. That struggle may help them conquer that fear and get them to become interested in computers. It may also keep them away from reaching for help. They may keep that feeling inside until they realize that it is not getting them anywhere, then they may admit their fear of computers, but it might be too late. They might already have developed certain attitudes toward computers while fighting themselves from showing their fears that are capable of destroying their interest in using computers. Weinberg and Fuerst (1984) believed that more women than men are willing to show their feelings and admit that they fear computers. They said that "admitting the fear is the first step in conquering it" (p. 129).

It is only fair to say that others felt differently about women's involvement and attitudes toward computers. Lockheed (1985) and McClain (1983) believed that women have always been a part of the computer culture. They mentioned the name of (Augusta Ada Lovelace) as the first programmer in the world and denied that women resist or oppose computers. McClain said that women are not intimidated by computers and that they are becoming a part of

every computer industry. They are enthusiastic about computers and take them seriously rather than considering them as toys to play with. McClain raised the question: "Do women resist computers?" and answered it by saying that it is "Quite the opposite, actually, and their skills and enthusiasm may change the course of computing in the '80s" (p. 66). Lockheed disagreed with the idea that women are falling behind in this field by saying that "Computers are not and have never been the exclusive domain of men. Women have made valuable contributions to the development and application of computers" (p. 117). Sanders (1984) believed that women are equally successful in using computers, but men are usually more eager and willing to spend time playing and working with them.

Summary

Computers are becoming an essential part of life, learning to use them is important in order to function productively in today's society. Many are realizing that and are welcoming the opportunity with enthusiasm and taking advantage of this device, some of them are going beyond that by allowing themselves to become obsessed with computers to a point where they misuse them. While others fear them and develop what is called "Computerphobia," * They feel uncomfortable around computers and try to avoid them. These two extreme reactions to using computers had

many concerned about the future of those people with such attitudes. They suggest that people should build positive attitudes toward computers to become comfortable and have confidence using them because they will have to accept their presence in society, but warned that a limit must be put to interacting with them.

There are factors that contribute to people's attitudes toward computers. Some of those factors are: level of education, the reason is that more educated people have more understanding of things including computers; age, because research and literature indicate that many of those who grew before the computer revolution tend to fear them more than those who were a part of it; experience with computers, which reduces the fear of using them; and marriage, because a married person has more responsibilities in life than one who is not and their involvement with computers may be influenced by their relationship.

Most of the available research and literature indicated that women are usually the ones to fear computers and their involvement with them is limited. Many of them fear machines in general and computers may just add to that list, but may be the one most feared since they are powerful. Some of them associate computers with mathematics which is not one of their favorite subjects. More men react positively to computers and enjoy using them more than women, which had many feel that women are falling

behind in the field and stressed the importance of helping women to overcome their fears of using computers.

CHAPTER III

METHODOLOGY AND PROCEDURES

Introduction

The study was conducted to investigate the change in attitudes of college students toward computers. To meet the purpose of the study, a 40-item questionnaire was developed based on ideas gathered from previous studies about attitudes toward computers and informal interviews with several students enrolled in computer classes during the development of the instrument.

The instrument was developed and pilot tested during the Fall quarter, 1986. During the 1987 Winter quarter, students enrolled in three beginning computer classes responded to the questionnaires at the beginning and the end of that quarter. Responses were collected from 44 students who willingly participated in the study. Data were gathered, tabulated, and analyzed using the Statistical Analysis System (SAS), and the Statistical Package for the Social Sciences (SPSS).

This chapter describes how the instrument was developed and pilot tested, the selection of subjects, the methods and procedures followed to collect the data, and the data analysis.

The Subjects

The study took place in the College of Education at the University of Tennessee, Knoxville. The subjects for the study were 44 students enrolled in three introductory computer classes offered during the Winter quarter of 1987. The participants in the study included 16 students from the first class, 15 students from the second class, and 13 students from the third class. Two of those classes were taught in the same department (Technological and Adult Education), the third class was offered in another department (Curriculum and Instruction). The courses provided students with an overall view about computers and their applications. Hands on experiences are a major part of those courses. Students were required to complete a number of exercises using computers.

The three courses were open not only to students from those two departments, but to others in the various fields. There were students majoring in Geography, Public Health, Finance, Educational Leadership, Industrial and Organizational Psychology, Special Education, Mathematics, Nursing, Administrative Recreation, Food Systems Administration, and Physical Education.

The students were taught in a setting where a number of personal computers of different brands were provided to be used throughout the courses. The three classes were taught by three different male instructors.

Instrumentation

Development of the Data Gathering Instrument

The procedure used to develop the instrument for the study was based on two methods, (a) student input, and (b) review of previous studies.

The first procedure involved talking to a number of students during the Fall quarter of 1986 who were enrolled in computer classes. That was done through visiting them during the lab hours. With their permission, they were told that a study was to be conducted to examine college students' attitudes toward computers and their help was needed to generate ideas for the purpose of gathering questionnaires to be used in the study. Then they were asked to express their feelings and beliefs about computers and using them. They were also asked questions, such as, what did they like and dislike about computers, and whether they were willing to continue learning about and using them. Informal and friendly discussion was maintained to keep them interested in the topic. Their ideas were written down, analyzed, and transformed into simple statements which were listed to be evaluated. The second procedure was to review previous studies which were conducted to investigate attitudes toward computers, Elkins (1985) developed a questionnaire to measure attitudes of educators toward computers which was based

on form 8 of the "Minnesota Computer Literacy and Awareness Assessment" by Anderson, Hansen, Johnson, and Klassen (1979), Dambrot, Watkins-Malek, Siling, Marshal, and Garver (1985), Reece and Gable (1982), and Collis (1985). Those studies used instruments which were validated.

The two methods helped in generating ideas and statements about students' attitudes toward computers. That led to developing an instrument consisting of 66 statements grouped under five categories: (a) interest in computers, which contained 15 statements; (b) fear of computers, which contained 15 statements; (c) willingness to use computers, which contained 11 statements; (d) confidence in learning to use computers, which contained 10 statements; and (e) general attitudes toward computers, which contained 15 statements. A separate sheet for demographic information also was included. The committee chairman reviewed it and suggested that the items should be listed in a random order. Each item then was written on a small piece of paper and put into a hat. Items were drawn from the hat, numbered, and listed in that order without categorizing them. It was reviewed again and a suggestion was made to eliminate some of the items because it was felt that they did not serve any purpose in the study. The number of items was then reduced to 58.

Pilot Study

The instrument was pilot tested on a number of students at the computer lab. During the Fall quarter of 1986, eight students were visited while working in the computer lab. They were told about the study and were asked if they would read through and critique the proposed questionnaire which was to be used in the study but needed to be examined and refined. Those who agreed to do so were given a copy of that version and were asked to raise any questions or make suggestions about any of the items. Some of them felt that it would be a good idea to try to balance the number of items stated in a positive way and those stated negatively. Others believed that there were too many statements and suggested that some of them should be eliminated. Others had difficulty understanding some of the items. That immediate feedback was used to modify some of the items. The items the students questioned were eliminated. Efforts also were made to balance the quantity of items stated positively with those stated negatively to avoid biasing.

The style of the questionnaire was changed to make it more attractive and easy to read. The recommended changes involved limiting each statement in the instrument to a short and clear sentence that did not have to be read twice to be understood. The items were spread apart and lines were drawn between the numbers in the scale. The

modified version was pilot tested again by seven students other than those who participated in the first test. They were given the same instructions as the previous group and were asked to make any comments about the instrument. Their reactions were positive toward it. Since the instrument had been developed using previously validated items from other studies, this strengthened the validity of the instrument.

The Final Version

The final version of the instrument (Appendix A) which was the one used to collect data for the study, consisted of 40 items which were basically statements about computers. They were beliefs and feelings about them that include (a) interest in using computers; (b) willingness to use computers or continue using them; (c) confidence in learning how to use computers; and (d) fear of using computers. A five-point Likert scale was used in the instrument and each response was assigned different points. One point was assigned to "strongly disagree," two points to "disagree," three points to "neutral," four points to "agree," and five points for "strongly agree."

Directions were given at the beginning of the instrument. They included the purpose of the study as well as an example showing how to respond to each item. Also mentioned was that the respondents did not have to include their names. A demographic information sheet was provided

which included current age, sex, marital status, enrollment status, educational level, degree sought, experience with computers, time of experience using computers if any, and whether or not the respondent owned a computer. A blank sheet also was included for the respondent to give any suggestions or comments about the study.

The reliability of the final version of the instrument was estimated by using the Kuder-Richardson test (formula 20). Using pretest data, the reliability estimate was 0.93, while the post-test data yielded an estimate of 0.94. These results indicated the instrument was reliable.

Collection of Data

After preparing the items for the study, the three courses were identified by looking through the University of Tennessee catalogue where descriptions of each were given. Then by using the 1987 Winter quarter timetable of classes, information about the location, time, and instructor of each course was known. At the end of the 1986 Fall quarter, the three instructors were contacted and an appointment was made with each one of them. Meetings took place in their offices. At each meeting, each instructor was given a full explanation about the study. A discussion about how the study was to be conducted then took place. A copy of the items which were

used to collect the data was given to each instructor. Permission was then obtained from the instructors to allow their students to participate in the study at the beginning and end of the following quarter.

During the first week of the 1987 Winter quarter and prior to the scheduled time of the three classes another meeting with each instructor took place to set up a time for the students to respond to the instrument and to obtain the number of students in each class. It happened that the three classes were scheduled at different times which allowed the researcher to personally collect the data. Each instructor was met at least 15 minutes before the start of the class when the instrument was to be distributed.

The procedure for collecting the data at the beginning of the quarter differed slightly from the one used at the end. At the beginning of the quarter, during the first minutes of the class, after all the students were given a summary of the study, the researcher was then introduced to them to talk more about the study and to answer any questions asked about it. It was orally explained to the students that their responses would not have an effect on their outcome of the course. They were told that their responses would remain anonymous and the only reason for collecting them was for the purpose of carrying out the study. They also were told not to

include their names when responding to the items since names did not serve any purpose in the study.

Each student was given a copy of the instrument and was asked to take some time to respond to it. After a few minutes, the responses were collected by the researcher. Upon leaving each classroom, the responses were marked to be distinguished when analyzing the data.

The completed responses were counted. It was found that of the 53 students, only 37 of them responded to the items, an almost 70 percent response rate. The response rate for one of the classes was 100 percent. The other two had 74 percent and 35 percent respectively. Later, an additional nine questionnaires were returned, bringing the total to 46, or almost 87 percent response.

During the final days of the quarter, the instructors were asked for time to allow students to complete the final questionnaire during class time. All agreed to do so.

The same items were prepared to be used again at the end of the quarter. There were slight changes in stating some of the items. These changes were only made to change those items to the past tense (see Appendix B).

The students were reminded again not to include their names. Since it was not known who responded to the items at the beginning of the quarter and who did not, the students were asked to put a check mark at the top of the

first page of the questionnaires if they had returned the items at the beginning of the quarter. Students were allowed enough time to complete responding to the items.

The response rate was higher than the one for the beginning of the quarter, but the important thing was to have the same people respond again at the end. The responses that had a check mark on them were kept and the ones that did not were discarded. By matching the demographic data of the pretest questionnaire with the one for the post-test, it was found that two of the students who participated in the study at the beginning of the quarter had dropped out and their responses also were discarded. The total number of respondents was 44. The data were then ready to be tabulated and analyzed.

Data Processing and Procedures

A total of 44 students participated in the study. They were given a pretest to determine their initial reaction and attitudes toward computers and a post-test at the end of the quarter to see if any change had occurred. After collecting all the data, the items stated negatively were identified. The scale ranking for scale range was reversed for those items; a "strongly disagree" response was assigned a value of five points, four points for "disagree," three points remained for "neutral," two points for "agree," and one point for "strongly agree." Since

there were 40 items in the instrument and five responses, a person could have a maximum total score of 200 points and a minimum total of 40 points. A high score would indicate a positive attitude and a low score would indicate a negative attitude.

The data were entered into the computer to be analyzed using the Statistical Analysis System (SAS), and the Statistical Package for the Social Sciences (SPSS). The t-test was used to test the hypotheses and also to analyze each item for the different groups. Frequencies and percentages also were determined. The 95 percent confidence interval was selected. The probability must be 0.05 or less to be significant at the 0.05 level of significance. The values for unequal variances were used.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

The purpose of this study was to investigate the change in attitudes and perceptions of college students toward using computers as they participated in a hands-on computer class. The results will be presented as follows: (a) Demographic characteristics; (b) Comparison of attitudes at the beginning and at the end of the quarter; and (c) Factors affecting attitudes toward computers, including age, sex, experience, educational level, and marital status.

Demographic Characteristics

Forty-four students participated in the study. Table 1 presents the demographic data. Participants were divided into two groups by age. Eighteen students were 28 years of age or under (41 percent) and 26 students were older than 28 years (59 percent). Twenty-three students (52 percent) were female and 21 (48 percent) were male. Fifty-seven percent were married and the other 43 percent were single. One-half of those students were enrolled full-time and the other half were part-time. Thirty-eight (86 percent) were graduate students and 6 (14 percent) were undergraduates. Seventy-two percent were seeking

TABLE 1
DEMOGRAPHIC DATA DISTRIBUTION (N = 44)

Variable	Number of Students	Percentage
<u>Age</u>		
28 years or under	18	41
Over 28 years	26	59
<u>Sex</u>		
Female	23	52
Male	21	48
<u>Marital Status</u>		
Single	19	43
Married	25	57
<u>Enrollment</u>		
Part-time	22	50
Full-time	22	50
<u>Educational Level</u>		
Graduate	38	86
Undergraduate	6	14
<u>Degree Sought</u>		
Bachelor	6	14
Master's	32	73
Ed. D.	2	4
Ph. D.	4	9
<u>Own's a Computer</u>		
Yes	18	41
No	26	59

Master Degrees and 13 percent were working toward Doctorate Degrees. Seventy-five percent of the 44 students indicated they had used computers previously and only 25 percent had no prior experience with computers. When students were asked if they owned computers, 18 of them (41 percent) indicated that they did and 26 (59 percent) did not.

Comparison of Attitudes and Changes in Attitudes

The same students who participated in the study at the beginning of the term did so at the end of the term. The frequencies and percentages of their responses are included in Appendix C. The mean and standard deviation for each item on both the pretest and post-test is presented in Appendix D.

Review of data in Appendix D shows a rather high positive pretest response for most items. This may reflect a lower anxiety level at the outset of the study than expected due in part to the more common use of personal computers at present than in the past.

Hypothesis One

There is no significant difference between the attitudes of college students before and after learning how to use personal computers in the classroom.

A paired t-test was performed to determine whether students' attitudes on the pretest differed significantly

from those on the post-test. The results of the t -test, as presented in Table 2, indicated that, overall, there was no significant difference between the attitudes of students measured by the pretest and the post-test. The calculated t -value was -0.93 ($p = 0.36$).

Analysis of the t -tests for all items showed that three items, 4, 6, and 7, (Table 3) resulted in a significant change at the 0.05 level. Those items were stated as follows:

4. Learning to use computers will help me get a good job.
6. I really don't want to learn how to use computers, but I have to.
7. I feel that this was the right time to learn how to use a computer.

Item 4 (Learning to use computers will help me get a good job.) had a pretest mean of 3.82 and a post-test mean of 3.45 and showed a t -value of 2.23 ($p = 0.03$). Only 2 percent of the students were in disagreement with item 4 on the pretest as compared to 11 percent on the post-test. Overall, the change in attitude on this item was slightly negative.

Item 6 (I really don't want to learn how to use computers, but I have to.) had a pretest mean of 4.36 and a post-test mean of 4.09 and showed a t -value of 2.07 ($p = 0.04$), which indicated a significant negative change in this attitude. Analysis of item 6 showed that on the pretest, 91 percent of the students were in disagreement

TABLE 2

t-TEST RESULTS ON MEAN DIFFERENCE OF STUDENTS' ATTITUDES TOWARD COMPUTERS ON THE
PRETEST AND POST-TEST

	Mean	Mean Difference	SD	<u>t</u>	DF	Probability Level
Pretest	3.93					
		-0.05	0.35	-0.93	43	0.36*
Post-test	3.88					

* $p \leq 0.05$ ($\underline{t} = 2.01$ with 43 degrees of freedom)

TABLE 3

t-TEST RESULTS OF COMPARING THE MEANS OF THE PRETEST WITH THE
MEANS OF THE POST-TEST FOR ITEMS WHERE SIGNIFICANT DIFFERENCE WAS
FOUND

Item	Mean Difference	SD	$\underline{t}$	DF	Probability Level
4	-0.36	1.08	2.23	43	0.03*
6	-0.27	0.87	2.07	43	0.04*
7	-0.34	0.91	2.48	43	0.02*

* $p \leq 0.05$ ($\underline{t} = 2.01$ with 43 degrees of freedom)

with the statement while only 77 percent disagreed on the post-test.

The t-test results for item 7 (I feel that this was the right time to learn how to use a computer.) showed a pretest mean of 4.16 and a post-test mean of 3.82, which gave a t-value of 2.48 ($p = 0.02$). On the pretest, only 4 percent of the students believed it was not the right time to learn how to use computers as compared to 9 percent on the post-test.

Factors Affecting Attitudes Toward Computers

Hypothesis Two

There is no significant difference between the attitudes of older and younger students toward using personal computers.

To test the null-hypothesis, an independent t-test was performed. The results of the test are presented in Table 4. A t-value of 1.11 ($p = 0.28$) was obtained, which indicated that there was no significant difference between the attitudes of students 28 years of age or younger, and those over 28 years old.

Further analysis of each item by age indicated that none of the items had any significant difference in attitudes.

TABLE 4

t-TEST PROCEDURE ON THE MEAN DIFFERENCE OF ATTITUDES TOWARD COMPUTERS FOR YOUNGER
AND OLDER STUDENTS

Age Groups	N	Mean Difference	SD	STD Error	<u>t</u>	DF	Probability Level
28 years or under	18	-0.12	0.42	0.10	1.11	28.2	0.28*
Over 28 years	26	0.00	0.29	0.06			

* $p \leq 0.05$ (t = 2.05 with 28 degrees of freedom)

Hypothesis Three

There is no significant difference between the attitudes of male and female students toward using personal computers.

An independent t -test was performed to test the third null-hypothesis and the results are presented in Table 5. The calculated t -value was 0.44 ($p = 0.66$). There was no significant difference between the attitudes of male and female students toward using personal computers..

The results for the t -test for each item by sex indicated that a significant difference was found in two items (Table 6). The two items are:

4. Learning to use computers will help me get a good job.
12. I feel that I am too old to learn about using computers.

Item 4 (Learning to use computers will help me get a good job.) showed a mean difference of -0.74 for female students, and 0.05 for male students.

Female students had a mean of 3.91 on the pretest, and only 3.17 on the post-test. On the pretest, 22 percent strongly agreed with item 4, 52 percent agreed, 4 percent disagreed, and 22 percent were uncertain. On the post-test, only 4 percent strongly agreed, 35 percent agreed, 9 percent strongly disagreed, 9 percent disagreed, and 43 percent were uncertain.

TABLE 5

RESULTS OF A t -TEST ON MEAN DIFFERENCE OF ATTITUDES TOWARD COMPUTERS BY GENDER

Gender	N	Mean Difference	SD	STD Error	t	DF	Probability Level
Female	23	-0.07	0.42	0.09	0.44	37.5	0.66*
Male	21	-0.03	0.26	0.06			

* $p \leq 0.05$ ($t = 2.02$ with 38 degrees of freedom)

TABLE 6

t-TEST RESULTS FOR THE ITEMS WHERE ATTITUDES TOWARD COMPUTERS BY GENDER DIFFERED
SIGNIFICANTLY

Item	Gender	N	Mean Difference	SD	STD Error	$\underline{t}$	DF	Probability Level
4	Female	23	-0.74	1.18	0.25	2.61	39.1	0.01*
	Male	21	0.05	0.80	0.18			
12	Female	23	-0.43	0.79	0.16	2.70	41.9	0.01*
	Male	21	0.19	0.75	0.16			

* $p \leq 0.05$ ($\underline{t}$ = 2.02 with 39 degrees of freedom)
 ($\underline{t}$ = 2.00 with 42 degrees of freedom)

Male students had a mean of 3.71 on the pretest, and 3.76 on the post-test. On the pretest, 14 percent strongly agreed with item 4, 43 percent agreed, none disagreed, and 43 percent were uncertain. On the post-test, 24 percent strongly agreed, 33 percent agreed, 5 percent disagreed, and 38 percent were uncertain.

The calculated t -value for item 4 was 2.61 ($p = 0.01$), which indicated that the mean difference was significant at the 0.05 level.

Item 12 (I feel that I am too old to learn about using computers.) showed a mean difference of -0.43 for female students, and 0.19 for male students.

Female students had a mean of 4.78 on the pretest, and 4.35 on the post-test. On the pretest, 78 percent strongly disagreed with item 12, and the remaining 22 percent agreed. On the post-test, 52 percent strongly disagreed, 39 percent disagreed, and 9 percent agreed.

Male students had a mean of 4.43 on the pretest, and 4.62 on the post-test. On the pretest, 67 percent strongly disagreed with item 12, 19 percent disagreed, 5 percent agreed, and 9 percent were uncertain. On the post-test, 71 percent strongly disagreed, 19 percent disagreed, and 10 percent were uncertain.

The computer t -value for item 12 was 2.70 ($p = 0.01$), which indicated that mean difference was significant at the 0.05 level. The change in attitudes was more positive

for men than women although 90 percent or more felt that they were not too old to learn about using computers. Women at the beginning and at the end of the quarter had more positive attitudes on this item than the men.

Hypothesis Four

There is no significant difference between the attitudes of married students and single students toward using personal computers.

The results of an independent t -test (Table 7) showed a mean difference of 0.04 for married students and -0.17 for single students. The calculated t -value was 1.98 ($p = 0.06$), which was not significant at the 0.05 level. As a result, there was no significant difference between the attitudes of married and single students toward using personal computers.

Analysis of the t -test for each item showed that items 17 and 29 resulted in a significant difference at the 0.05 level (Table 8). The two items were stated as follows:

- 17. I am willing to take more computer classes.
- 29. I am proud of the fact that I am learning to use computers.

Item 17 (I am willing to take more computer classes.) showed a mean difference of 0.24 for married students, and -0.37 for single students.

TABLE 7
t-TEST RESULTS ON MEAN DIFFERENCE OF STUDENTS' ATTITUDES TOWARD COMPUTERS BY
 MARITAL STATUS

Marital Status	N	Mean Difference	SD	STD Error	<u>t</u>	DF	Probability Level
Married	25	0.04	0.30	0.06	1.98	33.0	0.06*
Single	19	-0.17	0.38	0.09			

* $p \leq 0.05$ ($\bar{t} = 2.02$ with 33 degrees of freedom)

TABLE 8

t-TEST RESULTS OF ITEMS WHERE ATTITUDES OF MARRIED STUDENTS TOWARD COMPUTERS
DIFFERED SIGNIFICANTLY FROM THOSE OF SINGLE STUDENTS

Item	Marital Status	N	Mean Difference	SD	STD Error	$\underline{t}$	DF	Probability Level
17	Married	25	0.24	0.89	0.18	2.17	37.1	0.04*
	Single	19	-0.37	0.96	0.22			
29	Married	25	0.16	0.80	0.16	2.53	37.8	0.02*
	Single	19	-0.47	0.84	0.19			

* $p \leq 0.05$ ($\underline{t} = 2.02$ with 37 degrees of freedom)
($\underline{t} = 2.02$ with 38 degrees of freedom)

Married students had a mean of 4.28 on the pretest, and 4.52 on the post-test. On the pretest, 40 percent strongly agreed with item 17, 48 percent agreed, and 12 percent were undecided. On the post-test, 56 percent strongly agreed, 40 percent agreed, and only 4 percent were undecided.

Single students had a mean of 3.74 on the pretest, and 3.37 on the post-test. On the pretest, 10 percent strongly agreed with item 17, 63 percent agreed, 11 percent disagreed, and 16 percent were undecided. On the post-test, 11 percent strongly agreed, 47 percent agreed, 5 percent strongly disagreed, 21 percent disagreed, and 16 percent were undecided.

The calculated t -value for item 17 was 2.17 ($p = 0.04$), which indicated that the mean difference was significant at the 0.05 level. Married students showed more positive attitudes about willingness to take more computer classes than single students.

Item 29 (I am proud of the fact that I am learning to use computers.) showed a mean difference of 0.16 for married students, and -0.47 for single students.

Married students had a mean of 4.00 on the pretest, and 4.16 on the post-test. On the pretest, 20 percent strongly agreed with item 29, 60 percent agreed, 4 percent disagreed, and 16 percent were uncertain. On the post-

test, 36 percent strongly agreed, 40 percent agreed, none disagreed, and 24 percent were uncertain.

Single students had a mean of 4.10 on the pretest, and 3.63 on the post-test. On the pretest, 26 percent strongly agreed with item 29, 58 percent agreed, none disagreed, and 16 percent were uncertain. On the post-test, 11 percent strongly agreed, 47 percent agreed, 5 percent disagreed, and 37 percent were uncertain.

The calculated t -value for item 29 was 2.53 ($p = 0.02$), which indicated that the mean difference was significant at the 0.05 level. Married students reflected a more positive change in attitudes toward being proud of learning to use computers.

Hypothesis Five

There is no significant difference between the attitudes of graduate and undergraduate students toward using personal computers.

The results of the independent t -test (Table 9) reported that the mean difference was -0.04 for graduate students and -0.09 for undergraduate students. The calculated t -value was 0.56 ($p = 0.58$). The results indicated that there was no significant difference between the attitudes of graduate and undergraduate students toward using personal computers.

Analysis of the t -test results for each item showed that three items (3, 5, and 6) reported significant

TABLE 9
t-TEST TO COMPARE THE MEAN DIFFERENCE OF STUDENTS' ATTITUDES BY EDUCATIONAL
 LEVEL

Educational Level	N	Mean Difference	SD	STD Error	<u>t</u>	DF	Probability Level
Graduate	38	-0.04	0.37	0.06	0.56	21.5	0.58*
Undergraduate	6	-0.09	0.13	0.05			

* $p < 0.05$ (t = 2.07 with 22 degrees of freedom)

differences. The results are presented in Table 10.

Those items were stated as follows:

3. Computers make life more complicated.
5. I would like to expand my knowledge of computers
6. I really don't want to learn how to use computers, but I have to.

Item 3 (Computers make life more complicated.) showed a mean difference of 0.29 for graduate students, and -0.50 for undergraduate students.

Graduate students had a mean of 3.63 on the pretest, and 3.92 on the post-test. On the pretest, 8 percent strongly disagreed with item 3, 66 percent disagreed, 5 percent strongly agreed, 8 percent agreed, and 13 percent were uncertain. On the post-test, 18 percent strongly disagreed, 63 percent disagreed, 8 percent agreed, and 11 percent were uncertain.

Undergraduate students had a mean of 4.17 on the pretest, and 3.67 on the post-test. On the pretest, 33 percent strongly disagreed with item 3, 50 percent disagreed, and 17 percent were uncertain. On the post-test, none strongly disagreed, 83 percent disagreed, and 17 percent agreed.

The calculated t -value for item 3 was 2.87 ($p = 0.02$), which indicated that the mean difference was significant at the 0.05 level. The change in attitudes for graduate students was greater than for undergraduates in disagreement that computers make life more complicated.

TABLE 10
t-TEST RESULTS FOR ITEMS WHERE A SIGNIFICANT DIFFERENCE WAS FOUND BETWEEN THE
 ATTITUDES OF GRADUATE AND UNDERGRADUATE STUDENTS

Item	Educational Level	N	Mean Difference	SD	STD Error	<u>t</u>	DF	Probability Level
3	Graduate	38	0.29	0.98	0.16	2.87	11.0	0.02*
	Undergraduate	6	-0.50	0.55	0.22			
5	Graduate	38	-0.37	0.97	0.16	2.67	11.6	0.02*
	Undergraduate	6	0.33	0.52	0.21			
6	Graduate	38	-0.34	0.91	0.15	2.29	14.7	0.04*
	Undergraduate	6	0.17	0.41	0.17			

* $p \leq 0.05$ (t = 2.20 with 11 degrees of freedom)
 (t = 2.18 with 12 degrees of freedom)
 (t = 2.13 with 15 degrees of freedom)

Item 5 (I would like to expand my knowledge of computers.) showed a mean difference of -0.37 for graduate students, and 0.33 for undergraduate students.

Graduate students had a mean of 4.55 on the pretest, and 4.18 on the post-test. On the pretest, 63 percent strongly agreed with item 5, 31 percent agreed, 3 percent disagreed, and 3 percent were undecided. On the post-test, 37 percent strongly agreed, 52 percent agreed, 3 percent strongly disagreed, 3 percent disagreed, 5 percent were undecided.

Undergraduate students had a mean of 4.17 on the pretest, and 4.50 on the post-test. On the pretest, 33 percent strongly agreed with item 5, 50 percent agreed, and 17 percent were undecided. On the post-test, 67 percent strongly agreed, 17 percent agreed, and 16 percent were undecided.

The completed t -value for item 5 was 2.67 ($p = 0.02$), which indicated that the mean difference was significant at the 0.05. While both, graduate and undergraduate students, agreed, the change in attitude was more positive for undergraduates that they would like to expand their knowledge of computers.

Item 6 (I really don't want to learn how to use computers, but I have to.) showed a mean difference of -0.34 for graduate students, and 0.17 for undergraduate students.

Graduate students had a mean of 4.42 on the pretest, and 4.08 on the post-test. On the pretest, 53 percent strongly disagreed with item 6, 39 percent disagreed, 3 percent agreed, and 5 percent were uncertain. On the post-test, 42 percent strongly disagreed, 34 percent disagreed, 3 percent strongly agreed, 5 percent agreed, and 16 percent were uncertain.

Undergraduate students had a mean of 4.00 on the pretest, and 4.17 on the post-test. On the pretest, 33 percent strongly disagreed with item 6, 50 percent disagreed, and 17 percent agreed. On the post-test, 50 percent strongly disagreed, 33 percent disagreed, and 17 percent agreed.

The calculated t -value for item 6 was 2.29 ($p = 0.04$), which indicated that the mean difference was significant at the 0.05 level. While both, graduate and undergraduate students, indicated they really wanted to learn how to use computers, the change in attitude in this direction was greater for undergraduate students.

Hypothesis Six

There is no significant difference between the attitudes of students experienced in using computers and those who are not toward using personal computers.

Table 11 presents the time students had some kind of experience in using computers, prior to taking the course. Table 12 presents the results of the t -test. The mean

TABLE 11
TIME OF EXPERIENCE STUDENTS HAD USING COMPUTERS

Time of experience Month(s)	Number of Students	Percentage
0	11	25
1	3	7
2	2	5
3	4	9
4	1	2
6	1	2
8	1	2
12	3	7
18	1	2
24	8	18
36	3	7
48	2	5
72	1	2
120	3	7

TABLE 12

t-TEST RESULTS ON MEAN DIFFERENCE OF STUDENTS' ATTITUDES TOWARD COMPUTERS BY EXPERIENCE

Experience	N	Mean Difference	SD	STD Error	$\underline{t}$	DF	Probability Level
No	11	-0.11	0.35	0.10	0.69	17.5	0.50*
Yes	34	-0.03	0.35	0.06			

* $p \leq 0.05$ ($\underline{t} = 2.10$ with 18 degrees of freedom)

difference was -0.11 for inexperienced students, and -0.03 for experienced students. The calculated t -value was 0.69 ($p = 0.50$), which indicated that there was no significant difference between the attitudes of experienced and inexperienced students toward using personal computers.

On further analysis of each item, the t -test results indicated that only two items (15 and 31) showed any significant change in attitudes. The results are presented in Table 13. Those two items were stated as follows:

- 15. I don't trust computers.
- 31. I am in favor of owning a computer.

Item 15 (I don't trust computers.) showed a mean difference of 0.45 for inexperienced students and -0.12 for experienced students.

Inexperienced students had a mean of 3.55 on the pre-test, and 4.00 on the post-test. On the pretest, 18 percent strongly disagreed with item 15, 37 percent disagreed, 18 percent agreed, and 27 percent were undecided. On the post-test, 27 percent strongly disagreed, 46 percent disagreed, and 27 percent were undecided.

Experienced students had a mean of 4.39 on the pre-test, and 4.27 on the post-test. On the pretest, 52 percent strongly disagreed with item 15, 36 percent disagreed, and 12 percent were undecided. On the post-test, 46 percent strongly disagreed, 42 percent disagreed, 3 percent agreed, and 9 percent were undecided.

TABLE 13

t-TEST RESULTS FOR THE ITEMS WHERE ATTITUDES OF EXPERIENCED STUDENTS DIFFERED SIGNIFICANTLY FROM THOSE OF INEXPERIENCED STUDENTS

Item	Experience	N	Mean Difference	SD	STD Error	<u>t</u>	DF	Probability Level
15	No	11	0.45	0.69	0.21	2.11	25.8	0.05*
	Yes	33	-0.12	1.02	0.18			
31	No	11	-0.55	0.69	0.21	3.95	20.6	0.00*
	Yes	33	0.45	0.83	0.14			

* $p < 0.05$ ($\bar{t} = 2.06$ with 26 degrees of freedom)
 ($\bar{t} = 2.08$ with 21 degrees of freedom)

The calculated t -value for item 15 was 2.11 ($p = 0.05$), which indicated that the mean difference was significant at the 0.05 level. The change in attitude toward trusting computers was greater for inexperienced users.

Item 31 (I am in favor of owning a computer.) showed a mean difference of -0.55 for inexperienced students, and 0.45 for experienced students.

Inexperienced students had a mean of 4.00 on the pre-test, and 3.45 on the post-test. On the pretest, 36 percent strongly agreed with item 31, 46 percent agreed, 9 percent strongly disagreed, and 9 percent were uncertain. On the post-test, 9 percent strongly agreed, 55 percent agreed, 9 percent strongly disagreed, 9 percent disagreed, and 18 percent were uncertain.

Experienced students had a mean of 4.06 on the pre-test, and 4.51 on the post-test. On the pretest, 40 percent strongly agreed with item 31, 36 percent agreed, 3 percent strongly disagreed, 3 percent disagreed, and 18 percent were uncertain. On the post-test, 58 percent strongly agreed, 36 percent agreed, and 6 percent were uncertain.

The calculated t -value for item 31 was 3.95 ($p = 0.00$), which indicated that the mean difference was significant at the 0.05 level. The overall attitude and the change in attitude toward owning a computer was high among experienced users.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The study was conducted to investigate college students' attitudes toward using personal computers. The study sought to determine whether there was a significant difference between the students' attitudes at the beginning and end of a computer class by age, sex, marital status, educational level, and experience.

To meet the purpose of the study, a questionnaire containing 40 statements about students' attitudes and perceptions about computers was developed and pretested. Three introductory computer classes were identified during the winter quarter of 1987 at the University of Tennessee in Knoxville. Forty-four students agreed to participate in the study both at the beginning and end of the quarter.

The data were collected, tabulated, and entered into the computer at the University of Tennessee using the Statistical Analysis System (SAS) package, and the Statistical Package for the Social Sciences (SPSS). The data were analyzed using t-tests to determine whether there was a significant change in students' attitudes.

Findings

1. There was no overall change in attitudes of students toward using personal computers between the beginning and end of the term. Further analysis of each item found that at the end of the quarter, 9 percent (4) more students felt learning to use computers would help them get good jobs. While most students reported wanting to learn to use the computer (post-test mean 4.09) a significant negative change in attitude was noted. Five percent fewer of them felt that it was the right time to learn how to use computers.

2. There was no change in the overall attitudes of older and younger students toward using personal computers.

3. There was no change in the overall attitudes of male and female students toward using personal computers. Further analysis of each item revealed, however, that at the end of the quarter, fewer female students felt that learning to use computers would help them get good jobs. More female students also felt that they were too old to learn about using computers.

4. There was no change in the overall attitudes of married and single students toward using personal computers. Analysis of each item indicated that at the end of the quarter, fewer single students were willing to take

more computer classes. Fewer single students also were proud of learning how to use computers.

5. There was no change in the overall attitudes of graduate and undergraduate students toward using personal computers. Further analysis of each item indicated, however, that at the end of the quarter, more undergraduate students felt that computers make life more complicated. Fewer graduate students reported that they would like to expand their knowledge of computers. More graduate students reported that they really did not want to learn to use computers, but they had to.

6. There was no change in the overall attitudes of students experienced in using computers and those who were not toward using personal computers. Further analysis of each item indicated that at the end of the quarter, more inexperienced and slightly fewer experienced students trusted computers, but more more experienced students favored owning computers.

Conclusions

1. An introductory computer course does not significantly change students' attitudes about using personal computers.

2. Older students are more aware of the need for learning to use computers.

3. The results of this study support the available research and literature in indicating that men are more positive in their attitudes toward computers than women.

4. Married students do not react any more negatively toward computers than single students. This was different from the results of other researchers.

Recommendations

1. A study should be conducted to identify effective strategies that instructors could use to alleviate anxieties and fear of computers.

2. A study should be conducted to compare students' and their instructors' attitudes toward computers.

3. A study should be conducted to compare the attitudes of a group of students taught by a female instructor with another group taught by a male instructor.

4. This study should be replicated with the post-test being given after all requirements for the course have been met and anxiety over final grades has subsided. Questions should be included to determine if students not wishing to take more classes feel the one class is sufficient for their objectives.

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APPENDIXES

APPENDIX A
PRETEST INSTRUMENT

"College Students' Attitudes Toward Computers"

The purpose of this study is to investigate the attitudes and perceptions of college students toward personal computers, to determine attitudinal differences by age, educational level, and sex on the way they feel about using personal computers.

Please respond to each item by circling the number which most typically is your belief as honestly and completely as possible. You are not required to include your name and your responses will be anonymous and kept confidential. Please respond to these items in general, not to a specific type of computer. Thank you for your help.

Example:

Computers are interesting. 1 2 3 4 5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I will enjoy using computers.	1	2	3	4	5
2. I will be using computers regardless of how difficult it is to use them.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. Computers make life more complicated.	1	2	3	4	5
4. Learning to use computers will help me get a good job.	1	2	3	4	5
5. I would like to expand my knowledge of computers.	1	2	3	4	5
6. I really don't want to learn how to use computers, but I have to.	1	2	3	4	5
7. I feel that now is the right time to learn how to use computers.	1	2	3	4	5
8. I feel confident about using computers.	1	2	3	4	5
9. I am planning to accept a job where I can use computers.	1	2	3	4	5
10. Using computers is a waste of time.	1	2	3	4	5
11. I am taking this class only because it was required.	1	2	3	4	5
12. I feel that I am too old to learn about using computers.	1	2	3	4	5
13. I force myself to learn how to use computers.	1	2	3	4	5

	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
14. This class will be a fun experience.	1	2	3	4	5
15. I don't trust computers.	1	2	3	4	5
16. I am afraid of making mistakes using computers.	1	2	3	4	5
17. I am willing to take more computer classes.	1	2	3	4	5
18. I am worried about using computers.	1	2	3	4	5
19. The more I use computers, the more I will like them.	1	2	3	4	5
20. I will encourage others to learn how to use computers.	1	2	3	4	5
21. I am planning to continue using computers in the future.	1	2	3	4	5
22. Using computers is boring.	1	2	3	4	5
23. I prefer learning by using a computer.	1	2	3	4	5
24. Computers are difficult to use.	1	2	3	4	5
25. Using computers will make me feel powerful.	1	2	3	4	5

	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
26. I feel that my future is threatened if I don't learn to use computers.	1	2	3	4	5
27. Anyone can learn to use computers.	1	2	3	4	5
28. I panic and feel nervous when I have to use computers.	1	2	3	4	5
29. I am proud of the fact that I am learning to use computers.	1	2	3	4	5
30. I feel helpless when I have to use a computer.	1	2	3	4	5
31. I am in favor of owning a computer.	1	2	3	4	5
32. I can't afford spending a lot of time learning about computers.	1	2	3	4	5
33. Learning to use computers will get me nowhere.	1	2	3	4	5
34. I fear computers because I don't like typing.	1	2	3	4	5
35. I am afraid of using computers.	1	2	3	4	5
36. In order to be successful in life, a person has to learn how to use computers.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
37. Learning to use computers is difficult for me.	1	2	3	4	5
38. I hate using computers.	1	2	3	4	5
39. I feel that I can do a lot of things using computers.	1	2	3	4	5
40. Computers are efficient and useful.	1	2	3	4	5

Demographic Information

Current age: _____ 28 years or under

_____ over 28 years

Sex: _____ Female

_____ Male

Marital Status: _____ Single

_____ Married

Enrollment: _____ Part-time

_____ Full-time

Educational Level: _____ Graduate

_____ Undergraduate

Degree currently working on (B.S., M.S., Ph.D., etc.):

Did you ever use a computer before taking this class?

_____ Yes

_____ No

Time of experience using computers:

_____ Month(s)

_____ Year(s)

Do you own a computer? _____ Yes

_____ No

Please feel free to include any additional comments about the study.

APPENDIX B
POST-TEST INSTRUMENT

"College Students' Attitudes Toward Computers"

The purpose of this study is to investigate the attitudes and perceptions of college students toward personal computers, to determine attitudinal differences by age, educational level, and sex on the way they feel about using personal computers.

Please respond to each item by circling the number which most typically is your belief as honestly and completely as possible. You are not required to include your name and your responses will be anonymous and kept confidential. Please respond to these items in general, not to a specific type of computer. Thank you for your help.

Example:

Computers are interesting. 1 2 3 4 5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I enjoy using computers.	1	2	3	4	5
2. I will be using computers regardless of how difficult it is to use them.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. Computers make life more complicated.	1	2	3	4	5
4. Learning to use computers will help me get a good job.	1	2	3	4	5
5. I would like to expand my knowledge of computers.	1	2	3	4	5
6. I really don't want to learn how to use computers, but I have to.	1	2	3	4	5
7. I feel that this was the right time to learn how to use a computer.	1	2	3	4	5
8. I feel confident about using computers.	1	2	3	4	5
9. I am planning to accept a job where I can use computers.	1	2	3	4	5
10. Using computers is a waste of time.	1	2	3	4	5
11. I only took this class because it was required.	1	2	3	4	5
12. I feel that I am too old to learn about using computers.	1	2	3	4	5
13. I force myself to learn how to use computers.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
14. This class was a fun experience.	1	2	3	4	5
15. I don't trust computers.	1	2	3	4	5
16. I am afraid of making mistakes using computers.	1	2	3	4	5
17. I am willing to take more computer classes.	1	2	3	4	5
18. I am still worried about using computers.	1	2	3	4	5
19. The more I use computers, the more I will like them.	1	2	3	4	5
20. I will encourage others to learn how to use computers.	1	2	3	4	5
21. I am planning to continue using computers in the future.	1	2	3	4	5
22. Using computers is boring.	1	2	3	4	5
23. I prefer learning by using a computer.	1	2	3	4	5
24. Computers are difficult to use.	1	2	3	4	5
25. Using computers will make me feel powerful.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
26. I feel that my future would have been threatened if I didn't learn to use computers.	1	2	3	4	5
27. Anyone can learn to use computers.	1	2	3	4	5
28. I panic and feel nervous when I have to use computers.	1	2	3	4	5
29. I am proud of the fact that I learned to use computers.	1	2	3	4	5
30. I feel helpless when I have to use a computer.	1	2	3	4	5
31. I am in favor of owning a computer.	1	2	3	4	5
32. I can't afford to spend a lot of time using computers.	1	2	3	4	5
33. Learning to use computers will get me nowhere.	1	2	3	4	5
34. I fear computers because I don't like typing.	1	2	3	4	5
35. I am afraid of using computers.	1	2	3	4	5
36. In order to be successful in life, a person has to learn how to use computers.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
37. Learning to use computers is difficult for me.	1	2	3	4	5
38. I hate using computers.	1	2	3	4	5
39. I feel that I can do a lot of things using computers.	1	2	3	4	5
40. Computers are efficient and useful.	1	2	3	4	5

APPENDIX C

RAW DATA

APPENDIX C

FREQUENCIES AND PERCENTAGES FOR STUDENTS' RESPONSES AT THE BEGINNING AND END OF THE QUARTER (N = 44)

Item	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
<u>Pretest</u>										
1	0	0	0	0	9	20.45	25	56.82	10	22.73
2	1	2.27	6	13.64	10	22.73	18	40.91	9	20.45
3	5	11.36	28	63.64	6	13.64	3	6.82	2	4.55
4	0	0	1	2.27	14	31.82	21	47.73	8	18.18
5	0	0	1	2.27	2	4.55	15	34.09	26	59.09
6	22	50.00	18	40.91	2	4.55	2	4.55	0	0
7	0	0	2	4.55	7	15.91	17	38.64	18	40.91
8	1	2.27	10	22.73	10	22.73	13	29.55	10	22.73
9	1	2.27	3	6.82	18	40.91	15	34.09	7	15.91
10	30	68.18	13	29.55	1	2.27	0	0	0	0
11	25	56.82	16	36.36	1	2.27	1	2.27	1	2.27
12	32	72.73	9	20.45	2	4.55	0	0	1	2.27
13	14	31.82	15	34.09	5	11.36	10	22.73	0	0
14	0	0	1	2.27	13	29.55	18	40.91	12	27.27
15	19	43.18	16	36.36	7	15.91	2	4.55	0	0
16	13	29.55	16	36.36	5	11.36	7	15.91	3	6.82
17	0	0	2	4.55	6	13.64	24	54.55	12	27.27
18	15	34.09	12	27.27	7	15.91	9	20.45	1	2.27
19	0	0	0	0	7	15.91	21	47.73	16	36.36
20	0	0	1	2.27	5	11.36	23	52.27	15	34.09
21	1	2.27	0	0	1	2.27	23	52.27	19	43.18

APPENDIX C (continued)

Item	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
22	16	36.36	23	52.27	3	6.82	2	4.55	0	0
23	1	2.27	8	18.18	18	40.91	10	22.73	7	15.91
24	7	15.91	20	45.45	11	25.00	6	13.64	0	0
25	4	9.09	17	38.64	13	29.55	10	22.73	0	0
26	2	4.55	10	22.73	9	20.45	18	40.91	5	11.36
27	1	2.27	6	13.64	5	11.36	27	61.36	5	11.36
28	10	22.73	20	45.45	6	13.64	7	15.91	1	2.27
29	0	0	1	2.27	7	15.91	26	59.09	10	22.73
30	12	27.27	21	47.73	6	13.64	5	11.36	0	0
31	2	4.55	1	2.27	7	15.91	17	38.64	17	38.64
32	8	18.18	22	50.00	8	18.18	6	13.64	0	0
33	19	43.18	24	54.55	1	2.27	0	0	0	0
34	20	45.45	18	40.91	4	9.09	2	4.55	0	0
35	16	36.36	22	50.00	3	6.82	3	6.82	0	0
36	3	6.82	19	43.18	14	31.82	7	15.91	1	2.27
37	7	15.91	22	50.00	11	25.00	4	9.09	0	0
38	22	50.00	16	36.36	4	9.09	1	2.27	1	2.27
39	0	0	0	0	5	11.36	28	63.64	11	25.00
40	0	0	0	0	2	4.55	21	47.73	21	47.73

APPENDIX C (continued)

Item	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
<u>Post-test</u>										
1	0	0	1	2.27	5	11.36	23	52.27	15	34.09
2	0	0	2	4.55	12	27.27	19	43.18	11	25.00
3	7	15.91	29	65.91	4	9.09	4	9.09	0	0
4	2	4.55	3	6.82	18	40.91	15	34.09	6	13.64
5	1	2.27	1	2.27	3	6.82	21	47.73	18	40.91
6	19	43.18	15	34.09	6	13.64	3	6.82	1	2.27
7	1	2.27	3	6.82	5	11.36	29	65.91	6	13.64
8	2	4.55	6	13.64	9	20.45	19	43.18	8	18.18
9	3	6.82	5	11.36	17	38.64	14	31.82	5	11.36
10	25	56.82	17	38.64	1	2.27	0	0	1	2.27
11	18	40.91	25	56.82	0	0	0	0	1	2.27
12	27	61.36	13	29.55	2	4.55	2	4.55	0	0
13	11	25.00	13	29.55	10	22.73	10	22.73	0	0
14	1	2.27	4	9.09	8	18.18	19	43.18	12	27.27
15	18	40.91	19	43.18	6	13.64	0	0	1	2.27
16	14	31.82	16	36.36	9	20.45	4	9.09	1	2.27
17	1	2.27	4	9.09	4	9.09	19	43.18	16	36.36
18	8	18.18	17	38.64	13	29.55	5	11.36	1	2.27
19	0	0	1	2.27	8	18.18	22	50.00	13	29.55
20	0	0	0	0	7	15.91	23	52.27	14	31.82
21	0	0	0	0	3	6.82	25	56.82	16	36.36
22	17	38.64	21	47.73	6	13.64	0	0	0	0
23	1	2.27	10	22.73	19	43.18	10	22.73	4	9.09
24	7	15.91	19	43.18	10	22.73	6	13.64	2	4.55

APPENDIX C (continued)

Item	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
25	4	9.09	15	34.09	14	31.82	11	25.00	0	0
26	5	11.36	11	25.00	10	22.73	14	31.82	4	9.09
27	0	0	5	11.36	9	20.45	23	52.27	7	15.91
28	13	29.55	16	36.36	10	22.73	5	11.36	0	0
29	0	0	1	2.27	13	29.55	19	43.18	11	25.00
30	12	27.27	24	54.55	4	9.09	4	9.09	0	0
31	1	2.27	1	2.27	4	9.09	18	40.91	20	45.45
32	8	18.18	19	43.18	6	13.64	9	20.45	2	4.55
33	18	40.91	23	52.27	3	6.82	0	0	0	0
34	22	50.00	16	36.36	6	13.64	0	0	0	0
35	22	50.00	17	38.64	5	11.36	0	0	0	0
36	5	11.36	14	31.82	15	34.09	10	22.73	0	0
37	9	20.45	14	31.82	10	22.73	10	22.73	1	2.27
38	22	50.00	15	34.09	6	13.64	0	0	1	2.27
39	1	2.27	2	4.55	3	6.82	24	54.55	14	31.82
40	0	0	0	0	1	2.27	23	52.27	20	45.45

APPENDIX D

MEAN AND STANDARD DEVIATION FOR EACH ITEM

OF BOTH THE PRETEST AND POST-TEST DATA

APPENDIX D

MEANS AND STANDARD DEVIATION FOR EACH ITEM ON THE
ATTITUDE QUESTIONNAIRE OF BOTH THE PRETEST AND POST-TEST

Item	Pretest		Post-test	
	$\bar{X}$	SD	$\bar{X}$	SD
1	4.02	0.66	4.18	0.72
2	3.64	1.04	3.89	0.84
3	3.70	0.93	3.89	0.78
4	3.82	0.76	3.45	0.98
5	4.50	0.70	4.23	0.86
6	4.36	0.78	4.09	1.03
7	4.16	0.86	3.82	0.84
8	3.48	1.15	3.57	1.09
9	3.55	0.93	3.30	1.05
10	4.66	0.53	4.48	0.76
11	4.43	0.85	4.34	0.71
12	4.61	0.78	4.48	0.79
13	3.75	1.14	3.57	1.11
14	3.93	0.82	3.84	1.01
15	4.18	0.87	4.20	0.85
16	3.66	1.26	3.86	1.05
17	4.05	0.78	4.02	1.02
18	3.70	1.21	3.59	1.00
19	4.20	0.70	4.07	0.76
20	4.18	0.72	4.16	0.68
21	4.34	0.75	4.30	0.59
22	4.20	0.76	4.25	0.69
23	3.32	1.03	3.14	0.95
24	3.64	0.92	3.52	1.07
25	2.66	0.94	2.73	0.95
26	3.32	1.09	3.02	1.19
27	3.66	0.94	3.73	0.87
28	3.70	1.07	3.84	0.99
29	4.02	0.70	3.91	0.80
30	3.91	0.94	4.00	0.86
31	4.05	1.03	4.25	0.89
32	3.73	0.92	3.50	1.15
33	4.41	0.54	4.34	0.61
34	4.27	0.82	4.36	0.72
35	4.16	0.83	4.37	0.69
36	2.64	0.92	2.68	0.96
37	3.73	0.85	3.45	1.13
38	4.30	0.90	4.30	0.88
39	4.14	0.59	4.09	0.88
40	4.43	0.59	4.43	0.55

VITA

Saeed T. Molla was born in Al-Baha, Saudi Arabia on September 29, 1958. He graduated from Sarwat High School in Saudi Arabia in 1977. He entered the Intensive English Language program at Temple University in Philadelphia, Pennsylvania. He attended the Community College of Allegheny County in Pittsburgh, Pennsylvania from 1979 to 1981.

He moved to Terre Haute, Indiana and while there earned a Bachelor of Science degree in 1983, and a Master of Science degree in 1984 from the Indiana State University.

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