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An investigation of the effects of attitudes toward computers, locus-of-control, computer experience, and profile characteristics on adult computer utilization

Roseboro, Barbara Ann, Ph.D.

Wayne State University, 1992

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AN INVESTIGATION OF THE EFFECTS OF ATTITUDES TOWARD COMPUTERS, LOCUS OF CONTROL, COMPUTER EXPERIENCE, AND PROFILE CHARACTERISTICS ON ADULT COMPUTER UTILIZATION

by

BARBARA ANN ROSEBORO

DISSERTATION

Submitted to the Graduate School

of Wayne State University

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

1992

MAJOR: INSTRUCTIONAL TECHNOLOGY

Approved by:

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DEDICATION

This work is dedicated, in part, to the memory of my father, Charlie Roseboro, who always made me feel "special." It is also dedicated, in part, to my mother, Elease Roseboro who has so often gone without so that I could pursue my dreams.

Lastly, it is dedicated to my son, Kyle. I hope that my endurance in completing this endeavor will motivate him to continue his education. I wish to encourage him to follow his dreams and to be the "best" that he can be.

ACKNOWLEDGEMENTS

A challenge of this nature is an undertaking of immense magnitude. It was not possible to complete this venture alone. Many patient, tolerant, and supportive people must be acknowledged as having contributed to the completion of this goal.

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A special note of thanks to my "adopted" parents, Solomon and Sylvia Knight. Their words of encouragement and their heartfelt warmness have been a constant source of motivation and spiritual guidance.

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Last, and most importantly, to the one who has been with me through it all, my son, Kyle. From age 11 when I received my undergraduate degree, until now at the age of 22, Kyle has endured the pain and agony of my defeats as well as the joys of my accomplishments. He never failed to be supportive, encouraging and proud of Mom.

B.A.R.

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CHAPTER I

PROBLEM STATEMENT

Introduction

Few technologies have captured society as rapidly and overwhelmingly as the computer. Like television, automobiles, telephones, and automation, computers are here to stay. Because this technology is revolutionizing the way people live, work, and think, it affects most individuals in one way or another (Carl, Carl, & Greathouse, 1986; Turner, 1988; Cross, 1981). The use of computers in work places, computerized instruction in schools, and the demand for the development of computer literacy in other aspects of society present many challenges.

Because of the widespread use of computer technology, it has become an important task of adult educators to develop a perspective about its role in education, as well as its influence on adult learners (Imel, 1988). The issues concerning the presentation of this technology may be complicated by the special needs of many adults. Research indicates that the novelty and technological aspects of a new subject matter, and the changing methods of instruction like that of computers, frequently create problems for the adult learner (Knox, 1977; Cross, 1981; Gressard & Loyd, 1985; Loyd & Gressard, 1986; Lewis, 1988). Often, in a

quest to become computer literate and embrace this technology, adults must perform tasks that are unrelated to their previous experiences.

Additionally, many individuals are not successful when working with computers. They already know what they do best and have developed and perfected skills in performing tasks in other ways. They do not like to give up a successful behavior for one that is untried. In turn, they may view the use of a computer as a frustrating obstacle (Ewing, Ewing, London & Ramierz-Ponce, 1986).

Knox (1986) points out that many adults prefer to relate the task or subject they are learning to real life circumstances. For example, secretaries and other office workers must understand the utility of word processing; administrators and managers must be convinced that computers will streamline their work efforts, as well as assist them in carrying out their present tasks (Barnes, 1986). Likewise, college students will need to view computer literacy as a marketable job skill to be used in employment after graduation (Malaney & Thurman, 1989; Campbell & Williams, 1990).

Background

With the expansion of computer technology, it is important to prepare individuals for entry and success in our increasingly computerized society. Therefore, factors that impact decisions regarding engagement and persistence

in the study and use of computers should be explored (Campbell & Williams, 1990). One factor that should be considered is attitudes toward computers. Research indicates that attitudes affect interest (Hannafin & Cole, 1983; Romiszowski, 1981, 1989). Cross (1981) suggests that persons who lack confidence in their own abilities avoid situations which might present a threat to their sense of self-esteem. And, because attitudes play such an important role in adult learning (Wlodkowski, 1985), the success or extent to which adults use computers may be largely dependent upon their attitudes toward this technology.

Secondly, computer usage may be influenced by the user's perception of either being in or out of control of the computer-related situation. Research indicates that negative or positive perceptions regarding success and failure in learning environments are functions of feeling in or out of control of the situation (Agarwal & Misra, 1986; Chaudary, 1986; Schwarzer, 1986). Research also indicates that the person who believes actions can influence outcomes is more likely to act upon the environment than the person who believes his or her actions have no effect on outcomes (Rotter, 1954). Additionally, it is reported that under many circumstances people who believe events are controlled by forces outside their control will be high in their anxiety and low in their anticipation of positive outcomes (Atkinson, & Feather 1966; Brockner, 1985).

Social learning theory suggests that an individual's reinforcement responses in the past will influence his or her perception of education objects (technology-related or not) and expectations of success within a given educational environment (Louie, 1985). It is expected that this perception will vary in degree from person to person. Agarwal and Misa (1986) report that individuals make internal attributions for their own positive behaviors and external attributions for their own negative behaviors.

It becomes the responsibility of educators, therefore, to help computer users see themselves as the cause of their own successes with computer technology. Hence, it is also logical to consider users' locus of control as a factor in the design, development, and implementation of computer-related programs.

Thirdly, the factors of age, gender, and educational attainment may also be related to success with computers. Age may be a significant factor because of the developmental and socialization characteristics of the different age groups that will utilize computer technology. Gender should be addressed because of earlier research that reports that females are more likely than males to exhibit computer anxiety (Loyd & Gressard, 1984b). Additionally, the educational level of computer users should be considered in order to determine the effect this factor has on the overall utilization of computer technology. Research indicates that individuals who are better educated will respond more

positively to computers (Morris, 1988).

A fourth area which should be considered is computer experience and its impact on the utilization of computers. The amount of experience with computers is expected to be a significant factor in computer attitudes because anxiety is a product, in part, of one's lack of familiarity with the computer (Loyd & Gressard, 1984a, 1984b). Therefore, individuals need to become familiar with computers in order to become successful users. Educators must take these factors into consideration when designing programs to acquaint individuals with computer technology. Because of the various options open to adults, they tend to select programs that meet their various needs and circumstances (Cross, 1981). Therefore, the designers of computer-related programs have a twofold task: to make the computers relevant to the needs of the users; and, to determine which conditions promote positive responses to the utilization of this technology.

Purpose of the Study

The purpose of this study was to determine which factors explain differences in the attitudes toward computers and the utilization of computers by adults. The specific questions that were investigated are:

1. What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitudes will include:

a. computer anxiety

b. computer confidence

c. computer liking

d. computer usefulness

2. What is the relationship between locus of control and change in attitudes toward computers?

3. What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include:

a. age

b. gender

c. educational level

d. admission status

4. What is the relationship between selected profile characteristics and change in attitudes toward computers?

5. What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experience will include:

a. computer games experience

b. word processing experience

c. programming experience

d. electronic communications, such as $Message system on MTS

e. special computer applications, such as income tax preparation, desk top publishing, and database graphics

6. What is the relationship between prior computer experience and change in attitudes toward computers?
7. What is the relationship between selected profile characteristics and post-instruction computer utilization? Such utilization will include:
   a. Computer Science 100 course work only
   b. enrollment in additional computer-related courses or programs
   c. utilization in areas such as work and personal projects
   d. No subsequent computer utilization after this course
8. What are the patterns of relationships between locus of control, post-instruction attitudes toward computers, prior computer experience and post-instruction computer utilization of adults of diverse age categories?

Definition of Terms

The terms and their meaning used in this study are the following:

Adult Learner - An individual performing social roles typically assigned by our culture to those it considers adult; an individual who perceives himself or herself to be essentially responsible for her or his own life (Knowles, 1980).

Attitude - An individual's feeling, position, orientation,

or opinion toward a topic, subject, or event (Carl, Carl, & Greathouse, 1986).

Computer Anxiety - A feeling of uneasiness, apprehension, or fear of computers (Gressard & Loyd, 1985).

Computer Attitude Scale - A Likert-type instrument consisting of 40 items which present positively and negatively worded statements of attitudes toward the use of computers (Gressard & Loyd, 1985, Loyd & Gressard, 1986).

Computer Confidence - A belief in the ability to use or learn about computers (Gressard & Loyd, 1985).

Computer Experience - The amount and/or level of exposure to learning about and using computers (Koohang, 1986).

Computer Liking - A fondness or pleasure of computers or enjoying working with computers (Gressard & Loyd, 1985).

Computer Literacy - A basic knowledge of how computers work and of common computer terminology. Ability to use the computer and appropriate software. An awareness of when and how computers may be used in the academic disciplines and various fields of work, as well as daily life. Some understanding of the problems and issues confronting individuals and society, generally in the use of computers, including social and economic effect of computers and ethics involved in their use (Spresser, 1986).

Computer Usefulness - The perception of computers as helpful in one's future work (Gressard & Loyd, 1986).

Computer Utilization - Subsequent use and/or implementation of computers after engaging in activities to use or learn about them (Trayer, 1988).

Fully-admitted Student - For the purpose of this study a fully-admitted Wayne State University student is an individual who has been granted admission to the University and who has satisfied all of the admission criteria.

Locus of Control - The difference in expectancies of being able to control the events in one's life. Internal locus of control is perceived success resulting from personal effort. External locus of control is perceived success by forces other than self (Schwarzer, 1986; Long, 1983; Rotter, 1954; Gardner & Cole, 1986).

Non-matriculated Student - For the purpose of this study, a non-matriculated student is an individual who is either enrolled in undergraduate or graduate courses offered by the College of Lifelong Learning, Wayne State University, and who either does not meet admission criteria, or has not applied for admission.

Perception of Ability - The way in which an individual views the reasons for actual or potential successes and failures (Campbell & Williams, 1990; Hayamizu & Weiner, 1991).

Significance of the Study

Preparing individuals for their future roles in our society is an important goal of educators. As the innovations of computer technology become more and more a part of our daily lives, educators are being called upon to design educational systems to integrate this technology into the classrooms of our schools, colleges, universities, and training environments.

The issue of computer utilization has become increasingly important in the business and industry sectors of our society. Individuals who work in these areas have a need for more and better information. The rapid changes associated with this technology have had a tremendous impact on job duties and work procedures. As a result, workers need to acquire skills in areas such as electronic mail, word processing, electronic filing systems, telecommunications, and networking. They also need to have practical knowledge of how to use the technology required to obtain this information.

Because the emphasis today is on total office automation, executives and managers have the dual responsibility of becoming computer literate as well as directing staff in the use of computers and computerized management systems. Educators are being called upon to design and develop programs that incorporate the flexibility and adaptability needed to orchestrate these systems (Barnes, 1986). Therefore, factors that may affect this

utilization, should be explored.

It is anticipated that an investigation of the effects of attitudes, locus of control, profile characteristics and prior computer experience on the utilization of computer technology will create new knowledge to the fields of education and training. Professionals in these fields should be able to use this knowledge to maximize the utilization of this innovative technology.

Summary

This chapter highlighted many problems confronted by the overwhelming effects of computer technology. It provided an introduction to the factors that may influence the utilization of this innovation. Answering the stated research questions was an attempt to further identify these factors and to provide additional evidence of the role they may play in adult computer utilization. The next chapter will focus on the theoretical framework for this study.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The review of related literature is divided into the following five sections: attitudes toward computers, locus of control, computer experience, profile characteristics and computer utilization.

Attitudes Toward Computers

For over a decade, researchers have been concerned with factors which may have a negative affect on the success or extent of computer technology. Attitudes toward computers have been the primary focus of many investigations. The importance of assessing attitudes has prompted several researchers to design, develop, and validate instruments to measure the attitudes of users of this technology (D'Souza & Smith, 1985; Swadener & Hannafin, 1987; Loyd & Gressard, 1984a, 1984b; Gressard & Loyd, 1985; Koohang, 1986; Cambre & Cook, 1987). The literature reveals that researchers are concerned with four major categories of attitudes toward computers. The four categories are: computer anxiety, computer confidence, computer liking, and computer usefulness.

Computer Anxiety

Research indicates that computer anxiety, a fear or feeling of uneasiness of computers, is an attitude that many computer users exhibit to some degree in their attempts to master skills (Loyd & Gressard, 1984a, 1984b, 1986; Koohang, 1986, 1989; Koohang & Byrd, 1987; Honeyman & White, 1987; Lewis, 1988; Lambert & Lenthall, 1989; Stone et al., 1989; Cambre & Cook, 1987). These studies indicate that users who lack experience and familiarity with computers may exhibit a great deal of anxiety in their attempts to learn about or use computers. Koohang (1986) suggests that in order to reduce computer anxiety, programs and courses that are designed to provide first-time exposure to computers need to incorporate ways of identifying individuals who tend to be anxious about interacting with computers. It is suggested that if this is done, pleasurable and non-threatening experiences can be provided, hence, diminishing or lessening the potential anxiety toward learning about and using computers (Koohang, 1986).

Historically, computers have been associated with mathematics (Spresser, 1986). Because of this association, Gressard and Loyd (1987) suggest that individuals who experience computer anxiety may also be adversely affected by math anxiety. This notion was confirmed in an investigation of the effects of math anxiety and computer attitudes (Gressard & Loyd, 1987). The findings reveal that math anxiety is positively related to computer anxiety.

Because of this relationship, the investigators suggest that factors other than fear of computers might be attributed to computer anxiety. It is further suggested that the results from math anxiety studies may also reveal these computer-related factors.

Computer Confidence

Research indicates that an individual's ability, or perception of his or her ability, influences his or her attitude toward computers and computer usage. Payne (1983) investigated home economics teachers' levels of confidence related to computer usage. The findings reveal that the experience received from participating in an in-service computer training program significantly increased the confidence levels of the participants. Later studies support these findings where the familiarity and experience with computers gained by participating in computer-related programs either increased the perception of the ability, or the actual ability to use computers. For example, Loyd and Gressard (1984b) investigated the confidence levels of high school and college students. Their findings report significant increases in confidence after students gained familiarity with using computers. Subsequent studies by these investigators substantiate these findings (Gressard & Loyd, 1987; Loyd & Gressard, 1986).

Koohang and Byrd (1987) report similar findings in their investigation of confidence toward using a computerized library information system where the participants

demonstrated a significant increase in confidence after using the system. Further research in a similar area investigated the confidence levels of individuals who also used a computer based information system (CBIS). The findings also reveal that after experience and involvement, computer confidence increased. Additional studies also report significant increases in confidence toward computers after individuals were provided opportunities to use computers or computerized information systems (Kay, 1989a; Stone et al., 1989; Keller & Klein, 1990).

Computer Liking

Computer liking is another attitude that has been explored by investigators. Research indicates that the enjoyment of working with computers increases when opportunities to learn about and use computers are provided. Loyd and Gressard (1984b) studied the attitudes of high school and college students. Their findings reveal that experience with computers significantly increases computer enjoyment. Later investigations by Gressard and Loyd (1985, 1987) further support their earlier findings.

Koohang (1986) reports similar findings in an investigation of factors influencing computer liking of users of a computerized library information system. Computer involvement and experience were found to relate significantly to computer liking. Koohang (1989) later reports that students with more experience expressed a more positive attitude toward enjoyment of computers. Later

investigations continue to provide evidence that enjoyment of using computers is greatly enhanced by involvement and experience with computers (Honeyman & White 1987; Koohang & Byrd, 1987; Stone et al., 1989).

Computer Usefulness

Research indicates that the utilization of computer technology may be dependent on the user's perception of its usefulness (Loyd & Gressard, 1986; Koohang, 1987, 1989). It is reported that if individuals are provided opportunities to learn about and use computers, they will more readily use computers in their future work (Loyd & Gressard,1986). It is further suggested that if these experiences are positive, computers will also be viewed as useful, time saving tools (Koohang, 1987, 1989).

Research in the area of health care also explored attitudes toward the usefulness of computers (Carl, Carl & Greathouse, 1986). These findings indicate that, in general, health care workers view computer technology as a useful medium that will enable them to accomplish their tasks more efficiently. The findings also suggest that the nurses, nursing faculty, and student nurses who participated in the study, viewed the computerization process in health care as a tool that will have an overall positive affect on workers, as well as patients (Carl et al., 1986).

A review of the literature reveals that researchers are concerned with the effects that attitudes have on the utilization of computers. Extensive research has been

employed in this area. Few studies, however, have grouped attitudes with other factors that may affect computer usage. Further research is needed to investigate the relationships of attitudes and other factors that may predict computer behavior.

Locus of Control

According to social learning theory, an individual's reinforcement responses in the past will influence his or her perception of objects and their expectations of success within given environments (Louie, 1985). Rotter (1966) defines this perception as internal and external locus of control. He defines internal locus of control as perceived success resulting from personal effort. External locus of control, on the other hand, is perceived success by forces other than self. These forces are, therefore, attributed to luck, fate, chance, or being under the control of powerful others.

Weiner (1986) defines this perception as "perception of ability." He reports that to whatever persons attribute their own outcomes determines their expectancies, emotions, and motivations. It is suggested that it is the properties or characteristics of perceived causes that determines expectation, affect, and motivation. Three properties have been identified: locus, stability, and controllability. Like Rotter (1966), Weiner (1986) also defines locus in terms of internal and external. Stability, he explains, designates

causes as constant or varying over time. He defines controllability as personal responsibility or whether a cause is subject to one's own volitional influences.

Several studies have investigated computer users' perception of the degree of control they feel they have over computers (Coovert & Goldstein, 1980; Kerber, 1982; Louie, 1985; Kay, 1989a, 1989b; Campbell & Williams, 1990; Hawk, 1989). Presumably, individuals who perceive successful computer usage as contingent upon their own behavior (internals) will feel more in control in a computer-related situation than those who feel these successful events are a result of luck, chance, or some other force (externals).

Coovert and Goldstein (1980) report that individuals with internally controlled beliefs are more likely to view computers as beneficial tools that can help people than are individuals who are externally controlled. They suggest that locus of control measures be employed to identify individuals who are suited to working with computers when filling positions requiring computer use. Hawk (1989), on the other hand, reports that the relationship between locus of control and computer attitudes found by Coovert and Goldstein (1980) does not generalize to the context of information systems used in work environments. The study indicates that at the onset of using these systems, there were no significant differences between the attitudes of "internals" and "externals." It is pointed out, however, that when degree of user involvement is considered,

differences do emerge; the attitudes of internally controlled individuals were significantly more positive (Hawk, 1989). In an earlier study (Kerber, 1982) suggests that involvement with computers and perceptions about the ability to use them correlated significantly with attitudes only toward specific applications. The findings further indicate that locus of control and attitudes toward computers, in general, are not related.

As previously indicated, however, locus of control is an acknowledged factor that influences computer behavior. The literature consisting of research related to the influence of this factor on computer technology and its utilization is sparse. More evidence, therefore, should be provided to identify factors that may affect the users' perception of this technology. Further research is needed to investigate these factors.

Computer Experience

Research has clearly indicated that experience with computer technology significantly influences computer behavior. A search of the literature indicates that computer experience is a key factor to consider when assessing computer attitudes, perceptions, and other computer-related behavior. Loyd and Gressard (1984b) investigated high school and college students enrolled in language arts and mathematics courses. Their findings reveal that more positive computer attitudes correspond with greater amounts

of computer experience. Subsequent studies by these investigators support their earlier findings (Gressard & Loyd, 1985; Loyd & Gressard, 1986).

Koohang and Byrd (1987) investigated the effects of prior computer experience on the attitudes toward computers of students. Several levels of prior computer experience were explored: 1 week to 3 months; 3 months to 6 months; and, 6 months and over. Students with the greatest amount of prior experience had significantly more positive attitudes toward computers, computer usage, and computer usefulness. These findings support an earlier study by Koohang (1986).

Hertsgaard, Baumler, and Beyer (1985) explored the effects of computer experience and attitudes toward computers of faculty enrolled in a two week computer workshop that had been designed to increase computer literacy. This investigation reveals significant differences between pre- and post-attitudes of the participants; post-attitudes were significantly more positive than pre-workshop attitudes. Chapline and Turkel (1986) report similar findings in an investigation of the pre- and post-instruction attitudes of pre-service teachers. After participating in an introductory computer course, the subjects' anxiety toward computers and computer use significantly decreased. Helms (1987) reports similar findings in a study of the effect of post-instruction computer experience on the computer attitudes of college

faculty. Sullivan (1989) and Koohang (1989) provide additional support that, in general, computer experience significantly increases positive attitudes toward computers.

It can be concluded from the literature that research related to computer experience acknowledges that it is a major factor that influences attitudes toward computers and other computer behavior. Further research is needed to to delineate possible computer experiences which promote positive attitudes.

Profile Characteristics

Personal demographics are valid predictors of attitudes (Cross, 1981; Wlodkowski, 1985). Attitudes toward computers and the subsequent utilization of this technology may also be associated with various personal characteristics. This section will discuss the following profile characteristics: age, gender, and educational level.

Age

A review of the literature on age and computer related behavior indicates that researchers are concerned with this factor. Loyd and Gressard (1984b) investigated the effects of age on attitudes toward computers of junior high, high school, and college students between the ages of 13 to 21 years and older. The subjects were grouped into the following age ranges: 13-15; 16-18; 19-20; over 21. Their findings reveal that the main effect of age was statistically significant only for computer liking. Subjects

in the 13-15 age range displayed a higher degree of liking toward computers. This, however, was attributed to this group's probable prior experience with video games.

Cambre and Cook (1987) also investigated the attitudes of individuals who represented a wide range of ages. The subjects, ranging in ages from 9 to 75 years, were enrolled in a community introductory computer program. The findings from this one-week program reveal that, in general, adults appear to be more fearful about the use of computers than do children and teenagers. Cross (1981) attributes the fear adults experience in these environments reveals certain socialized perceptions about participations in educational programs at various life stages. It is pointed out that in many instances adults feel they are too old to learn new ideas or methods. Morris (1988) and Flynn (1988) also suggest that age relates significantly to the attitudes of older adults. They report that when provided with the opportunities to use and learn about computers, however, older people can become satisfied, enthusiastic computer users.

Gressard and Loyd (1985) explored the effects of age on the attitudes toward computers of teachers who were enrolled in a staff development program. The ages of the teachers ranged from 22 to 51 and over. Age, in this instance, was not found to be a contributing factor to the subjects' attitudes toward computers. Koohang (1986) reports similar findings in an investigation of the effects of age on the

attitudes toward computers of undergraduate and graduate students. Ages of the students ranged from 20 to 30 years and above. Both investigations indicate that anxiety towards, confidence with, and liking of computers were not determined by the age of the subjects.

A search of the literature reveals that age is a factor that is considered in investigations of computer behavior. Even though the older adult population is returning to educational settings in growing proportions, the literature does not reveal whether or not this population will make effective use of computer technology. Further research is needed to investigate the factors that may promote computer utilization of diverse age groups.

Gender

Studies indicate that researchers are concerned with the influence gender has on attitudes toward computers and computer usage. Loyd and Gressard (1984b) examined the effects of gender on attitudes toward computers of high school and college students. The findings indicate no significant relationship between gender groups and computer attitudes. A later study investigated a similar population and supports these findings (Gressard & Loyd, 1987). Koohang (1986) investigated the effects of gender on attitudes toward a library computer system. This research reports that gender does not have a significant affect on computer attitudes. Likewise, Kay's (1989a) exploration of the effects of gender differences on the computer behavior of

student teachers also reveals that gender does not have a significant affect on attitudes toward computers.

In contrast, however, Loyd and Gressard (1986) investigated the effects of gender on the computer behavior of elementary, junior high, and high school teachers. Unlike the findings of their earlier research (Loyd & Gressard, 1984b), a difference in the attitudes toward computers of males and females is shown to be statistically significant; male subjects had a more positive attitude than did females. Loyd and Gressard (1986) suggest that these differences are due to the older and broader age range of the subjects of this later investigation.

Cambre and Cook (1987) assessed the computer attitudes of males and females of varying ages who were voluntarily enrolled in a week-long computer orientation program. The findings indicate that females more often "describe" themselves as computer anxious than do males. Temple and Lip (1989) report similar findings in an investigation of gender differences and similarities of attitudes toward computers. The researchers suggest that females respond more positively than males when assessing the ability and potential of females in general as computer users, but that females view themselves as less comfortable, confident, and competent with computers than do males. The findings further indicated that females often describe themselves as having negative attitudes because of uncertainty of their own abilities (Temple & Lips, 1989).

Smith (1989) suggests, however, that even when the computer related abilities of males and females are measurably the same, males use computers more often than females. Fish, Gross and Sanders (1986) suggest that the only way society can bridge this gender gap is to develop educational systems that incorporate strategies that promote equity. In their investigation of the effect of equity strategies on the computer usage of girls, the findings reveal that with interventions that encouraged computer usage, females used the computer more significantly than males did.

The research related to the effects of gender on computer attitudes and computer usage clearly indicates that gender is a factor that concerns investigators. Much of the available research focuses on selected attitudes. More research is needed to investigate gender as it relates to other aspects of computer behavior.

Educational Level

Researchers are also concerned with educational level and its effect on computer attitudes, other computer behavior and overall computer usage. Diem (1986) investigated the socioenvironmental impacts of computer technology in an elementary school, a secondary education special education setting, and a introductory adult literacy program. The comparisons reveal that students at all observed educational levels had little, if any, trouble incorporating computer technology within their own

sociocultural structure, even if a student had not previously used the technology. The investigator further reports that younger students had an easier time adjusting to computer technology, but only in terms of following initial instructions. After the subjects became familiar with the system, no problems at any educational level were observed.

Koohang (1986) also investigated educational levels in a study of the effects of age, gender, college status, and computer experience. The findings of this research reveal that college status does not make a significant difference in terms of attitudes toward computers. There were indications, however, that graduate students showed a lesser degree of anxiety and a higher confidence with, and liking of computers than did undergraduates.

Morris (1988) also researched educational levels by investigating the effects of age, education, gender, and household income on attitudes toward computers. Four educational levels were considered: less than high school, high school graduate, some college, and college graduate. The findings reveal that years of education relate significantly to attitudes toward computers. It is suggested that education is more likely to have an effect on attitudes toward computers regardless of age; those who are better educated will more likely be favorably disposed to computer technology.

Because research suggests that educational level is a factor that may influence computer attitudes and subsequent

computer usage, further research is needed to expand the knowledge in this area.

Computer Utilization

The concern for the utilization of computer technology prompted several studies. D'Souza and Smith (1985) investigated the influence of microcomputer inservice activities and their implications on vocational teachers' perceptions of microcomputer use in the education process. The findings reveal a statistically significant change in the attitudes toward computer use of vocational teachers. There are also indications that microcomputer inservice workshops may be the link that vocational teachers need in order to develop a solid bases for incorporating microcomputer activities in the classroom. It is suggested that inservice workshops are a viable means of influencing vocational teachers to utilize microcomputers in education.

Hertsgaard, Baumler, and Beyer (1985) report an increase in computer usage as a result of participation in a microcomputer literacy project. The project involved a two week introductory microcomputer workshop, a developmental phase, a wrap-up workshop, a testing phase, and a series of campus presentations. Thirty faculty participated in the project. There is evidence that the thirty faculty continue to use microcomputers in their classes; many have expanded their usage as they develop more materials. It is suggested that the thirty participants

will eventually become a resource and support group for the rest of the campus as additional faculty expand their use of computers in their classrooms. This project underscores the value of providing computer instruction to educators in environments where computers are being introduced in order to enhance the instructional process (Gressard & Loyd, 1985).

A similar investigation examined affective variables prior to and after pre-service teacher participation in a brief computer literacy program (Chapline & Turkel, 1986). The study was designed to determine whether brief exposure to computers can be useful in facilitating positive attitudes; whether participants use what they have learned; and, whether their attitudes remained positive over time. The subjects were 73 female elementary teacher education students who had completed their basic course requirements, were currently student teaching and chose the computer course as an elective. Results from this study, reported in follow-up data, reveal that half of the follow-up group were using computers with children and half were not. The half that was not using computers cited insufficient hardware or software, a school policy of using computers only with the upper elementary grades, and similar reasons for not continuing to use computers. Overall, however, there are indications that the attitudes toward computers expressed during the follow-up interviews were positive, and that most of the subjects indicated their desire to use

computers more frequently. Additionally, several students registered for subsequent courses after this initial course experience. Helms (1987) also reports that participation in a computer workshop contributed to positive attitudes toward computers as well as an increase in computer usage.

A review of the literature consisting of research related to computer utilization indicates that it is an area of primary concern. Further research is needed to provide additional knowledge of how to maximize the utilization of computer technology.

Summary

This chapter provided the theoretical framework for this investigation. It discussed the literature and research findings in relation to attitudes toward computers, locus of control, profile characteristics, and prior computer experience on the computer utilization of adults. The next chapter will focus on the methodology of the study.

CHAPTER III

METHODOLOGY

Introduction

This study investigated factors which may affect the utilization of computers by adults. This chapter will include a description of the population and the sample, the data collection procedures/instrumentation, the data analysis, and the limitations of the study.

Population and Sample

The population for this study consisted of Wayne State University students enrolled in four Computer Science 100 (CSC-100) introductory Computer Science courses which were scheduled during the Fall, 1991 semester.

Wayne State University, located in the center of metropolitan Detroit, Michigan is a commuter institution. The University offers morning, afternoon, evening, weekday, and Saturday classes. The classes are offered on main campus and at seven extension centers. Two of the centers are located in the City of Detroit; five are located in outlying suburban areas.

Students who take classes on campus are fully matriculated. Extension centers, on the other hand, because of the "open door" policy that governs them, offer classes

to matriculated as well as non-matriculated students.

The population for this study, therefore, was comprised of 196 matriculated and non-matriculated students enrolled in introductory Computer Science courses at Wayne State University. The sample size for this population, as determined by using the process developed by Krejcie and Morgan (1970) is 132.

The sample was made up of students enrolled in Computer Science 100 (CSC-100) during the Fall, 1991 semester. CSC-100 is described as a survey of computer science on the elementary level. The course content is comprised of the following: analysis, structured algorithm development and programming, and testing. Students are expected to run several problems on a computer in the BASIC language using arrays, functions, and subroutines. Students also learn file construction and manipulation using MTS and the editor. Generally, CSC-100 is taken to fulfill the General Education Computer Competency Requirement.

Every student admitted to Wayne State after Fall, 1987 must fulfill the Computer Competency Requirement. Students may fulfill this requirement in one of the following ways:

1. successful completion of a high school course in computing.
2. a score of 3 on the Advanced Placement test in computer science.
3. completion of an approved course at Wayne State University which includes "hands on" computer use.

4. transfer credit for such a course from another post-secondary institution.
5. Proficiency Examination.

The Fall, 1991 semester at Wayne State University offered 1 morning and 1 evening CSC-100 sections on campus, and 1 Saturday morning and 1 evening section at extension centers. A total of 196 students were enrolled in these 4 scheduled sections. The forced sample size for this study was 132 students who volunteered for the pre-instruction portion of the study and 72 of that same sample who participated in the post-instruction follow-up portion of the investigation.

Research Design

In order to assess relationships between attitudes, locus of control, prior computer experience, profile characteristics, and computer utilization, a correlational design was used. This type of design allowed the researcher to quantify and describe the distribution of key variables for a group of students enrolled in Computer Science 100 (CSC-100) courses at Wayne State University, Fall, 1991. It also enabled the investigator to explore relationships between the variables and to answer the questions of this study. The objective of a correlational design for this study was to describe and develop ideas that can be conceptually generalized.

Instruments

The following instruments were administered (see Appendices A and E):

1. Rotter Internal-External Control Scale (I-E).
2. Computer Attitude Scale (CAS).
3. Researcher designed questions relating to prior computer experience.
4. Researcher designed questions relating to post-instruction computer utilization.

The Rotter Internal-External Control (I-E) was utilized in the study to identify the subjects' locus of control. The I-E Scale was designed by Julian Rotter (1966) to measure an individual's perception of how much reinforcement is inside or outside the respondents own control. This scale is a self-report measure that assesses the degree to which individuals habitually view events in their environments as being under their personal control.

The Rotter I-E Scale uses a construct validation and discriminant validation. The program of research on internal vs. external control is illustrative. Rotter (1966) developed several I-E scales and established a considerable number of correlates. The individual scored as "internal" tends to be more alert to pick up information useful to better his condition, to be more concerned over failures, and be less suggestible. These conclusions were used on observable everyday and laboratory behavior.

The research program also demonstrated that the

"feeling-of-control" dimension is a distinct trait. This claim is supported with the low or zero correlations of the I-E scales, with questionnaire measures such as anxiety, social desirability, and scholastic aptitude. Rotter's program of construct validation supports the test and the "social learning" theory from which it derives.

A discriminant analysis was conducted as a correlation study with the Marlowe-Crowne Social Desirability Scale (M-CSDS). Rotter (1966) reported that correlations between the I-E Scale and the M-CSDS ranged from -.07 to -.35 and cited occasional substantial correlations between I-E scores and social desirability.

Reliability for the Rotter I-E Scale is viewed in terms of test-retest reliability and internal consistency. The additive nature of the test resulted in the moderate but uniform set of internal consistency estimates reported by Rotter (1966). These estimates ranged from .65 to .79. Rotter suggested that the noncomparability of the items in an additive scale of this type makes it difficult to achieve high estimates of internal consistency.

The test-retest reliability for the test is adequate. Rotter (1966) reported reliabilities for several samples that vary from .49 to .83, depending upon the time interval and sample involved.

The I-E Scale consists of 23 I-E items and 6 filler items. Each of the combined forced choice items has an "A" and a "B" choice. In each of these items a comparison of

an external belief is given with an internal belief. The scale is scored in the following manner:

A. Items 2a, 3b, 4b, 5b, 6a, 7a, 9a, 10b, 11b, 12b, 13b, 15b, 16a, 17a, 18a, 20a, 21a, 22b, 23a, 25a, 26b, 28b, and 29a are scored.

B. Items 1, 8, 14, 19, 24, and 27 are filler items and are not scored.

Low scores indicate perceived internal control, and high scores indicate perceived external control.

The Computer Attitude Scale (CAS) was used to assess negative and positive attitudes toward computers. The CAS was designed by Brenda H. Loyd and Clarice P. Gressard (1984a). The instrument provides four scores on four subscales (see Appendix C): Computer Anxiety, Computer Confidence, Computer Liking, and Computer Usefulness.

The authors report coefficient alpha reliabilities of .90, .89, .89, and .82 respectively for the teachers in the study. Each subscale consists of ten items and presents positively and negatively worded statements. Subjects respond to all statements by selecting one of four responses ranging from "strongly agree" to "strongly disagree." One additional response, "uncertain," has been incorporated for this study in order to provide greater variation, (see Appendices A and D). Item responses are coded so that a higher score corresponds to a higher degree of liking, confidence, or perception of usefulness, and a lower degree of anxiety. The four subscale scores are obtained by

summing the items. Scores on any subscale can range from 10 to 50 and a higher score on any subscale indicates a more positive attitude. A detailed development of the CAS Scale has been included in another section (see Appendix B).

Researcher developed questions were used to assess prior computer experience and post-instruction computer utilization.

Pilot Study

The questionnaires used in this study were finalized after a preliminary pilot study was conducted. A comprehensive questionnaire, Locus of Control/Computer Attitude Survey (LOCCAS) which incorporated researcher developed questions relating to prior computer experience, demographic information, the Rotter I-E Scale, and the CAS Scale (see Appendix A) was administered to a Computer Science 100class at Wayne State's Eastside Extension Center, Fall, 1990, during the first week of classes. Seven subjects responded (N=7). The respondents provided the following useful information: 1) the directions were easy to follow, and 2) the five statements relating to prior computer experience were clear and understandable.

Researcher-developed questions were also used to assess post-instruction computer utilization. The researcher-developed questions relating to post-instruction computer utilization were administered to the same seven subjects who had participated in the pre-instruction study. The survey,

Computer Utilization/Computer Attitude Survey (CUCAS), which also incorporated the CAS scale (see Appendix E), was administered the thirteenth week of the same Fall, 1990 semester. Subjects provided the following information: 1) items 1,2, and 3 were clear and understandable, 2) items 4 and 5 were confusing, and 3) item 5 seemed to be a restatement of item 1. The responses led to a revision resulting in a four-statement survey of post-instruction computer utilization and the 40-item CAS Scale.

Procedures

In order for the questions of this study to be answered, several preparatory steps were necessary. First, the instruments for the study which were incorporated into a pre-instruction survey were administered to the subjects, students enrolled in 4 CSC-100 classes on campus and 2 CSC-100 classes at extension centers. Subjects were requested to record their names in the space provided on the questionnaire so that information could be matched with later post-instruction data (see Appendix A). The investigator was assisted by an office assistant, a student assistant, and the Southfield Center Manager. To ensure that the subjects fully understood the procedures and purpose of the study, each section of the survey was explained and appropriate directions were given.

During the tenth week of classes a follow-up memo was sent to each assigned CSC-100 instructor. Each instructor

was requested to remind the students that a follow-up post-instruction survey would be administered during the twelfth week of classes (see Appendix D). Each instructor received a follow-up phone call during the eleventh week of classes in order to confirm dates and times when the post-instruction questionnaire would be administered.

A post-instruction survey which incorporates a computer utilization questionnaire and the CAS Scale (see Appendix E) was administered during the twelfth week of classes. General directions for each sections was given. Subjects were once again requested to record their names in order for follow-up data to be matched with pre-instruction data. The investigator was assisted by the same individuals who helped to administer the LOCCAS pre-instruction survey.

Variables

The dependent variable in this study is computer utilization. Data regarding computer utilization was obtained from responses to researcher-developed statements on a post-instruction survey, CUCAS.

The independent variables of the study are pre-instruction computer experience, and the profile characteristics, age, gender, educational level, and admission status. Prior computer experience was measured by subjects' identification of their prior computer experience on the pre-instruction researcher-developed questionnaire. Profile characteristics were obtained from responses to

researcher-developed statements on the same questionnaire.

The intervening variables are locus of control and attitudes toward computers. The Rotter I-E Scale was used to measure locus of control. The CAS Scale was used to measure attitudes toward computers.

Two variables were controlled: common course content, the objectives of which have been mandated by Wayne State's Computer Science Department, hence, instructors are expected to provide the same course objectives for CSC-100 sections University-wide; and, common semester. All of the subjects were enrolled in CSC-100 sections during the Fall, 1991 semester. A summary of the variables in this study can be found in Figure 1.

Figure 1

Summary of Variables in the Design

DEPENDENT	INDEPENDENT
Computer Utilization	Prior Computer Experience
	Profile Characteristics
INTERVENING	
Attitudes Toward Computers	Locus of Control
CONTROL	
Common Course Content	Common Semester

The profile characteristics of age and educational level have been revised from broad categories. This grouping, along with gender and admission status, were used to facilitate the analysis of data for this study and can be found in Figure 2.

Figure 2

Grouping of Profile Characteristics

AGE	GENDER	EDUCATIONAL LEVEL
18-24	Male	Freshman
25-35	Female	Sophomore
36-45		Junior
46-55		Senior
56+		Post-Bachelor

ADMISSION STATUS
Matriculated
Non-Matriculated

Data Analysis

In order to gain an understanding of the relationships between the variables identified in this study, univariate, bivariate, and mutivariate analysis were employed. Additionally, the statistical techniques that were used to answer the research questions of this study were: 1) tabular presentation of frequencies, means, standard

deviations and percentage distributions; 2) correlations; 3) multiple regression; and 4) narrative descriptions. Pearson's correlations and multiple regressions were used to test the research questions. The relationships of research questions, instruments and statistical procedures can be found in Figure 3.

Limitations of the Study

This study was limited by several factors. First, as indicated by Borg and Gall (1983), oftentimes relationship studies cannot establish cause and effect. And, too, it is pointed out that relationship studies are often criticized by researchers because investigators will often attempt to modify complex behavior into simple components.

Secondly, even though the overall content for CSC-100 classes was the same, each section was taught by a different instructor. Computer usage and attitudes toward computers may be influenced by a like or dislike of the instructor

Finally, because of attrition and possible other factors, only 72 of the initial 132 subjects of the pre-instruction population responded to the post-instruction follow-up. Therefore, portions of the results may be skewed.

All in all, therefore, any generalization to adults and computer-related behavior other than those found in this study will depend upon replicated studies.

Figure 3

Data Analysis Summary

Research Questions	Data Source	Method of Analysis
1. What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitudes will include: a. computer anxiety b. computer confidence c. computer liking d. computer usefulness	I-E Scale CAS Scale Pre-instruction Questionnaire (LOCCAS)	Correlation
2. What is the relationship between locus of control and change in attitudes toward computers?	I-E Scale CAS-Scale Post-instruction Questionnaire (CUCAS)	Correlation
3. What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include: a. age b. gender c. educational level d. admission status	CAS Scale Pre-instruction Questionnaire	Regression
4. What is the relationship between selected profile characteristics and change in attitudes toward computers?	CAS Scale Pre-instruction Questionnaire Post-instruction Questionnaire	Regression
5. What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experience will include: a. computer games experience b. word processing experience c. programming experience d. electronic communication, such as $Message system on MTS e. special computer applications, such as income tax preparation, desk top publishing, and database graphics	CAS Scale Pre-instruction Questionnaire	Correlation Regression

Figure 3 (con't.)

Research Questions	Data Source	Method of Analysis
6. What is the relationship between prior computer experience and change in attitudes toward computers?	CAS Scale Pre-instruction Questionnaire Post-instruction Questionnaire	Regression
7. What is the relationship between selected profile characteristics and post-instruction computer utilization? Such utilization will include: a. Computer Science 100 course work only b. enrollment in additional computer-related courses or programs c. utilization of computers in areas such as work and personal projects d. no subsequent utilization	Pre-instruction Questionnaire Post-instruction	Regression
8. What are the patterns of relationships between locus of control, post-instruction attitudes toward computers, prior computer experience and post-instruction computer utilization by adults of diverse age categories?	CAS Scale I-E Scale Pre-instruction Questionnaire Post-instruction Questionnaire	Multivariate Analysis

Summary

This chapter presented the methodology of the study. It related the methodology to the purposes stated earlier, described instruments, discussed the population and described the data collection procedures and analysis of the data. The general design of the study was also presented. The next chapter will present the results of the data analyses.

CHAPTER IV

RESULTS

Introduction

The purpose of this study was to investigate the effects of attitudes toward computers, locus of control, profile characteristics and prior computer experience on adult computer utilization. In this chapter, analyses performed on the data collected will be presented in four sections. The first section presents the research questions that guided this investigation. The second section includes data describing the subjects. The third section presents research data as they apply to four areas of the study. And finally, the fourth section presents research data as they apply to the research questions. All analyses were tested at the .05 level of significance.

Research Questions

Eight research questions were developed to investigate computer attitudes, locus of control, profile characteristics, prior computer experience and post-instruction computer utilization of the subjects. The first research question was: What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitudes will include a) computer anxiety; b) computer confidence; c) computer liking; and,

d) computer usefulness.

The second research question was: What is the relationship between locus of control and change in attitudes toward computers?

Research question three stated: What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include a) age; b) gender; c) educational level; and d) admission status.

The fourth research question was: What is the relationship between selected profile characteristics and change in attitudes toward computers?

The fifth research question of the study was: What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experience will include a) computer games experience; b) word processing experience; c) computer programming experience; d) electronic communications experience; and e) special computer applications experience.

The sixth research question was: What is the relationship between prior computer experience and change in attitudes toward computers?

Research question seven stated: What is the relationship between selected profile characteristics and post-instruction computer utilization? Such utilization will include a) Computer Science 100 course work only; b) enrollment in additional computer-related courses or

programs; c) utilization in areas such as work and personal projects; and d) no subsequent computer utilization after this class.

The final research question, number eight, was: What are the patterns of relationship between locus of control post-instruction attitudes toward computers, prior computer experience and post-instruction computer utilization of adults of diverse age categories?

Subject Profile

This study was restricted to students enrolled in the course, Computer Science 100, at Wayne State University, Fall, 1991. The participants were enrolled in four sections of the course: two campus sections and two extension sections. Complete data for the pre-instruction portion of of the study was received from a total of 132 subjects. For the post-instruction portion of the investigation, complete data was received from 72 of the 132 who had participated in the pre-instruction portion. This was a self-report investigation and no attempts were made to verify answers.

The profile characteristics, age, gender, and educational level were obtained from responses to statements on a comprehensive pre-instruction questionnaire, Locus of Control Computer Attitude Survey (LOCCAS). Major area of study and admission status were determined from responses to statements on a post-instruction questionnaire, Computer Utilization Computer Attitude Survey (CUCAS) and class

rosters for the two extension sections that participated in the study. A summary of these characteristics can be found in Table 1. The ages of the subjects ranged from 18 to 56+. It may be seen from the table that 73.5 percent of the students who participated in the study were ages 18-24; 17.4 percent fell into the 25-35 range; 6.8 percent were between the ages of 36-45; and only 2 percent were 46 and over. There were seventy-two females, 54.5 percent, and sixty males, 45.5 percent. The majority of the subjects reported freshman and sophomore level status at the University. Twenty-two percent reported junior status, 15 percent reported senior status, and only 4.5 percent reported post-bachelor ranking. Of the total participants in the study, 120 were fully-admitted matriculated students; only twelve were non-matriculated students.

Table 1

Summary of Profile Characteristics

(N=132)

AGE	N	Percent
18-24	97	73.5
25-35	23	17.4
36-45	9	6.8
46-55	2	1.5
56+	1	.8

Table 1 (Cont.)

Gender	N	Percent
Male	60	45.5
Female	72	54.5
Educational Level		
Freshman	34	25.8
Sophomore	43	32.6
Junior	29	22.0
Senior	20	15.2
Post-Bachelor	6	4.5
Admission Status		
Matriculated	120	90.9
Non-Matriculated	12	9.1

Subjects who participated in the post-instruction portion of the study were requested to record their major or intended major on the first page of the CUCAS questionnaire. Responses were categorized into the schools and colleges of Wayne State University. Twenty-three of the subjects reported majors in liberal arts areas such as history, political science, and sociology. The major area, Education was reported by 12.5 percent of the subjects. Responses such as occupational therapy, pharmacy, and mortuary science were grouped into the Allied Health category and represented 15.2 percent of the responses. Nine participants in the group reported Business majors. One of the of the subjects

recorded Nursing as a major; one indicated a General Studies major; and, one reported an Engineering major. Thirteen of the participants, 18 percent, did not report majors or intended major areas of study. A summary of these findings is presented in Table 2.

Table 2

Summary of Major Areas of Study

(N=72)

Major	N*	Percent
Liberal Arts	23	31.9
Education	9	12.5
Business	9	12.5
Engineering	1	1.3
Fine and Performing Arts	4	5.5
Allied Health	11	15.2
Nursing	1	1.3
General Studies	1	1.3

*Thirteen students (18 percent) did not report majors

Analysis Related to the Areas of the Study

The analysis of data related to the intervening variables--attitudes toward computers and locus of control--the independent variable--prior computer experience--and dependent variable--computer utilization--are discussed in this section.

Computer Attitudes

The Computer Attitude Scale (CAS) was used to measure attitudes toward computers. The CAS provides four scores on four subscales: Computer Anxiety, Computer Confidence, Computer Liking, and Computer Usefulness. Scores on any subscale can range from 10 to 50, and a higher score on a subscale indicates a higher degree of confidence, liking, or perception of usefulness, and a lower degree of anxiety. The overall maximum total score is 200.

Table 3 presents a description of the subjects' pre-instruction computer attitudes. The mean scores of each of the components of the attitude scale and the overall computer attitude scores of the group indicated positive attitudes toward computers. The mean scores of 36.62 for computer anxiety, 36.81 for computer confidence, 32.12 for computer liking, and 41.12 for computer usefulness indicated higher perceptions of the usefulness, more moderate degrees of confidence and anxiety, and a more neutral computer liking.

Table 3

Description of Pre-Instruction Computer Attitudes

	(N=132)	
Attitude Component	Mean	Std. Dev.
Computer Anxiety	36.629	8.416
Computer Confidence	36.818	7.622
Computer Liking	32.121	5.157
Computer Usefulness	41.129	6.306
Overall Attitude	146.697	23.232

Seventy-two of the subjects who participated in the pre-instruction portion of the study also participated in the post-instruction follow-up. A t-Test was calculated in order to determine change between the subjects' pre- and post-instruction attitudes toward computers. The analysis showed that the overall mean score of the paired-scores increased by 5.944. The analysis further revealed an increased mean score of 2.21 for computer anxiety, .917 for computer confidence, and .493 for computer liking. However, the mean score for computer usefulness decreased by -.833. The change mean scores indicated less anxiety, more confidence, more liking, and a slightly lower perception of the usefulness of computers. The results of this analysis are presented in Table 4.

Table 4

Summary of Change in Computer Attitudes

(N=72)

Attitude = Overall				
	Mean	Standard Deviation	t Value	Probability of t
Pre-Instruction	147.097	22.328	3.30	.002**
Post-Instruction	153.041	29.914		
Change	5.944	15.282		

Attitude = Computer Anxiety				
	Mean	Standard Deviation	t Value	Probability of t
Pre-Instruction	36.452	8.401	2.89	.005**
Post-Instruction	38.671	7.617		
Change	2.219	5.955		

Attitude = Computer Confidence				
	Mean	Standard Deviation	t Value	Probability of t
Pre-Instruction	37.027	7.619	1.32	.192
Post-Instruction	37.945	7.617		
Change	.917	5.955		

Attitude = Computer Liking				
	Mean	Standard Deviation	t Value	Probability of t
Pre-Instruction	32.356	4.945	1.05	.299
Post-Instruction	32.849	5.997		
Change	.493	4.028		

Table 4 (Cont.)

Attitude = Computer Usefulness				
	Mean	Standard Deviation	t Value	Probability of t
Pre-Instruction	51.527	5.912	-1.67	.100
Post-Instruction	40.694	6.307		
Change	-.833	4.243		

*Significant at .05 **Significant at .01

Locus of Control

The Rotter Internal-External Control Scale (I-E) was used to measure locus of control. The I-E scale is a self-report measure that assesses the degree to which individuals habitually view events in their environments as being under their personal control. There are twenty-nine forced choice items with an "A" and a "B" choice. Six items are filler items; twenty-three are scored. Low scores indicate perceived internal control, and high scores indicate perceived external control.

An analysis of the data revealed the mean score for the group studied was 9.636. This indicated internal control; therefore, overall, the subjects reported they perceived they had internal control of their environments. Table 5 summarizes the results of this analysis.

Table 5

Description of Locus of Control Scores

(N=132)

Mean	Std. Dev.
9.636	3.515

Prior Computer Experience

Prior computer experience was assessed from responses on the pre-instruction survey LOCCAS. Subjects were requested to circle their level of prior computer experience, ranging from "frequently" to "never." Subjects responded to the following questions:

(4) I have played computer games:

(5) I have used word processing programs:

(6) I have written computer programs:

(7) I have used electronic communications:

(8) I have used special computer applications:

Table 6 presents a summary of prior computer experience of the subjects. Eighty percent of the students reported having had experience with computer games. Seventy-two percent indicated they had word processing experience, with only 19.7 percent reporting frequent experience in this area. Over half of the subjects reported no computer programming experience (54.5%). The data relating to electronic communications experience revealed that, overall,

the participants had little or no experience in this area. Subjects' responses indicated that 44.7 percent had never experienced electronic communications. Likewise, seventy-two percent reported no special computer applications experience.

Table 6

Summary of Prior Computer Experience

(N=132)		
Prior Computer Experience	N	Percent
Computer Games		
Frequently	22	16.7
Sometimes	26	19.7
Occasionally	34	25.8
Rarely	32	24.2
Never	18	13.6
Word Processing		
Frequently	26	19.7
Sometimes	24	18.2
Occasionally	20	15.2
Rarely	25	18.9
Never	37	28.0
Computer Programming		
Frequently	5	3.8
Sometimes	8	6.1
Occasionally	8	6.1
Rarely	39	29.5
Never	72	54.5

Table 6 (Cont.)

Prior Computer Experience	N	Percent
Electronic Communications		
Frequently	5	3.8
Sometimes	7	5.3
Occasionally	18	13.6
Rarely	43	32.6
Never	59	44.7
Special Computer Applications		
Frequently	4	3.0
Sometimes	3	2.3
Occasionally	10	7.6
Rarely	20	15.2
Never	95	72.0

Post-Instruction Computer Utilization

Post-instruction computer utilization was assessed from responses on the post-instruction questionnaire, CUCAS. Subjects were requested to check responses that applied to their current and future computer-related utilization. The subjects responded to the following statements:

(4) Currently I use computers for Computer Science course work only:

(5) I utilize computers in other aspects of my life, such as work, courses other than Computer Science 100 and/or personal projects:

(6) I intend to enroll in additional computer-related courses or programs:

(7) After completing this class, I do not intend to use computers again:

An analysis of the data revealed that 43.4 percent of the subjects utilized computers for Computer Science 100 course work only. Fifty of the participants reported using computers in additional areas. Twenty-five, 34.7 percent, reported future enrollment in subsequent computer-related programs. Eight of the participants reported no desire to use computers after completing the course. A summary of these finding is presented in table 7.

Table 7

Summary of Post-Instruction Computer Utilization

(N=72)

Post-Instruction Computer Utilization	N	Percent
Computer Science 100 Course Work Only	31	43.0
Utilize in Other Aspects of Life	50	69.4
Enroll in Subsequent Computer-related Courses or Programs	25	34.7
Never Use Computers Again	8	11.1

Analysis Related to the Research Questions

Eight research questions guided this investigation. This section presents the data from the analyses of each research question. Each question was tested at the .05 level of significance.

Research Question One:

> **What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitudes will include: a) computer anxiety; b) computer confidence; c) computer liking; and d) computer usefulness.**

The research question was addressed with Pearson Correlation statistical techniques using locus of control scores and pre-instruction attitude scores for each computer attitude component. The analysis revealed a statistically significant negative relationship between locus of control and computer liking (r= -.14). There was also a statistically significant negative relationship between locus of control and computer usefulness (r= -.22). The negative relationships were the result of more internalized locus of control scores being associated with more positive attitudes of computer liking and computer usefulness. There were no statistically significant relationships between locus of control and computer anxiety or locus of control and computer confidence. The results of this analysis are presented in Table 8.

Table 8

Relationship Between Locus of Control and Pre-Instruction Attitudes Toward Computers

(N=132)

Attitude Components	Locus of Control
Computer Anxiety	r= .0186 p= .416
Computer Confidence	r= -.0769 p= .191
Computer Liking	r= -.1441* p= .050
Computer Usefulness	r= -.2286* p= .004

*Significant at .05

Research Question Two:

What is the relationship between locus of control and change in attitudes toward computers?

This question was addressed using Pearson Correlation statistical techniques using locus of control scores and change scores between pre-instruction and post-instruction computer attitudes scores of each of the components of the Computer Attitude Scale. The analysis revealed a statistically significant relationship between locus of control and change in computer confidence (r=.20). This indicated a more external locus of control was associated with increased confidence toward computers. The analysis also revealed a statistically significant relationship between locus of control and computer usefulness (r=.27).

This associated internal scores with decreased change toward the usefulness of computers. There were no statistically significant relationships between locus of control and change in computer anxiety or change in computer liking. A summary of this analysis is presented in Table 9.

Table 9

Relationship Between Locus of Control and Change in Attitudes Toward Computers

(N=72)

Attitude Components	Locus of control
Computer Anxiety	r= .0545 p= .325
Computer Confidence	r= .2066* p= .041
Computer Liking	r= .0349 p= .385
Computer Usefulness	r= .2701* p= .011

*Significant at .05

Research Question Three:

What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include: a) age; b) gender; c) educational level; and d) admission status.

In order to answer the research question, regression analyses were calculated using each of the computer attitude components as the dependent variable with the profile characteristics as the independent variables. Due to the dichotomous scaling of the profile characteristics gender

and admission status, dummy coding was used to allow these variables into the equation.

A summary of the regression equations relating pre-instruction attitudes toward computers to profile characteristics is presented in Table 10. The results of the stepwise regression using anxiety as the dependent variable and the selected profile characteristic variables gender, age, educational level, and admission status as the independent variables, revealed one statistically significant predictor of computer anxiety, Gender of Student. The negative beta of -.181 indicated that females were associated with higher levels of anxiety toward computers. The R^2 of .033 showed that 3.3 percent of the variance in computer anxiety scores was attributable to Gender. The other independent variables failed to achieve significance as predictors of computer anxiety.

The results of the regression analysis using computer confidence as the dependent variable and selected profile characteristics as the independent variables showed no statistically significant relationships. However, as shown in Table 10, the results of the regression analysis using computer liking as the dependent variable and selected profile characteristic variables as the independent revealed one statistically significant predictor of computer liking, Admission Status. The beta of .172 indicated matriculated subjects were associated with greater levels of computer liking. The R^2 of .029 showed that 2.9 percent of the

variance in computer liking was attributable to Admission Status. No other independent variable achieved significance as a predictor of computer liking

The results of the regression analysis using computer usefulness as the dependent variable and the selected profile characteristics as the independent variables revealed one statistically significant predictor of computer usefulness, Age of Student. The beta of .180 indicated that older subjects were associated with higher perceptions of the usefulness of computers. The R^2 of .032 showed that 3 percent of the variance in computer usefulness was attributable to Age. The other independent variables failed to achieve significance as predictors of computer usefulness.

Table 10

Summary of the Regression Equations Relating Pre-Instruction Attitudes Toward Computers to Selected Profile Characteristics

(N=132)

Attitude = Computer Anxiety	B	T	SIG OF T
Gender of Student	-.18196	-2.110	.0368
CONSTANT	38.30000	35.712	.0000

Multiple R = 0.18196 R^2 = 0.03311

Attitude = Computer Liking	B	T	SIG OF T
Admission Status	.17206	1.992	.0485
CONSTANT	31.84166	68.398	.0000

Multiple R = 0.18034 R^2 = 0.03252

Table 10 (Con't.)

Attitude = Computer Usefulness			
	B	T	SIG OF T
Age of Student	.18034	2.091	.0385
CONSTANT	39.02108	34.090	.0000
Multiple R = 0.18034		R^2 = 0.03252	

*Significant at .05

Research Question Four:

What is the relationship between selected profile characteristics and change in attitudes toward computers?

In order to answer the research question, multiple stepwise regressions were calculated to determine the relationship between selected profile characteristics and change in attitudes toward computers. Using change in the computer attitudes anxiety, confidence, liking, and usefulness as dependent variables and the profile characteristics, gender, age, educational level, and admission status as the independent, the results revealed that in each equation the profile characteristics failed to achieve significance as predictors of change in computer attitudes.

Research Question Five:

What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experiences will include: a) computer games; b) word processing; c) programming; d) electronic communications; and e) special computer applications.

This research question was addressed by using Pearson Product Moment Correlation to develop an intercorrelational matrix using the pre-instruction scores of each of the components of the Computer Attitude Scale and responses to the questions on prior computer experience. The responses on prior computer experience provided for lower scores being associated with greater prior computer experience. The intercorrelational matrix provided a statistically significant correlation between the pre-instruction computer attitude scores and prior computer experience scores. The results were all negative, indicating that greater experience with computers through games, word processing, programming, electronic communication, and special computer applications were associated with lower computer anxiety and more positive confidence, liking and perception of the usefulness toward computers. Table 11 presents the results of the intercorrelational matrix.

Table 11

Relationship Between Pre-Instruction Attitudes Toward Computers and Prior Computer Experience

(N=132)

Prior Computer Experience	Computer Attitude Component			
	Computer Anxiety	Computer Confidence	Computer Liking	Computer Usefulness
Computer Games	r= -.2319* p= .004	r= -.2130* p= .007	r= -.1214 p= .083	r= -.1180 p= .089
Word Processing	r= -.3406* p= .000	r= -.3238* p= .000	r= -.2298* p= .000	r= -.2347* p= .003
Programming	r= -.2747* p= .001	r= -.3055* p= .000	r= -.3459* p= .000	r= -.2275* p= .004
Electronic Communications	r= -.1698* p= .026	r= -.1426 p= .051	r= -.1825* p= .018	r= -.1085 p= .108
Special Computer Applications	r= -.2961* p= .000	r= -.2131* p= .007	r= -.2425* p= .003	r= -.2459* p= .002

*Significant at .05

Additive analyses in the form of multiple linear regression analyses further explained the relationships between the variables. A summary of the regression equations relating pre-instruction attitudes toward computers to prior computer experience can be found in Table 12. The results of the regression analysis using computer anxiety as the dependent variable and prior computer experience variables as the independent revealed two statistically significant predictors of computer anxiety, Word Processing and Computer Programming experiences. The

negative beta weights of -.279 for Word Processing and -.179 for Computer Programming indicated these experiences were associated with lower computer anxiety. The R^2 of .148 showed that 14.8 percent of the variance in computer anxiety was attributable to Word Processing and Computer Programming experiences. The other independent variables failed to achieve significance as predictors of computer anxiety. The results of the regression analysis using computer confidence as the dependent variable and prior computer experience variables as the independent revealed two statistically significant predictors of computer confidence, Word Processing and Computer Programming experiences. The negative beta weights of -.248 for Word Processing and -.221 for Computer Programming indicated that greater experience in these areas were associated with higher levels of confidence towards computers. The R^2 of .148 showed that 14.8 percent of the variance in computer confidence was attributable to Word Processing and Computer Programming experience. The other prior computer experiences failed to achieve significance as predictors of computer confidence.

The results of the regression analysis using computer liking as the dependent variable and prior computer experience variables as the independent revealed two statistically significant predictors of computer liking, Computer Programming and Special Computer Applications experiences. The negative beta weights of -.312 for

Computer Programming and -.185 for Special Computer Applications experiences indicated greater exposure to these experiences were associated with greater liking of computers. The R^2 of .152 showed that 15.2 percent of the variance in computer liking was attributable to the combined experiences of Computer Programming and Special Computer Applications. No other independent variables achieved significance as predictors of computer liking.

The regression analysis using computer usefulness as the dependent variable and prior computer experience variables as the dependent revealed two statistically significant predictors of computer usefulness, Special Computer Applications and Computer Programming experiences. The negative beta weights of -.211 for Special Computer Programming and -.188 for Computer Programming were associated with greater experience in these areas and were predictors of higher perceptions of the usefulness of computers. The R^2 of .095 showed that 9.5 percent of the variance in computer usefulness was attributable to the combined experiences of Special Computer Applications and Computer Programming. No other prior computer experience achieved significance in this equation.

Table 12

Summary of the Regression Equations Relating Pre-Instruction Attitudes Toward Computers to Prior Computer Experience

(N=132)

Attitude = Computer Anxiety	B	T	SIG IF T
Word Processing	-.27963	-3.231	.0016
Computer Programming	-.17992	-2.079	.0396
CONSTANT	47.62978	16.593	.0000
Multiple R = 0.38037	R^2 = 0.14468		

Attitude = Computer Confidence	B	T	SIG OF T
Word Processing	-.24887	-2.881	.0046
Computer Programming	-.22110	-2.560	.0116
CONSTANT	47.53816	18.324	.0000
Multiple R = 0.38488	R^2 = 0.14813		

Attitude = Computer Liking	B	T	SIG OF T
Special Computer Applications	-.31205	-3.786	.0002
Computer Programming	-.18559	-2.252	.0260
CONSTANT	43.06642	17.813	.0000
Multiple R = 0.39107	R^2 = 0.15293		

Attitude = Computer Usefulness	B	T	SIG IF T
Special Computer Applications	-.21150	-2.483	.0143
Computer Programming	-.18894	-2.218	.0283
CONSTANT	52.18844	17.080	.0000
Multiple R = 0.30823	R^2 = 0.09500		

*Significant at .05

Research Question Six:

What is the relationship between prior computer experience and change in attitudes toward computers?

This study was concerned with prior computer experiences and their relationship to the subjects' change in attitudes toward computers. Multiple stepwise regression equations were calculated using change for each attitude toward computers component as the dependent variable and prior computer experience as the independent. The results of each equation revealed no statistically significant relationships between prior computer experiences and change in attitudes toward computers.

Research Question Seven:

What is the relationship between selected profile characteristics and post-instruction computer utilization? Such utilization will include: a) Computer Science 100 Course Work only; b) enrollment in additional computer-related courses or programs; c) utilization in areas such as work and personal projects; and d) no subsequent computer utilization after this class.

In order to address the research question, multiple regression analyses were calculated. A summary of the regression equations relating post-instruction computer utilization to selected profile characteristics is presented in Table 13. The equation using Computer Science 100 Course Work Only as the dependent variable and selected profile characteristics as the independent revealed one statistically significant predictor of this area of utilization, Gender of Student. The beta of .390 indicated females were

associated with using computers for their Computer Science 100 course work only. The R^2 of .152 indicated that 15.2 percent of the variance in Computer Science 100 Course Work Only was attributable to Gender.

The regression equation using Use Computers in Other Aspects of Life as the dependent variable and each selected profile characteristic as the independent also revealed Gender of Student to be the only statistically significant predictor of this area of computer utilization. The beta weight of -.260 indicated females were not likely to use computers in other aspects of their lives. The R^2 of .067 showed that 6.7 percent of the variance in Use Computers in Other Aspect of Life was attributable to Gender.

The regression equation using Intending to Enroll in Other Computer-related Classes and No Subsequent Computer Utilization After This Course as dependent variables and profile characteristics as the independent revealed no statistically significant relationships.

Table 13

Summary of the Regression Equations Relating Post-Computer Utilization to Selected Profile Characteristics

(N=72)

Post-Utilization = Computer Science 100 Course Only	B	T	SIG OF T
Gender	.39055	3.575	.0006
CONSTANT	.17575	-.996	.3225
Multiple R = 0.26054	R^2 = 0.06788		

Post-Utilization = Use in Other Aspects of Life	B	T	SIG OF T
Gender	-.26053	-2.274	.0260
CONSTANT	1.06136	6.103	.0000
Multiple R = 0.26054	R^2 = 0.06788		

*Significant at .05

Research Question Eight:

What are the patterns of relationships between locus of control, post-instruction attitudes toward computers, prior computer experience and post-instruction computer utilization of adults of diverse age categories?

In order to determine the patterns of relationships between the variables, multiple regression analyses were calculated. The results of the regression analysis relating post-instruction computer utilization to locus of control, post-instruction attitudes toward computers and prior computer experience, using all of the post-instruction subjects, revealed five statistically significant relationships. Electronic Communications, with a beta of -.231 associated this experience with increased areas of computer utilization. A beta of .239 for Word Processing

experience was associated with decreased areas of computer utilization. Locus of Control, with a beta of .205 associated external locus of control with increased computer utilization. A beta of .580 for Post-Instruction Computer Confidence associated positive confidence toward computers with increased post-instruction computer utilization. And, a beta of -.472 for Post-Instruction Computer Anxiety, associated high anxiety toward computers with increased areas of computer utilization. The R^2 of .278 showed that 27.8 percent of the variance in post-instruction computer utilization was attributable to the combined variables, Electronic Communication, Word Processing, Locus of Control, Post-Instruction Computer Confidence, and Post-Instruction Computer Anxiety. No other independent variable in the equation achieved significance as a predictor of post-instruction computer utilization when considering the total post-instruction population.

The regression equation using post-instruction computer utilization as the dependent variable and the same selected variables as the independent with subjects who ranged in ages from 18-24, revealed two statistically significant predictors of post-instruction computer utilization, Electronic Communications and Computer Games prior computer experiences. Because lower scores were associated with greater prior computer experience, the beta of -.282 for Electronic Communications indicated this experience was associated with increased areas of post-instruction computer

utilization. Computer Games, on the other hand, with a beta of .280 was associated with decreased areas of post-instruction computer utilization. The analysis also revealed that with a R^2 of .163, 16.3 percent of the variance in post-instruction computer utilization was attributable to the combined prior computer experiences, Electronic Communications and Computer Games. No other independent variable in the equation achieved significance as a predictor of post-instruction computer utilization for this age group.

The results of the regression analysis using post-instruction computer utilization as the dependent variable and Locus of Control, Post-Instruction Attitudes Toward Computers, and Prior Computer Experience as the dependent with subjects twenty-five years of age and older, revealed one statistically significant predictor of post-instruction computer utilization, Post-Instruction Computer Usefulness. The beta .530 indicated higher perceptions of computer usefulness were associated with increased areas of computer utilization. The R^2 of .281 showed that 28.1 percent of the variance in post-instruction computer utilization was attributable to Post-Instruction Computer Usefulness. No other independent variable achieved significance as a predictor of post-instruction computer utilization for subjects in the twenty-five and older group. The results of these analyses are presented in Table 14.

Table 14

Summary of Regression Equations Relating Post-Instruction Computer Utilization to Selected Variables.

Post-Instruction Utilization = All Ages (N=72)	B	T	SIG OF T
Electronic Communications-	-.23106	-2.109	.0388
Word Processing	.23989	2.143	.0358
Locus of Control	.20514	1.952	.0552
Post-Instruction Computer Confidence	.58058	3.284	.0016
Post-Instruction Computer Anxiety	-.47214	-2.621	.0109
CONSTANT	1.16903	2.359	.0213
Multiple R = 0.52793	R^2 = 0.27871		

Post-Instruction Utilization = Ages 18-24 (N=52)	B	T	SIG OF T
Electronic Communications-	-.28228	-2.159	.0358
Computer Games	.28075	2.147	.0367
CONSTANT	1.72659	5.566	.0000
Multiple R = 0.40402	R^2 = 0.16323		

Post-Instruction Utilization = Ages 25+ (N=20)	B	T	SIG OF T
Post-Instruction Computer Usefulness	.53091	2.658	.0160
CONSTANT	-.87338	-.896	.3820
Multiple R = 0.53092	R^2 = 0.28187		

A summary of the findings of the analyses of the research questions is presented in Table 15.

Table 15

Summary of Research Questions and Data Analysis Findings

Research Question	Data Analysis Findings
1. What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitudes will include a. computer anxiety b. computer confidence c. computer liking d. computer usefulness	There were statistically significant negative relationships between locus of control and computer liking and computer usefulness. There were no statistically significant relationships found between locus of control and computer anxiety and computer confidence.
2. What is the relationship between locus of control and change in attitudes toward computers?	There were statistically significant relationships found between locus of control and changes in computer confidence and computer usefulness. There were no statistically significant relationships between locus of control and change in computer anxiety or change in computer liking.
3. What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include: a. age b. gender c. education level d. admission status	There were statistically significant relationships between gender and computer anxiety; admission status and computer liking; and, age and computer usefulness. There were no relationships found between educational level and pre-instruction attitudes toward computers.
4. What is the relationship between selected profile characteristics and change in attitudes toward computers?	There were no statistically significant relationships between these variables.
5. What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experiences will include: a. computer games	There were statistically significant relationships between computer games and computer anxiety and computer confidence; word processing and computer anxiety, computer confidence, computer liking

Table 15 (Con't.)

Research Question	Data Analysis Findings
b. word processing c. programming d. electronic communications. e. special computer applications	and computer usefulness; programming and computer anxiety, computer confidence, computer liking, and computer usefulness; electronic communications and computer anxiety, and computer liking; special computer applications and computer anxiety, computer confidence, computer liking and computer usefulness.
6. What is the relationship between prior computer experience and change in attitudes toward computers?	There were no statistically significant relationships between these variables.
7. What is the relationship between profile characteristics and post-instruction computer utilization? Such utilization will include: a. Computer Science 100 Course Work Only b. Enrollment in Additional computer-related Courses or Programs c. Utilization in areas such as work and personal projects d. No subsequent Computer Utilization After This Course	There was a statistically significant relationship between Computer Science 100 Course Work Only and Gender. There were no statistically significant relationships between Enrollment in Additional Computer-related Courses and profile characteristics. There was a statistically significant relationship between Utilization in Other aspects of Life and Gender. There were no statistically significant relationships between No Subsequent Utilization and profile characteristics.
8. What are the patterns of relationships between locus of control, post-instruction attitudes toward computers, prior computer experience, and post-instruction computer utilization of adults of diverse age categories?	When all age groups in the the study were considered, there were statistically significant relationships between post-instruction computer utilization and electronic communications, word processing, locus of control, and post-instruction computer anxiety. In the age group, 18-24, there was a statistically significant relationship between post-

Table 15 (Con't.)

Research Question	Data Analysis Findings
	instruction utilization and electronic communications and computer games. There were no significant relationships between post-instruction utilization and locus of control or post-instruction attitudes toward computers. When subjects 25 years of age and older were considered, one statistically significant relationship was found between post-instruction utilization and post-instruction attitudes toward computers, Computer Usefulness. There were no significant relationships found between post-instruction computer utilization and locus of control, and prior computer experience.

Summary

This chapter presented the results of the analysis of data. A detailed description of the subjects was provided. The results of analyses relating to the research questions were reported. An interpretation of the significant results and other factors will be presented in the next chapter.

CHAPTER V

DISCUSSION OF THE FINDINGS

Introduction

The purpose of this study was to investigate the effects of attitudes toward computers, locus of control, profile characteristics and prior computer experience on adult computer utilization. This chapter discusses the findings of this study. It is divided into four sections: summary of the study, discussion of the findings, implications for instructional designers, and recommendations for future research.

Because of the overwhelming effects of computer technology, there is a need to address possible factors that may impact the utilization of this innovation. The dramatic expansion of the role of computers in recent years makes it evident that familiarity with this technology and the ability to use it effectively will be of paramount importance to success in almost every aspect of society. This study explored several factors that reportedly contribute to the engagement and persistence of computer utilization.

The following eight research question were developed to guide this study:

1. What is the relationship between locus of control and pre-instruction attitudes toward computers? Such attitude will include:
   a. computer anxiety
   b. computer confidence
   c. computer liking
   d. computer usefulness
2. What is the relationship between locus of control and change in attitudes toward computers?
3. What is the relationship between selected profile characteristics and pre-instruction attitudes toward computers? Such characteristics will include:
   a. age
   b. gender
   c. educational level
   d. admission status
4. What is the relationship between selected profile characteristics and change in attitudes toward computers?
5. What is the relationship between prior computer experience and pre-instruction attitudes toward computers? Such experience will include:
   a. computer games experience
   b. word processing experience
   c. programming experience
   d. electronic communications such as $Message

system on MTS

e. special computer applications such as income tax preparation, desk top publishing, and database graphics.

6. What is the relationship between prior computer experience and change in attitudes toward computers?
7. What is the relationship between selected profile characteristics and post-instruction computer utilization? Such utilization will include:
   a. Computer Science 100 course work only
   b. enrollment in additional computer-related courses or programs
   c. utilization in areas such as work and personal projects
   d. no subsequent computer utilization after this course
8. What are the patterns of relationships between locus of control, post-instruction attitudes toward computers, prior computer experience and post-instruction computer utilization of adults of diverse age categories?

Summary of the Study

A total of 132 Wayne State University students participated in the pre-instruction portion of this investigation. In the post-instruction portion, 72 of the

initial subjects were participants. The students were enrolled in one of four Computer Science 100 sections during the Fall, 1991 semester. Computer Science 100 is an introductory course designed to provide a survey of computer science on the elementary level. The course content is comprised of analysis, structural algorithm development and programming, and testing. This course also fulfills Wayne State University's Computer Competency Requirement. Data from the subjects were obtained from responses to two self-administered questionnaires: Locus of Control Computer Attitude Survey (LOCCAS) for the pre-instruction and Computer Utilization Computer Attitude Survey (CUCAS) for the post-instruction.

The Computer Attitude Scale (CAS), incorporated into both questionnaires, was used to measure pre- and post-instruction attitudes toward computers. This scale appeared to be able to provide insight into the subjects' computer anxiety, confidence, liking and perceptions of the usefulness of computers. Overall, both pre- and post-instruction attitudes of the subjects in this study were relatively positive. The mean scores were 147.09 for the pre-instruction and 153.94 for the post-instruction.

The Rotter Internal-External Control Scale (I-E), incorporated into the LOCCAS, was used to measure locus of control. Overall, the participants reported an internal locus of control. The mean score was 9.63. Scores on the scale can range from 0 (most internal) to 23 (most external). The mean score of the group suggested the

participants believed themselves to be in control of their environments.

Demographic information, prior computer experience, and post-instruction computer utilization were obtained from responses to researcher-developed statements on the pre- and post-instruction questionnaires.

Discussion of the Findings

It is important to note that the findings presented pertain only to the subjects in this study. No intent was made to infer that any data represent any subjects beyond the respondents participating in this study. The results and methodology employed may, however, have implications for similar populations in educational settings. Additionally, as indicated in the limitations of the study, results may be skewed due to attrition in the population.

As indicated, because of the increased demands computer technology has placed upon our society, factors which impact the engagement and persistence of its use should be explored. In any study where the issue of computer utilization is discussed, it follows that many types of variables will be introduced in an effort to discover one or more which will impact strongly enough to affect involvement. Thus, four variables were selected for this study in order determine the effects of each on the subjects' post-instruction computer utilization.

The variables selected were attitudes toward computers,

locus of control, selected profile characteristics, and prior computer experience. The overall consideration of these variables yielded significant relationships. The findings indicated that the adults in this study were not operating in an emotional vacuum. In general, their attitudes toward computers were found to relate significantly to locus of control, computer experience, profile characteristics, as well as computer utilization. In both the pre- and post-instruction portions of the study, the subjects, in general, appeared moderate in their orientations toward computers, showing neither extremely positive nor extremely negative attitudes.

The Predictors of Initial Attitudes Toward Computers

The pre-instruction portion of the study showed significant relationships between attitudes toward computers and locus of control, prior computer experience, and profile characteristics. This section will discuss these findings.

Attitudes and Locus of Control

The findings of the pre-instruction portion of the study relating attitudes toward computers to locus of control provided interesting conclusions. Subjects who reported a more internal locus of control also enjoyed working with computers and viewed computers as useful tools that would help them in future endeavors. This supports the findings of Coovert and Goldstein (1980) who reported that internally controlled individuals were more likely to view

computers as beneficial tools that can help people.

Attitudes and Prior Computer Experience

The pre-instruction assessment of attitudes toward computers and prior computer experience also showed significant relationships. Each of the four computer attitude components were found to relate to these experiences. As pointed out, research indicates that, in part, attitudes are influenced by an individual's experiences. Consistently, research has indicated that computer experience is a key factor to consider when assessing computer attitudes, perception, and other computer-related behavior (Koohang & Byrd, 1987; Sullivan, 1989; Koohang, 1989).

The present study supports these findings. Programming experience was significantly related to each of the four attitude components. Possibly this kind of experience gave the subjects a feeling of control over the computer. Computer programming, it seems, enables the user to understand the logic of computers and provides an understanding of how to control them.

The word processing experiences reported by the subjects were also significantly related to attitudes toward computers. Subjects with this kind of experience reported low anxiety and indicated they enjoyed working with computers. Perhaps this is an indication that these subjects were adept at opening, changing, and editing files. Quite possibly they understood how easily a document could

be created, changed, and saved for future use. It may be assumed that word processing experience gave the subjects more confidence and feelings of control; consequently, fear may have subsided allowing one to actually enjoy working with computers.

The findings also indicated that subjects with special computer applications experiences reported they enjoyed working with computers and saw the usefulness of this technology. Special computer applications such as income tax preparations and database graphics enable the user to enhance his or her world. Income tax preparation programs allow the user to shorten the time as well as ease the task of an annual chore that is usually associated with anxiety. Database graphics provide opportunities to enhance documents, manuscripts, and other projects. Experience with special computer applications would, therefore, ultimately provide enjoyment as well as enhance one's perception of the usefulness of computers.

Attitudes and Profile Characteristics

Pre-instruction attitudes toward computers also related significantly to the profile characteristics gender, age, and admission status. Female subjects felt more anxious toward computers than male subjects. The anxiety the females subjects reported is certainly an emotion that many computer users display when they first attempt to master the computer. In general, gender has not been found to relate to attitudes toward computers (Loyd & Gressard, 1984b;

Koohang, 1986). It may be that the subjects who reported high anxiety lacked familiarity and experience with computers. Beginning computer users require enough time working with computers to allow their anxiety to become abated. At the time of the pre-instruction assessment of attitudes toward computers (the first week of classes), there had not been sufficient time for this decrease in anxiety to occur.

Older subjects in the study reported that they viewed computers as a tool that would be useful in their work. Quite possibly older subjects were employed. Work-related activities would have provide opportunities to gain knowledge about the overall utility of computers as a tool for work.

There was an indication that matriculated subjects in the study were more likely to enjoy working with computers. This finding has at least two implications: nonmatriculated subjects' overall computer attitudes were neutral; and/or the total number of nonmatriculated subjects was to small to predict computer-related attitudes (only 12 persons).

Attitudes Toward Computers Following Instruction

In the post-instruction portion of the study, attitudes toward computers continued to relate significantly to locus of control. After involvement in course activities, the change in attitudes toward computers of subjects who reported external locus of control indicated they had become more confident about working with computers. Even though

involvement and familiarity should produce confidence, research indicates that when degree of user involvement is considered, the attitudes of internally controlled individuals were significantly more positive (Hawk, 1989). It must be noted, however, that even though overall change in attitudes was significantly more positive, the change was relatively small. It can be concluded, therefore, that the overall relationship between internal locus of control and positive attitudes toward computers remained relatively unchanged.

Post-Instruction Computer Utilization

The post-instruction assessment also showed significant relationships between profile characteristics, prior computer experience, post-instruction attitudes toward computers, and locus of control. The following is an explanation of these findings.

Utilization and Gender

It was anticipated that the profile characteristics of gender, age, educational level, and admission status would affect computer utilization. Only one characteristic, however, gender of student, showed a significant relationship to computer utilization. Female subjects reported utilizing computers for course work activities only. Additionally, the findings indicated that females had no desire to use computers in other areas. Possibly the anxiety reported by females during the pre-instruction continued to linger. Earlier research indicated that

participation in computer-related activities, in general, resulted in increased computer utilization (D'Souza & Smith, 1985; Chapline & Turkel (1986).

Utilization and Prior Computer Experience

The overall findings relating post-instruction computer utilization to attitudes toward computers, locus of control, and prior computer experiences revealed significant relationships. Subjects with prior computer experience involving electronic communications and word processing reported utilizing computers in a variety of areas. This is a possible implication that subjects with these experiences used computers for course work in other classes or that they were associated with employment activities. The possibility of a desire to continue to enhance their skills as well as remain current with changes in computer technology may have prompted some subjects to see the need to enroll in subsequent computer-related programs or courses.

Utilization and Post-Instruction Attitudes Toward Computers

Subjects who expressed confidence in working with computers also indicated they utilized computers in a variety of areas. On the other hand, subjects who continued to feel anxious about using computers also indicated they were not limited to using computers for course work only.

Utilization and Locus of Control

Additionally, externally controlled subjects reported increased computer utilization. According to Coovert and Goldstein (1980), one of the best predictors of attitudes toward computers is locus of control. Externally controlled individuals, they suggest, perceive events in their world as being out of control and will most likely experience computer anxiety. This certainly seems to explain the dynamics that were operating in the post-instruction assessment of computer utilization. In spite of these findings, earlier research does not support this dynamic (Hawk, 1989). It is suggested that positive attitudes toward computers were most often associated with increased utilization.

Utilization and Assigned Age Group

The dichotomous findings between age and computer utilization provided interesting results. The younger group's (ages 18-24) computer utilization was significantly related to its prior computer experience; while the older group's (ages 25-56+) computer utilization was associated with its post-instruction attitudes toward computers. Subjects in the younger group who reported electronic communication experiences also reported using computers in a variety of areas. Subjects in this younger group who were associated with computer games experience, however, reported decreased areas of utilization. It must be noted that, in general, computer games are associated with recreation

activities. Subjects in this younger group grew-up playing with video and computer-related games. Experience with computer games does not necessitate utilizing computers for anything other than "fun-related" activities. Decreased areas of utilization may well reflect the "limiting" aspect of computer games. Electronic communications, on the other hand, are more readily associated with employment. Experiences in this area may have meant using computers in work-related activities as well as course work.

Overall, subjects in the older group who viewed computers as useful tools also reported using computers in areas other than for course work activities. This relationship supports the findings by Loyd and Gressard (1986) and Koohang (1987, 1989). These earlier studies suggest that if individuals are provided opportunities to learn about and use computers, they will more readily use computers in their future work. Quite possibly the subjects in the older group of the present study were employed. Therefore, attitudes toward the usefulness of computers would be positive. Work-related activities would have provided additional opportunities to utilize computers for reasons other than course assignments.

Implications for Instructional Designers

The results of this study seem to indicate that computer utilization is affected by the subjects' attitudes toward computers, locus of control, prior computer

experiences, as well as gender and age. Such findings provide additional knowledge for designers of computer-related courses and programs to consider.

Richey's (1986) conceptual model for instructional design would be an appropriate framework to consider when designing computer-related instruction. This conceptual model is based on the following four clusters of variables: The learner, the content, the environment, and the delivery. The model provides a mathematical equation for addressing the relationships among the clusters. The equation is: Ach = bL + bC + bE + bD + e. The equation hypothesizes that achievement is an accumulation of the effects of learner variables, content variables, environment variables, and delivery variables.

Even though this present study did not focus on the achievement of the subjects, the findings certainly provide a great deal of support for the impact of learner characteristics. They not only affect computer utilization, but may well play a role in achievement as well, especially with content related to the learner's attitudes and experiences. It becomes the tasks of instructional designers to address the learner characteristics found significant in this study as well as earlier computer-related studies. Ideally, then, designers of instruction which demands computer use should incorporate additional strategies that will provide computer experience and promote positive attitudes toward computers, especially

for older learners and females without substantial computer involvement. If these strategies are employed, there is a greater likelihood of increased computer utilization.

Recommendations for Future Research

After analyzing the results of the present investigation, it is apparent that there is a need for further study regarding factors that impact computer utilization. This study, as have many research studies, has generated many questions. For this reasons, the following recommendations are made for further research:

(1) A follow-up of this study to determine the long-term effects of attitudes and computer utilization should be initiated.

(2) The present study should be replicated during subsequent semesters in order to compare findings.

(3) Further research on other factors that may affect computer utilization should be initiated, especially on the concept of "self-efficacy." This relates one's judgements about how well one can organize and execute courses of action required to deal with prospective situations that contain ambiguous, unpredictable, and stress elements like those associated with computer technology.

(4) Further research that incorporates a methodology that sets gender and age as the focus and controls for differences in computer-related behavior

should be initiated.

(5) Wayne State University's College of Lifelong Learning should further investigate the computer-related behavior of matriculated and nonmatriculated students over a period of several subsequent semesters in order to address possible remedial interventions for the nonmatriculated students.

(6) And, finally, in-service programs should be provided for computer science instructors in order to acquaint them with the strategies and skills needed to minimize the anxiety, counter balance the negative attitudes, and promote subsequent computer utilization of students enrolled in their classes.

Summary

The final chapter has presented the conclusions that were drawn from the findings, a discussion of the implications for instructional designers, and recommendations for further research. It is hoped that the present study will provide an understanding of the relationship between attitudes toward computers, locus of control, profile characteristics and computer experience on the computer utilization of adults.

Appendix A

Locus of Control/Computer Attitude Survey (LOCCAS)

Rotter Internal-External Control Scale

Computer Attitude Scale

LOCUS OF CONTROL/COMPUTER ATTITUDE SURVEY (LOCCAS)

Directions: The attached survey is a major part of research designed to investigate the computer-related behavior of adults. The purpose of this research is to determine which factors explain differences in the attitudes toward computers and the subsequent utilization of this technology.

The data from this study will be used for my doctoral dissertation in association with Wayne State University. My sample size is small, therefore, your responses are significant to the success of this project. The information that you submit will be strictly confidential. This is **not** a "test". Additionally, there are no right or wrong responses to any of the questions.

Later, during the twelfth week of classes, your assistance will once again be requested. This information will also be confidential. In order to match information with follow-up responses, I am requesting that you print and sign your name to the statement below.

Thank you for your time and cooperation!

STATEMENT: I have read the above information and I agree to voluntarily participate in this study.

_____ Date_____

Print name

_____ Date_____

Sign name

Barbara A. Roseboro

Barbara A. Roseboro
Doctoral Student

LOCUS OF CONTROL/COMPUTER ATTITUDE SURVEY (LOCCAS)

Directions: This survey should be completed by Wayne State University students who are enrolled in the introductory computer course, Computer Science 100 (CSC 100). Check one response in the space provided for each of the following questions.

I. Demographic Information

1. Gender	2. Age	3. Education (Highest Level attained)
_____ Male	_____ 18-24	_____ Freshman
_____ Female	_____ 25-35	_____ Sophomore
	_____ 36-45	_____ Junior
	_____ 46-55	_____ Senior
	_____ 56+	_____ Post-Bachelor

II. Prior Computer Experience

Directions: Circle the number on the right that most closely matches your level of experience, where (1) F–Frequently; (2) S–Sometimes; (3) O–Occasionally; (4) R–Rarely; (5) N–Never.

		F	S	O	R	N
(4)	I have played computer games:	1	2	3	4	5
(5)	I have used word processing programs:	1	2	3	4	5
(6)	I have written computer programs:	1	2	3	4	5
(7)	I have used electronic communications such as $Message System on MTS:	1	2	3	4	5
(8)	I have used special computer applications such as income tax preperation, desk top publishing and database graphics:	1	2	3	4	5

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Appendix B

Development of the Computer Attitude Scale

Development of the Computer Attitude Scale

The success or extent of computer utilization can be largely dependent upon attitudes toward computers. The importance of assessing attitudes has prompted several studies which designed, developed, or validated attitude scales (Loyd & Gressard, 1984a, 1986; D'Souza & Smith, 1985; Swadener & Hannafin, 1987; Cambre & Cook, 1987). The literature reveals, however, that there is one instrument that has been used extensively to measure computer attitudes, The Computer Attitude Scale (CAS), designed by Loyd and Gressard (1984b). The research that has resulted from the use of this instrument provides much of the framework for this study. The following discussion will address the development of this scale and highlight the extent of its use in assisting researchers assess computer attitudes.

The CAS is a Likert-type instrument consisting of 40 items which present positively and negatively worded statements of attitudes toward computers and the use of computers. Four main types of attitudes are represented: (a) anxiety or fear of computers, (b) confidence in the ability to use or learn about computers, (c) liking of computers or enjoying working with computers, and (4) the perception of the usefulness of computers. In response to the statements, subjects indicate which one of the four ordered responses, ranging from "strongly agree" and "strongly disagree," most closely represent the extent to which they agree or disagree with the ideas expressed.

The CAS provides for scores on four subscales: Computer Anxiety, Computer Confidence, Computer Liking, and Computer Usefulness, as well as a total scale score. Each subscale consists of ten items which are distributed

alternately throughout the instrument. The item responses are coded so that a higher score corresponds to a lower degree of anxiety and a higher degree of confidence and liking. The four subscale scores are obtained by summing the recoded items on the respective subscales and may range from 10 to 40. The total is the sum of the four subscale scores and may range from 40 to 160. A higher score on the total scale indicates a more positive attitude toward learning about or using computers (Loyd & Gressard, 1984a, 1986).

In order to validate the instrument, 155 students in grades 8 though 12 were administered the Computer Attitude Scale by their classroom teachers. The students were involved in a computer-based education program in a large school district. Ages of the subjects ranged from 13 to 18; 104 were females and 51 were males.

Response to the items were coded so that a higher score indicated a higher degree of liking or confidence and a lower degree of anxiety. The three subscale scores were obtained by summing the recoded items and the respective subscales. The total scales indicated a more positive attitude toward using or learning about computers.

In an effort to determine the usefulness of the CAS, its subscales (Computer Anixiety, Computer Confidence, Computer Liking) were subjected to three additional validation studies(Gressard & Loyd, 1985). The three studies involved the administration of the CAS to elementary, middle, and secondary school teachers who were enrolled in staff development programs that were designed to provide computer instruction and experience. The purpose of the first study was to examine the

reliability and factorial validity of the CAS and its subscales. The participants were 192 elementary, middle, and secondary teachers. The teachers were administered the CAS by the instructor of the staff development program in which they were enrolled. The scale was administered to some of the teachers at the beginning of the program, to others during the program, and to others at the termination of the program. Means, standard deviations, and estimates were calculated for each of the three subscales and for the total scale. Intercorrelations among the scales were also computed. A 30x30 matrix of item intercorrelation was formed. A principal-component analysis of the data and a classical factor analysis with a three factor solution and varimax rotation were conducted (Gressard & Loyd, 1985). This study supported the findings of the earlier validation study by Loyd and Gressard (1984a) in which the CAS was administered to students in grades 8 through 12.

A second study was employed in order to determine the convergent validity of the CAS with another computer attitude inventory. The participants in this study were 118 of the 192 teachers who had participated in Study I (Gressard & Loyd, 1985).

In addition to the CAS, the participants were administered and instrument in which they responded to two statements concerning their general attitudes towards computers and the use of computers; (1) "I think learning about and working with computers is (would be)_____" by selecting one or more words or phrases form a list of 14 choices. (2) "In general, I would describe myself as_____about the learning about and working with computers," by selecting one of the four ordered responses ranging from "very anxious" to "very comfortable."

A significant relationship was found between the CAS and the selected responses to the two statements presented to the participants concerning their general attitude toward computers and the use of computers. The results of this study validated the subscales as measures of the computer attitudes confidence, liking, and freedom from anxiety (Gressard & Loyd, 1985).

A third validation study was conducted in order to analyze the results of preprogram-postprogram administration of the CAS and to determine their effectiveness in reflecting change in computer attitudes as a result of computer instruction and experience. The participants in this study were 70 of the 192 teachers who participated in Study I. They were administered the CAS at the beginning of the staff development program and at the completion of the program. An inspection of the means of each of the subscales indicated that the participants were significantly less anxious after the program than before; they were significantly more confident after the program than before; and, they were substantially more positive in regard to computer liking than before.

The instructor's observations of the change in attitudes among the participants were consistent with the attitude changes demonstrated by the CAS. Gressard and Loyd (1985) conclude that the results of this third study support the use of the CAS where documentation of changes in computer attitudes is needed.

The results of the three studies suggest that the CAS is a reliable and valid measure of computer attitudes and that it can be used confidently and effectively in program evaluation contexts and research (Gressard and Loyd, 1985).

Since 1984 onward, the CAS has been used frequently in computer-related investigations:

1. Loyd and Gressard (1984b) explored the effects of sex, age, and computer experience on computer attitudes.

2. Loyd and Gressard (1986) investigated age and staff development experience with computers as factors affecting teachers' attitudes towards computers.

3. Loyd and Gressard (1986) expanded the subscales to include computer usefulness (see Appendix C). The instrument was administered to elementary, junior high, and high school teachers' to determine the effects of gender and amount of computer experience on computer attitudes.

4. Koohang (1986) used the scale to explore the effects of age, gender, college status, and computer experience on attitudes toward a library computer system.

5. Gressard and Loyd (1987) investigated the effects of math anxiety and sex on computer attitudes by administering the scale to junior high, high school, and college students.

6. Honeyman and White (1987) modified the scale to determine the degree of computer anxiety in educators who were learning to use computers.

7. Koohang and Byrd (1987) studied the attitudes toward the usefulness of a library system by developing an additional subscale, computer usefulness.

8. Koohang (1987) further utilized the CAS by exploring the attitudes of pre-service teachers toward the use of computers.

9. Koohang (1989) administered the scale in a study that investigated the attitudes toward computers and perceptions of computer usefulness.

10. Stone, Thompson, and Lacount (1989) used the scale in their investigation of high school counselor's attitudes toward computers.

Appendix C

Statements for Each Subscale of the Computer Attitude Scale

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Appendix C, Computer Attitude Scale Statements for each Subscale, 109-110

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Appendix D

Follow-up Letter to Computer Science 100 Instructors

November, 1991

Wayne State University
Computer Science 100 Instructor
Section No.:_____

Dear Instructor:

Earlier in the semester I administered a survey to students in your CSC-100 class. Let me take this opportunity to once again thank you for your cooperation. As I indicated previously, I will also need follow-up information on the students who participated in the initial study.

I am once again requesting your assistance. Please announce to your students that I will return for follow-up information the first week in December, _____.

If there are conflicts or concerns, please contact me at my office, 577-4701. Thank you for your continued consideration and cooperation.

Sincerely,

Barbara A. Roseboro
Doctoral Student

Appendix E

Computer Utilization/Computer Attitude Survey

Computer Attitude Scale

COMPUTER UTILIZATION/COMPUTER ATTITUDE SURVEY (CUCAS)

Directions: The attached survey is the follow-up portion of a research project designed to investigate the computer-related behavior of adults. Your continued participation is significant to the success of this project. The information reported in this follow-up will be matched with earlier reponses. The combined data will be used for my doctoral dessertation in association with Wayne State University. All information is strictly confidential.

In order to match reponses, I am requesting that you print and and sign your name to the statement below.

Thank you for your time and continued cooperation!

STATEMENT:

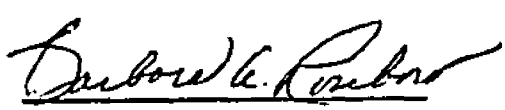
I have read the above information and I agree to voluntarily participate in this portion of this study.

_____ Date_____

Print name

_____ Date_____

Sign name



Barbara A. Roseboro
Doctoral Student

COMPUTER UTILIZATION/COMPUTER ATTITUDE SURVEY (CUCAS)

Directions: This survey should be completed by Wayne State University students who are enrolled in the introductory computer course, Computer Science 100 (CSC 100). This follow-up information will be matched to reponses on an earlier survey, Locus of Control/Computer Attitude Survey (LOCCAS). Please respond to the items below.

PLEASE RECORD YOUR MAJOR OR INTENDED MAJOR: _____

I. UNIVERSITY STATUS

Directions: Please check (✓) the appropriate item.

☐ 1. I am a fully admitted Wayne State student.
☐ 2. I am **not** fully admitted, but rather am a nonmatriculated student.

II. COMPUTER UTILIZATION

Directions: Please check (✓) **all** of the following computer-related activities in which you are currently participating or plan to participate in.

☐ 3. Currently, I use computers for Computer Science 100 course work only.

☐ 4. I utilize computers in other aspects of my life, such as work, courses other than Computer Science 100, and/or personal projects.

☐ 5. I intend to enroll in additional computer-related courses or programs.

☐ 6. After completing this class, I do not intend to use computers again.

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Appendix E, Computer Attitude Scale, 116-117

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ABSTRACT

AN INVESTIGATION OF THE EFFECTS OF ATTITUDES TOWARD COMPUTERS, LOCUS OF CONTROL, COMPUTER EXPERIENCE AND PROFILE CHARACTERISTICS ON ADULT COMPUTER UTILIZATION

by

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MAY, 1992

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With the expansion of computer technology, it is important to prepare individuals for entry and success in our increasingly computerized society. Therefore, factors that impact decisions regarding engagement and persistence in the study and use of computers should be explored. Several factors should be considered: 1) attitudes toward computers, 2) locus of control, 3) profile characteristics, and 4) computer experience.

The purpose of this study was to examine the relationship among these factors as they related to computer utilization. Pre- and post-instruction self-administered questionnaires were used to obtain data on 132 students enrolled in four introductory Computer Science 100 classes, Fall, 1991.

The Computer Attitude Scale (CAS) was used to measure pre- and post-instruction attitudes toward computers. The Rotter Internal-External Control Scale (I-E) was used to measure locus of control. Profile characteristics, prior computer experience, and post-instruction utilization were obtained from researcher-developed statements on comprehensive pre- and post-instruction questionnaires, partially constructed by the investigator.

The data were analyzed by correlation, t-Test, and multiple regression analyses. The results of the analyses of data indicated the following: 1) There were significant relationships between pre-instruction attitudes toward computers and locus of control, prior computer experience, and profile characteristics; 2) There were significant relationships between post-instruction attitudes toward computers and locus of control; 3) There were significant relationships between post-instruction computer utilization and prior computer experience, post-instruction attitudes toward computers, and locus of control; and 4) There were significant relationships between the diverse age groups of the subjects and post-instruction utilization.

Recommendations were made for additional research that would build on the findings of this study.

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