1-1-1997

Computer Use, Exposure And Experience And Gender Issues Among Preschool Children

Michelle L. Meadows
Eastern Illinois University

COMPUTER USE, EXPOSURE AND EXPERIENCE AND GENDER ISSUES AMONG PRESCHOOL CHILDREN

MEADOWS

THESIS REPRODUCTION CERTIFICATE

TO: Graduate Degree Candidates (who have written formal theses)

SUBJECT: Permission to Reproduce Theses

The University Library is receiving a number of requests from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow theses to be copied.

PLEASE SIGN ONE OF THE FOLLOWING STATEMENTS:

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university for the purpose of copying it for inclusion in that institution's library or research holdings.

Michelle L Meadows
Author

July 17, 1997
Date

I respectfully request Booth Library of Eastern Illinois University not allow my thesis to be reproduced because:

_____

_____

_____

_____
Author

_____
Date

Computer Use, Exposure and Experience, and Gender Issues Among Preschool Children

(TITLE)

BY

Michelle L. Meadows

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science in Family and Consumer Sciences

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1997

YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

July 3, 1997
DATE

ADVISER

July 3, 1997
DATE

DEPARTMENT HEAD

July 3, 1997
DATE

COMMITTEE MEMBER

July 3, 1997
DATE

COMMITTEE MEMBER

ABSTRACT

Meadows, M. (1997). Computer use, exposure and experience, and gender issues among preschool children. Master of Science in Family and Consumer Sciences, Eastern Illinois University. Thesis advisor, S. Jayne Ozier, PhD.

Past research has been inconclusive on the subject of computer use and preschool children with some studies showing little or no sex differences and some studies showing strong differences. This descriptive, exploratory research used both observational and questionnaire data. The purpose of the study was to investigate prior computer experience and exposure, computer use, and gender issues among preschool children.

The nonprobability convenience population consisted of 17 children, ten males and seven females, between the ages of 36-72 months. Naturalistic observation occurred through video taping of a child development laboratory. A modified event sampling schedule was used to record the variables of frequency and duration of computer use by each sex. Females chose the computer center as a free-play option an average of 9.99 minutes per hour of availability. Males used the computer 12.75 minutes per hour of availability. A t-test found no statistical significance between the sexes. A comparison of the variables of frequency of use and duration of use found that when children, male or female, approached the computer they were not hesitant to use the system.

A 15 item, closed-ended parent questionnaire was used to address the variables of computer experience and exposure, and computer modeling behavior the children observed. Items on the questionnaires were assigned a numerical value according to themes of computer exposure and experience.

Female children tended to have similar amounts of technological exposure and experience as males. Of a possible 77 points, females scored an average of 24.8 points on

the questionnaires. Males scored an average of 24.6 points on the questionnaires. A t-test was performed and no statistical significance was found.

When a computer problem arose, eight times it was an adult male who was called on to solve the problem; and in only four instances was it an adult female. In general, the preschool age children saw men using the computer more frequently than women, and they used the men more often than women to help solve their computer problems.

The research also examined children's previous technological experience or exposure in relation to use of the computer in the laboratory. Overall, the amount of experience and exposure of each child did not seem to be related to the time he or she spent using the computer in the laboratory.

Both the major and the minor research questions of this exploratory study addressed gender differences in computer use, exposure, and experience with regard to preschool children. Very little difference, according to sex, was found at any point during the research. The only segment of the study in which differences were evident were in regard to modeling behavior that the children observed outside of the laboratory setting.

Both boys and girls should be encouraged to be computer users. If the initial interest the children in this study showed toward computers is nourished, there is every reason for them to continue to feel comfortable and competent using computers when they become adults, regardless of their sex.

DEDICATION

This research is dedicated to my husband Brian, my statistician and my support system. This work, like everything else in our lives, was done as a partnership. He has shown nothing but enthusiasm and delight in my academic life and all that it entails.

I would also like to acknowledge my children for their patience, understanding of my schedule, and love. Their happiness exhilarates me.

ACKNOWLEDGMENTS

I would like to express my thanks to the following individuals for the contributions that they made to this work:

Dr. S. Jayne Ozier, my thesis advisor, for her support, encouragement, and wisdom. Her ability to see various shades of a situation and help clarify different aspects of research for me were invaluable. Personally, her warmth and humor made every part of thesis work much more pleasant.

Dr. Jim Slavik, one of my committee members, for his attention to detail and for his willingness to accommodate my needs. I enjoyed his interest in the children and appreciated his ability to ask the critical questions that helped me elucidate my thinking.

Dr. Lucy Campanis, one of my committee members, for sharing her experience with children and computers. The interest and enthusiasm Dr. Campanis showed for my ideas and my plans invigorated me.

Wendy Trimble, who helped me with the reliability checks and was with me throughout every step of the process. Her understanding and ability to listen and help critique ideas were of great import.

Carolyn Woolever, for her work in the laboratory. Her giving spirit made my experiences more pleasurable.

The children of the laboratory for their affection and their caregivers and parents for their interest and support.

The people of the School of Family and Consumer Sciences, most especially Dr. Dow and Dr. Brown for their encouragement.

My family for their unending support and belief in me at every juncture. A special thought for my late step-father and my father who always saw my potential.

Dr. Frances Murphy, my academic advisor, mentor, and my friend. I feel that I owe a significant part of my academic life to her. Her encouragement has been life-changing. Through her eyes I saw the person I could be, and with her help I become that person more every day. My life is much richer because Frances is a part of it.

TABLE OF CONTENTS

LIST OF TABLES AND GRAPHICS

TABLE

GRAPHIC

CHAPTER I: INTRODUCTION

Background of the Problem

Previous research has shown a clear and consistent gender gap in computer use by older children and adults. Males, in fact, have been shown to be the majority of computer users (Bernhard, 1992; Chen, 1986; Clariana, 1990; Cooper, Hall & Huff, 1990; D'Amico, Baron & Sissons, 1995; DeRemer, 1990; Levin & Gordon, 1989; Lipinski, Nida, Shade & Watson, 1986; Miller, Chaika & Groppe, 1996; Newman, Cooper & Ruble, 1995; Siann, Durndill, Macleod & Glissov, 1988). Therefore, a preponderance of the software programs produced for individuals of all ages is geared toward males. Males are also more likely to have a computer available to them in the home, are more likely to attend computer camps and clubs, and are more likely to be trained in technologically related fields (Chen, 1986; Chrisler, White & Morrissey, 1990). The repeated technological exposure males are receiving often leads to a "patriarchal bureaucracy" in which females possess fewer computer skills and, therefore, are not rivals of males in today's competitive job market (Crawford, 1996).

Nevertheless, research into gender differences in computer use during the preschool years has been inconclusive. Deremer (1989) found that males and females are equal in technological talent and use at young ages, but develop into patterns of discrimination as they become more aware of society's expectations of sex-role behaviors. On the other hand, King and Alloway (1992) discovered a clear dichotomy of use patterns in children as young as four years old.

The gender gap in computer use cannot be seen as conclusive unless prior exposure to technology can be taken into account (Chen, 1986; Levin & Gordon, 1989).

Unfortunately, research has been limited in regard to the effect of previous technological exposure and gender issues on computer use in preschool children.

Purpose

Computers are rapidly becoming a significant part of the landscape of our society's educational and employment systems. Research has clearly shown discrepancies between the use pattern of males and females (Bernhard, 1992; Chen, 1986; Clariana, 1990; Cooper, Hall & Huff, 1990; D'Amico, Baron & Sissons, 1995; DeRemer, 1990; Levin & Gordon, 1989; Lipinski, Nida, Shade & Watson, 1986; Miller, Chaika & Groppe, 1996; Newman, Cooper & Ruble, 1995; Siann, Durndill, Macleod & Glissov, 1988). However, little of the research focused on preschool children. What research has been conducted with preschool children and their use of computers has failed to take prior technological experience into account. The purpose of this descriptive, exploratory research was to investigate prior technological experience and exposure, computer use, and gender issues among preschool children.

Objectives

The following three objectives were addressed in this study:

1) To determine if any difference along gender lines occurs in regard to computer use by preschool children.
2) To determine if any difference along gender lines occurs in regard to the previous technological experiences of preschool children.
3) To determine if a relationship exists between those preschool children who have had previous exposure to technology and their frequency of computer use.

Major Research Questions

Three major research questions were considered in the study:

1) Will males spend more time involved in computer use than females when offered the option as a free-play alternative in a child development laboratory?
2) Will the children who have had previous exposure to technology spend more time involved in computer use than the children who have had no previous exposure to technology when offered the option as a free-play alternative?
3) Is previous technological exposure more indicative than sex of the choice to spend time involved in computer use when the option is offered as a free-play alternative?

Minor Research Questions

Minor research questions were also considered:

1) What type of technological exposure does the population of preschool children have?
2) What type of technological experience does the population of preschool children have?
3) Which sex does the population of preschool children see modeling technological use with more frequency?

Delimitations of the Study

A delimitation of the research study was the population size. The convenience population of 17 preschool children limited the generalizability of the data. Human perception is also a delimitation when observing and recording research of any kind (Touliatos & Compton, 1988).

Operational Definitions

Several operational definitions were needed for clarification for this research project.

1) Technological exposure was defined as having access to a computer either at home, through an extended family member, friend, or parental place of employment. The child may or may not use the computer, but could observe others using the machine.
2) Technological experience was defined as any time spent by the child in actual use of technology, whether alone or with assistance.
3) Technology was defined as any equipment that has an electronic technological component, such as personal computers and video games.
4) Computer use in the laboratory was defined as any observable interaction with the computer. Interaction with the computer included any of the following actions: a child clearly visible in the video screen looking in the direction of the computer, a child engaged in cooperative behavior with any computer user, or a child manipulating the system in any way through the use of the keyboard or mouse.

CHAPTER II: REVIEW OF THE LITERATURE

Introduction

The review of literature concentrated on several areas relevant to the research. Sections of the review included: a) a historical examination of the computer's rise to prominence in a classroom environment and the use of the technology with preschool children; b) cautions associated with young children and computer use; c) positive aspects of young children and computer use; d) gender issues in relation to computer use; e) effects of prior computer experience on gender issues; and f) summary.

A Historical Examination of the Computer's Rise to Prominence in a Classroom Environment and with Preschool Children

Throughout time, educators have been involved in a perpetual search for ways to improve their field. Catching and holding the attention of students has only become more difficult with each passing year. Technological advances have come and gone, and each was touted as the next great educational tool. In the late 19th century, the Magic Lantern was used to display large pictures on a wall. The illumination came from the glow of a flame (Dockterman, 1995). Teachers have also seen film projectors, film strips, and video cassettes move through the system. According to Miller and Olson (1994), this history of educational innovations taught professionals to be cautious when making predictions in association with new technologies. Nevertheless, when computers became available they were almost immediately adopted for use in educational settings. Computers quickly became part of the natural landscape and culture (Shade & Watson, 1990).

Using a computer is so rudimentary that with today's superior technological advances even very young children can be involved with the technology with a minimum of adult

interaction. Preschool and kindergarten students are successful, autonomous users for considerable periods of time (Anselmo & Zinck, 1987). Miller and Olson (1995) reported that children are drawn to technology and are intrinsically motivated to use computers. Clements, Nastasi, and Swaminathan (1993) found that age does not appear to be a limiting factor, as even preschool children could operate a computer using software that required only simple skills. The youngest of children have shown the ability to start the computer, load software, develop keyboard skills, and understand and respond to pictorial or verbal cues.

Shade, Nida, Lipinski, and Watson (1986) stated that:

> It can be inferred that including microcomputers and age-appropriate software as another self-selected activity is indeed feasible. Teachers need not fear losing control of their classrooms due to spending increased amounts of time at the computer station. In other words, just as at most self-selected learning centers, children at the computer station worked fairly independently. (p. 60)

According to Ryba, Selby, and Nolan (1995) the ideas of using technology to empower and to assist students in gaining authority over their scholarship are now acknowledged. However, some researchers see cautions to be addressed in the prevalence of children involved with technology.

Cautions Associated with Young Children and Computer Use

Most early childhood educators integrated technology into the classroom with a theoretical curriculum based on developmental practice. Unfortunately it has been found that computers were not always used in an appropriate manner. Many explanations for this problem have been studied. Miller and Olson (1995) stated that "Teachers may plan to use technology in one manner but, ... children modify these plans through their

actions." (p. 77) On the other hand, Kearsley and Lynch (1992) reported that another idea held true. They found that the majority of teachers had less than ten years experience using computers and, therefore, lacked adequate training. This lack of instruction left teachers in an insecure position. They had been given a mandate to use computers, but they did not have a strong sense of how to accomplish the task of integrating the machines effectively into their curriculum.

Computers are tools. They have been used to encourage divergent thinking or conformity, freedom or limitation, confidence or anxiety (Burg, 1984). David Elkind (1996) was one of the early childhood professionals who saw the jeopardy of computers being used in inappropriate ways. He expressed concern that preschool children's intellectual capacity may be judged based on their performance with computers. Other problems were found. Some software programs have features almost indistinguishable from video games or television. In addition, the high cost of computers forced educators to rush into establishing a technological curriculum to justify their economic outlay. Often these programs were not based on sound theoretical practices (Burg, 1984; Papert, 1993). Despite the drawbacks of integrating computers into an early childhood education program, there is a proliferation of research that points to the advantages of exposing children to technology at a young age.

Positive Aspects of Young Children and Computer Use

The National Association for the Education of Young Children published a position statement on computers and young children in 1996. The organization found that computers were generally used as a supplement to the existing learning environment, not as a replacement for other useful activities. When children were observed using the

computer they showed high levels of cooperation and communication. Furthermore, they expressed themselves in a different manner, often providing a unique perspective into their thought processes. When developmentally appropriate software programs were used in a facility, the software offered children opportunities to develop sensitivities to others from different cultures, ages, sexes, and to those with disabilities. In effect, computers were found to provide children with many productive opportunities to interact with one another and their environment without deleting other valuable aspects of early childhood programs.

In general, early childhood programs studied were found to use computers in almost every area of the curriculum. Haugland (1992) found that computer use in schools facilitated cognitive skills, language, and social development in children. Burg (1984) found that the microcomputer promoted autonomy, self-esteem, and cooperation. These positive aspects of computer use were in addition to the experience fostered by continued exposure to, and experience with, computers. In addition, students across a large range of abilities have been able to use this technology. It should also be noted that computers were fun for students. The fun aspect of technology was found to be especially important to students who had faced difficulties and failures in traditional learning situations (Ryba, Selby & Nolan, 1995).

By using technology, as opposed to more conventional avenues of play, children learned in different ways. Cooperative playing and turn-taking activities were evident during computer use. Children were interdependent, and they enjoyed social interactions. The synthesis of computers and cooperative learning was advantageous for the social, motivational, and cognitive development of children. Researchers (Henniger, 1994; Ryba,

Selby & Nolan, 1995) observed computer centers and found that children preferred using technology in a social manner. Also, even when children were instructed to work independently on a project, they continued communication with one another and assisted each other with problems (Nastasi & Clements, 1993).

Findings consistently suggested that positive social interactions increased as children cooperated in computer environments. Ryba, Selby and Nolan (1995) found that children seemed to learn more from one another than they did from working alone on the computer. Davis and Shade (1994) observed children taking over the role of teacher with their peers when working in a technological setting.

In a 1986 observational study, Shade, Nida, Lipinski, and Watson found that preschool "children's self-generated rules of computer conduct changed from an egocentric turn-taking perspective to a more peer-oriented, teaching role." (p. 58) They reported that children in two separate studies exhibited magnified helping actions toward one another as the research progressed.

Mikropoulos, Kossivaki, Katsikis and Savranides (1994) observed the computer used as a tool for children to conceptualize and understand ideas that were only familiar to them in the most basic manner. They felt that technology provided a sheltered avenue in which children experimented with processes and added depth to their knowledge. In the past it was impossible for children to receive the methodological broadening and the opportunities for exploration of their environment that computers provide. Nevertheless, some researchers (Chen, 1986; DeRemer, 1990; Levin & Gordon, 1989; Lipinski, Nida, Shade & Watson, 1986; King & Alloway, 1992) reported that not all children were

afforded an equal chance. Some experts found significant gender disparity when they observed groups of children using computer systems.

Gender Issues in Relation to Computer Use

Children who use computers become adults who use computers. Technology has played a central role in education and industry for several years. An aversion toward computer use and the lack of application and knowledge of computer skills may become major impairments to those individuals hoping to be effective in anything but the most servile careers (Newman, Cooper & Ruble, 1995). Therefore, the need to determine existing gender discrepancies in computer use habits and isolate their beginnings is of great import for those individuals who work with young children.

Women have been involved in the development of computer technology from the beginning. In fact, Augusta Ada Lovelace wrote the instructions for the first computing machine in the 1800s (Chrisler, White & Morrissey, 1990). In spite of significant historical contributions to the computer sciences by females, Miller, Chaika, and Groppe (1996) reported that the gender gap in the use of technology had become profound. They stated that more males graduated from computer science programs in colleges and universities, and that females perceived themselves as lacking in computer skills and, therefore, did not attempt these programs of study. Chen (1986) found that the faultlines of inequity were stratified along social division in terms of both gender and wealth. The possibility that this perceived gender gap led to females having a deficit in their technological knowledge and skills had alarming implications. As technology became more a part of the fabric of society, computer skills were a significant factor in the

economic deprivation or advancement of numbers of people (Miller, Chaika & Groppe, 1996).

Siann, Durndell, Macleod and Glissov (1988) suggested that intrinsic differences exist between the sexes in regard to their cognitive talents, especially in association with mathematics, science, and technology. Males were found to have superior spatial skills that allowed them to consistently perform well in these areas. Ironically, computers have always used more than just science and mathematics. Computers have been commonly used to process information. Anderson (1987) found that it took mostly linguistic skills to program a computer. However, computer curricula in education continued to originate from the science or mathematics departments in most schools. It then followed that careers involving the use of science, mathematics, and therefore computing, contained occupational discrimination. The effects of this phenomenon included a lower income, less job prestige, and a decreased sense of social status for females (Bernhard, 1992). According to Crawford (1996) females encountered limited alternatives when searching for a career that expected their input or even welcomed them into the ranks.

The experts have been divided in relation to the ideas of where, when, and why this dichotomy comes about. Studies indicated that both male and female children of preschool and elementary school age were equally confident of their technological abilities. In fact, females showed equal or greater interest and skill in computer use (DeRemer, 1990; D'Amico, Baron & Sissons, 1995; Dyck & Smither, 1994; Merrill, Hammons, Vincent, Reynolds, Christensen & Tolman, 1996). Anderson (1987) said "Commonly held expectations and stereotypes of male superiority could well represent a gross distortion of the actual statistical distributions of ability in the population." (p. 50)

On the other hand, just as many studies have found discrepancies in gender and computer usage. King and Alloway (1992) found that in their observation of preschool children, males elected to use the computer with a frequency nearly double that of females. They believe that during self-selected activities the girls did not display the aggressive tendencies needed to secure themselves a turn at the computer center. This hypothesis was shared by Lipinski, Nida, Shade and Watson (1986). Levin and Gordon (1989) found that the males surveyed for their study had more computer exposure and confidence and found computers to be more enjoyable, important, and friendly than did females. In addition, males were more likely to enroll in computer courses and camps and showed a greater interest in technology, both in educational settings and at home (Chen, 1986). Brett (1994) stated that technology tended to be a male-dominated activity. She also found that sex-stereotyping was common. DeRemer (1990) found that males considered technology to be their exclusive domain. He theorized that this male attitude actually influenced female dispositions as the children's sex-roles developed and strengthened. The idea of male domination in computer fields then became a self-fulfilling prophecy, as it were. This idea of male dominance and female learned-helplessness is shared by many experts (Anderson, 1987; Cooper, Hall & Huff, 1990; D'Amico, Baron & Sissons, 1995; Levin & Gordon, 1989; Miller, Chaika & Groppe, 1996; Newman, Cooper & Ruble, 1995).

Therefore, a resolution to this issue has yet to be found. Kay (1992) stated:

> In general, when asked which sex is more positive toward computers, more apt at using computers, and more likely to use a computer, one would be advised to answer 'it depends.' It depends on what attitudes you are measuring, what skills you are assessing, and what the computer is being used for. (p. 278)

Effects of Prior Computer Experience on Gender Issues

Research was limited in regard to the effects of prior technological exposure on gender issues with preschool children, although the topic was studied with primary school students and adults. Levin and Gordon (1989) studied 222 high school students and found that positive attitudes toward technology and the attitude that computers had an important function in daily living were most often found in those students, both male and female, who were computer owners. No studies of the same type of research with preschool children have been found. In a review of research on computers and young children, Clements, Nastasi and Swaminathan (1993) made no mention of studies involving variables related to sex and experience. Kay (1992) showed the same deficiency in a review of related research and stated that "gender does not account for the lion's share of the variance when coupled with experience, aptitude, locus of control and age". (p. 282-283) Along those same lines, in 1994 Dyck and Smither found that when the gender-related research they participated in was controlled for technological experience, no differences between male and female use patterns were in evidence. To the researcher this lack of research pointed to a need for the further examination of technological experience and gender differences among preschool children.

Summary

The review of literature focused on several areas relevant to the research, including: (1) a historical examination of the computer's rise to prominence in a classroom environment and with preschool children; (2) cautions associated with young children and computer use; (3) positive aspects of young children and computer use; (4) gender issues in relation to computer use; and (5) effects of prior computer experience on gender issue.

The computer has quickly taken its place in classrooms serving children of all ages. While some experts warned against the use of technology in preschool settings, many saw the computer as a viable addition to traditional early childhood activities and materials. Some studies on preschool children and computer use have been attempted, however, the literature review indicated a lack of research on observational studies that investigated both technological experience and gender use among preschool children.

CHAPTER III: METHODOLOGY

Research Design

The descriptive, exploratory research was undertaken by using both observational and questionnaire data. The purpose of the study was to investigate prior computer experience and exposure, computer use, and gender issues among preschool children.

Selection and Description of the Population

The nonprobability convenience population consisted of 17 children between the ages of 36 to 72 months. The children were enrolled in a child development laboratory of an east-central Illinois university. Of the 17 children enrolled, seven were females and ten were males. The mean age of the females was 47.6 months, and the mean age of males was 50.1 months as of January 21, the onset of the research. All of the children enrolled in the afternoon session of the program participated in the research study. Prior to enrollment in the child development laboratory, every child's parents signed a consent form giving permission to include their child in research projects.

Research Instrumentation

Two approaches were used for data collection. A video camera was used to record the children's use of the computer during the period of the program when they were allowed to self-select their activities. Video taping is "one of the most accurate ways to observe and record interaction in the group or classroom" (Billman & Sherman, 1996, p. 18). Based on previous research (Boehm & Weinberg, 1997; Medinnus, 1976), the researcher designed a schedule (See Appendix A) to note instances of each child's computer use and the duration of use for each day. Daily totals were then entered into a computer generated master spreadsheet (See Appendix B) used in final data tabulation.

In addition, a Parent Questionnaire was given to each of the children's parents (See Appendix C). Parent Questionnaires gathered data regarding prior computer experience or exposure of the child and any modeling of computer behaviors the child may have observed. The data were hand tabulated using an instrument of the researcher's design (See Appendix D). Experience and exposure data were used to explore major research questions, and modeling data were used to explore minor research questions.

Naturalistic Observational Setting

A naturalistic child development laboratory setting was the environment observed for this study. The computer center was one of seven learning centers in the facility. The area contained space to accommodate several children. Shade and Watson (1990) recommended that computers be used as would any other early childhood play equipment. That was the philosophy adopted by the child development staff. Three developmentally appropriate software programs were available for the children to chose from. The programs were exploratory in nature.

The laboratory followed the National Association for the Education of Young Children's guidelines regarding non-biased environments and curricula. Therefore, the environment, including the computer learning center, was not construed as friendly to either sex at the exclusion of the other.

Video camera equipment was set up to record the computer center. The camera range covered activity in approximately an eight feet by six feet area of the laboratory. The computer was located to the far right of the camera's range. The computer was placed against a wall on its left side (the camera's right) so the entire computer area was visible on the video tape.

A video camera was placed approximately six feet behind the single computer monitor in the laboratory. Research supports the fact that individuals have been shown to alter their standard behavior when they are aware of the fact that they are being observed, a circumstance known as the Hawthorne effect (Cozby, Worden & Kee, 1989). However, the camera was at a distance of several feet from the computer center, and the children did not associate the video camera with what they were doing at the computer. Furthermore, the camera was placed between a wall and an aquarium, which limited the visibility of the equipment.

While the computer center was in the facility four months prior to the onset of research, the computer was not turned on so the children did not use it. Availability of the computer center was established by merely leaving the system activated and ready for use when the children arrived on the first day after a seven week semester break. By having no formal introduction or instruction related to the computer, the researcher avoided presenting any unintentional bias.

The child development laboratory was staffed by one professor, one graduate assistant, who was also the researcher, and approximately 25 upper division university students who were enrolled in a child development practicum course. Each student worked three hours a week in the laboratory as a requirement of the course. At any one time it was expected that six adults would be on the floor with the seventeen children.

One student teacher was assigned to the computer center each day as a facilitator for the children. The student helped install the programs the children used and interpreted any screen instructions that the children found difficult to decipher. The student's role while engaged at the computer center was no different than while at any other learning center of

the laboratory. The child development practicum students were not aware of the focus of this research and did not participate in any way.

Procedures for Observational Data Collection

The researcher viewed the video taped segments, identified the variables of the study, and recorded data on the modified event sampling schedule and computer generated master spreadsheet. Video camera equipment was activated prior to the first child's arrival in the afternoon laboratory session and turned off at the end of the free play time. Free play time was the first scheduled block in the one hour and fifty minute session. The average observational session lasted 57 minutes, the shortest session was 27 minutes and the longest session was 78 minutes. The children attended the child development laboratory five days a week. Video-taping of the program was underway from January 22, 1997, until March 28, 1997. After allowing for scheduled university holidays and weekend days, there were 39 days of observation. The researcher completed a total of 2208 minutes of observation.

According to Haugland (1992) children are expected to engage in initial reactions to a new system that are not reflective of their responses after extended exposure. According to Clariana (1990) the duration of a study of children and computers must have enough length to control for the novelty effect a new technological system will bring. The researcher designed the study to control for subjects' contamination.

The video tape was viewed and computer use noted through the use of a modified event sampling schedule. Generally, each video tape was reviewed daily on standard speed, however, no more than 48 hours passed between taping and viewing the tape of a session.

The camera used to record the children had a built-in date and time feature, which was activated daily during taping in the laboratory. This feature allowed the researcher to refer to the time, which was recorded in the lower right corner of the screen, as each child either entered or exited the viewing area.

Each child's name was listed on the modified event sampling schedule; beside the name was an area to note the presence of the observational variables. Approximately twenty minutes additional tabulation was required daily to total the minutes each child used the computer and the number of times each child approached the computer center and to record the data on a computer generated master spreadsheet.

An inter-observer reliability check was conducted at the beginning of the study, on January 31, 1997. On March 28, 1997 an inter-rater reliability check was performed upon completion of observational data collection. Both the inter-observer and the inter-rater reliability checks resulted in a 100% reliability rate. The researcher trained a graduate assistant in the School of Family and Consumer Sciences Child Development Laboratory as an observer and rater. This student had completed a research methods course, and the researcher provided approximately ten minutes of instruction on the specific sampling procedure and on operational definitions relevant to this study.

Observational Data Analysis

The observational data collected, recorded, and summarized were arranged on a spreadsheet. Analysis of the observational data began by tabulating each child's average computer use per hour of availability. The researcher totaled the hours that the computer was turned on and available for the children to select for use. Absences for each child were also totaled to determine the hours each child was present and available to select the

computer as a free-play option. The researcher addressed each child and tabulated the total computer hours available to that individual child in the 39 day observation period and the total hours she or he chose to select the computer as a free-play option in that 39 day observation period. The average number of minutes of computer use that the child engaged in for each hour of computer availability was computed.

The group mean and the median of the number of minutes of computer use for each sex were calculated. The range, variances and standard deviation were also calculated. A correlation between the number of times each child approached the computer screen and the minutes of use in which the child engaged was also explored. A t-test was done to address statistical significance. The computer program, EXCEL, by Microsoft Products was used by the researcher for the final analysis.

Parent Questionnaire and Procedures for Data Collection

Data pertaining to the prior technological exposure and experience of each child were collected through the use of a 15 item, closed-ended Parent Questionnaire. Parent Questionnaires were mailed to the homes of each of the 17 children enrolled in the laboratory program. A cover letter (See Appendix E) briefly explained the research and gave the parents of the children the option of completing the Parent Questionnaire and returning it to the facility or meeting with the researcher either before or after the laboratory session and completing the Parent Questionnaire orally.

Content validity of the Parent Questionnaire was determined by a panel of three Child Development/Family Life professors. The technological content of the questionnaire was determined by two professionals from Oce Bruning Manufacturing who had experience with both computers and testing instruments. In addition, the Parent Questionnaire was

critiqued by a former English instructor for structural and grammatical accuracy. The instrument was pilot tested with three parents not affiliated with the child development laboratory, and the researcher made one change in the instrument.

Items on the Parent Questionnaire were assigned a numerical value according to themes of computer exposure and experience or the modeling of computer behavior by others. Questions number 1, 3, 4, 5, 10, 12, 13, 14 and 15 addressed the computer exposure and experience that the children engaged in. The Parent Questionnaire addressed three types of exposure and experience; a computer present in the home, a computer present in the home of a friend, child care provider, extended family member, or place of employment in which the child had access, and video games. Parent Questionnaire items 2, 6, 7, 8, 9 and 11 addressed computer modeling behaviors that the children observed.

Parent Questionnaire Data Preparation

Items on the Parent Questionnaires were assigned a numerical value according to themes of computer exposure and experience and the modeling of computer use as determined by the researcher. Based on previous research (Chen, 1986; Levin & Gordon, 1989) computer experience received more weight than did computer exposure. The most points a Parent Questionnaire could receive was 77. Items referring to individuals in the child's environment who modeled computer use were grouped by sex to discuss later minor research questions. Parent Questionnaires were hand-tabulated by the researcher.

Parent Questionnaire Data Analysis

The quantitative data collected by the Parent Questionnaire were used (a) to identify the types and amount of technological exposure and experience each child had outside of

the child development laboratory, (b) to explore the relationship of exposure and experience to computer use in the child development laboratory, (c) to determine if these exposures and experiences fell into gender lines, (d) to determine if they correlated with observed behaviors documented by video tape, and (e) to explore sex-role modeling of computer use. The self-report frequency data collected were presented in cross tabulation tables. The researcher compiled the data for each child and grouped them according to sex. The mean and the median of computer exposure and experience for each sex were calculated, as were the range, variances and standard deviation. Again, the software package EXCEL by Microsoft was used for statistical analysis.

A scattergram was then used to present a preliminary visual relationship between the amount of computer exposure and experience a child had and the incidences of computer use that were observed in the laboratory setting (See Appendix F).

Summary of Data Analysis

Descriptive statistical methods allowed the researcher to explore the following variables:

1) general amounts of observable computer use of preschool children.
2) sex and amount of time spent involved in observable computer use by preschool children.
3) type and amount of prior technological exposure and experience of preschool children.
4) prior technological exposure and experience of preschool children along gender lines.
5) modeling behaviors preschool children have been exposed to regarding the use of technology.

CHAPTER IV: RESULTS AND DISCUSSION

The purpose of this descriptive, exploratory research was to investigate prior technological experience and exposure, computer use, and gender issues among preschool children. The results were analyzed according to the following three major research objectives of the study:

1) To determine if any difference along gender lines occurs in regard to computer use by preschool children.
2) To determine if any difference along gender lines occurs in regard to the previous technological exposure and experience of preschool children.
3) To determine if a relationship exists between those preschool children who have had previous exposure to and experience with technology and their frequency of computer use.

Gender Differences in Regard to Computer Use by Preschool Children

The first research objective was to determine if any differences along gender lines occurred in regard to computer use by preschool children. Past research into the use patterns of preschool children had been found to be contradictory. Kay (1992) stated that determining if one sex showed preference toward the computer at the exclusion of the other was dependent on many factors. The researcher used nonintrusive, systematic observational techniques to video tape 17 children in a developmentally appropriate early childhood program. Ten males and seven females, with ages ranging from three to five years old, were taped for thirty-nine days. Each daily session lasted an average of 57 minutes; a total of 2208 minutes of observational data were collected. The children were taped during the self-selected activities period of the day. The researcher placed the

facility's computer center in view of the video equipment and activated the camera before the children arrived for the day.

Video tape was viewed daily and each child's total computer use for the day was reported through the use of a structured event sampling schedule (See Appendix A). The instrument listed each child enrolled in the laboratory in alphabetical order. Beside each child's name was an area to record the time the child entered and then exited the computer center. Each child's daily total of computer time was tabulated and transferred to a spreadsheet (See Appendix B). After all the observational data were collected the spreadsheet was prepared and the information analyzed.

Analysis of the observational data began by tabulating each child's average computer use per hour of availability. Data were then grouped according to sex. The females were combined as were the males, and averages were computed. The mean and median for each sex were computed as the measures of central tendency. Range, variance, and standard deviation for each sex were also calculated.

The females chose computer use as a free play option an average of 9.99 minutes for each hour of its availability to them. The median time of computer use was 10.2 minutes per hour of availability for females. The female children's use varied from 2.29 to 21.8 minutes per hour of availability, for a range of 19.51 minutes. The standard deviation was 7.61, and the variance was 57.91 for females. A .71 correlation was found between the number of times the females approached the computer center and the minutes of actual computer use by females. These data showed that, generally, if a female approached the computer center, she was also able to use the equipment (See Table 1).

Table 1

Minutes of Computer Use and Number of Approaches to Computer Center by Females

Females (n=7)	Minutes Used Per Hour of Availability	Num. of Approaches Per Hour of Availability
1) FA	2.68	0.49
2) FB	13.06	1.3
3) FC	10.2	2
4) FD	2.29	0.29
5) FE	16.5	1.86
6) FF	3.4	0.98
7) FG	21.8	1.41
Mean	**9.99**	**1.19**
Median	**10.2**	**1.3**
Variance	**57.91**	**0.42**
Std. Dev.	**7.61**	**0.65**
Range	**19.51**	**1.71**

Males used the computer slightly more than did females. The males chose the computer an average of 12.75 minutes per hour of availability. The median time of computer use was 13.41 minutes per hour of availability for males. The male children's use varied from 0.21 to 27.41 minutes per hour of availability for a range of 27.2 minutes. The standard deviation was 7.87, and the variance was found to be 61.90 for males. A .76 correlation was found between the number of times the males approached the computer center and the actual minutes of use per hour of availability. These data showed that, like females, if a male approached the computer, he was also able to use the equipment (See Table 2). A t-test was performed with an alpha level of .05. The result of .4807 showed that there was no statistical difference between the sexes in regard to computer use in the laboratory.

Table 2

Minutes of Computer Use and Number of Approaches to Computer Center by Males

Males (n=10)	Minutes Used Per Hour of Availability	Number of Approaches Per Hour of Availability
1) MA	12.52	1.69
2) MB	10.54	1.80
3) MC	27.41	1.61
4) MD	9.64	1.20
5) ME	14.30	1.19
6) MF	16.61	1.93
7) MG	2.26	0.45
8) MH	15.15	1.36
9) MI	18.85	2.04
10) MJ	0.21	0.28
Mean	**12.75**	**1.36**
Median	**13.41**	**1.49**
Variance	**61.90**	**0.36**
Std. Dev.	**7.87**	**0.60**
Range	**27.2**	**1.76**

Gender Differences in Technological Exposure and Experience of Preschool Children

The second research objective determined if a difference occurred in regard to sex and the previous technological exposure or experiences of preschool children, and was measured by the Parent Questionnaire on Child's Exposure to Technology (See Appendix C). Questions number 1, 3, 4, 5, 10, 12, 13, 14 and 15 addressed the children's computer exposure and experience while questions 2, 6, 7, 8, 9 and 11 addressed computer modeling behaviors that the children observed. The maximum points a Parent Questionnaire could receive was 77 (See Appendix D). Parent Questionnaires were mailed to the home of each of the 17 children enrolled in the laboratory program. A cover letter (See Appendix E) briefly explained the research and gave the parents of the children

the option of completing the Parent Questionnaire and returning it to the facility or meeting the researcher either before or after the laboratory session and completing the questionnaire orally. Of the 17 Parent Questionnaires sent to the parents, 16 were completed and returned to the researcher, for a 94% response rate. The child whose parents did not return the Parent Questionnaire was female.

Items on the Parent Questionnaires were assigned a numerical value according to themes of computer exposure and experience. Computer experience received a higher point scale than did computer exposure. Levin and Gordon (1989) stated that those individuals who have a computer in their home tend to develop the attitude that computers are a significant part of their lives and are more motivated to become familiar with the uses of the systems. Furthermore, Chen (1986) found that computer ownership signified greater parental encouragement in regard to children's use of the systems.

Items referring to those individuals in the preschool child's environment who modeled computer use were also analyzed by gender and frequency. These items were used to explore the minor research questions addressed in the study.

The Parent Questionnaires were hand-tabulated. The maximum points a Parent Questionnaire could receive was 77. Average points received on the 16 Parent Questionnaires were 24.7, the highest score was 44 points and the lowest score 4 points, for a range of 40 points. Parent Questionnaire scores were then grouped according to sex.

Female children were shown to have similar amounts of technological exposure and experience to males. Males scored an average of 24.6 points on the Parent Questionnaires; the scores spread from 4 to 44 points, for a range of 40.0. The standard deviation was 14.3, and the variance was 204.49. Females scored an average of 24.8

points on the Parent Questionnaires, the scores spread from 9 to 36 points, for a range of 27 points. The standard deviation was 12.8 and the variance was 163.77. A t-test was performed on the data (0.9736) and no statistical significance was found.

Comparison of Computer Exposure and Experience to Hours of Computer Use

The third research objective was to determine if a relationship existed between those preschool children who have had previous exposure to, or experience with, technology and their frequency of computer use. In addressing this objective, Parent Questionnaire data were used in conjunction with observation data (See Tables 1 & 2). Numerical values of computer exposure and experience were compared to minutes of computer use per hour of availability for each child (See Table 3).

Table 3

Comparison of Computer Exposure and Experience to Computer Use

	Males (n=10)		**Females (n=6)**	
	Experience & Exposure	**Use**	**Experience & Exposure**	**Use**
	1)MA 43	12.52	1)FA 36	2.68
	2)MB 24	10.54	2)FB 26	13.06
	3)MC 13	27.41	3)FD 33	2.29
	4)MD 24	9.64	4)FE 9	16.5
	5)ME 43	14.30	5)FF 9	3.4
	6)MF 44	16.61	6)FG 36	21.8
	7)MG 4	2.26		
	8)MH 20	15.15		
	9)MI 20	18.85		
	10)MJ 11	0.21		
Mean	**24.60**	**12.75**	**24.83**	**9.96**
Median	**22.00**	**13.41**	**29.50**	**8.23**
Range	**40.00**	**27.20**	**27.00**	**19.51**
Variance	**204.49**	**61.90**	**163.77**	**69.49**
Std. Dev.	**14.30**	**7.87**	**12.80**	**8.34**

Data were plotted on a scattergram for visual presentation (See Appendix F). Overall, the amount of experience and exposure of each child did not seem to be related to the time he or she spent using the computer in the laboratory.

Minor Research Questions

Minor research questions were also addressed in this study. These questions all related to preschool children and their past involvement with technology. Parent Questionnaires that were used to collect data from each child's parents in reference to their experience with and exposure to technology away from the laboratory were used. The descriptive data gathered to investigate the three minor research questions were purely exploratory.

The first two minor research questions addressed the preschool children's type of technological exposure and experience. The Parent Questionnaire included three types of exposure and experience: a computer present in the home, a computer present in the home of a friend, child care provider, extended family member, or place of employment in which the child had access, and video games. The presence of a computer in the home was scored higher by the researcher than any other type of exposure.

Twelve of the 16 children in the child development laboratory for whom the Parent Questionnaires were returned had computers in their homes; all of these children used those computers 0-5 hours a week or more, with the exception of one child, who never used the computer in his home. Two of the computer owners had additional contact with others who owned a computer; one computer owner also owned a video game system; and two computer owners were exposed to a computer elsewhere in addition to owning a video game system. The ownership of a video game system was worth noting due to the similarities between some computer games and video games in terms of graphics, child

controls, and objectives of the games (D'Amico, Baron & Sissons, 1995; Miller, Chaika & Groppe, 1996).

Four of the children in the study did not have a computer present in their homes. Of those four children, three had computer exposure and experience through a friend, extended family member, or noncustodial parent. Each of the three children used the computers outside of their homes from 0-5 hours a week. One child had no exposure to computers whatsoever; however, he did have a video game system in his home. One child had both video game experience and access to a computer outside of the home.

The third minor research question addressed the modeling of computer behaviors by significant individuals in the preschool children's lives. Of the twelve children who had a computer in their home, five of the parents stated that a male adult was the primary user of the system, one identified a female adult as the primary user, three described an adult male and an adult female as equal users, and the remaining three stated that the child or a sibling were the primary computer users. The operators of the computers outside of the children's homes were not addressed in the Parent Questionnaire.

The Parent Questionnaire also asked who was consulted if a computer question or problem arose in the home. This item would suggest who in the home environment was considered the computer "expert", and therefore may be seen by the child as more knowledgeable about the systems. Eight respondents stated that males answered the computer questions, four said that females answered the computer questions. Males modeled computer competency skills with twice the frequency as females.

CHAPTER V: SUMMARY, CONCLUSION, & RECOMMENDATIONS

Summary

The purpose of this descriptive, exploratory research was to investigate technological experience and exposure, computer use, and gender issues among preschool children. The nonprobability convenience population consisted of 17 children, ten males and seven females, between the ages of 36-72 months.

Naturalistic observation occurred through video taping of a child development laboratory. The researcher completed a total of 2208 minutes of observation. A modified event sampling schedule was used to record the variables of frequency and duration of computer use by each sex. Females chose the computer center as a free-play option an average of 9.99 minutes per hour of availability. The males used the computer 12.75 minutes per hour of availability. The male's average use was higher than the female's average; however, a t-test found no statistical significance between the sexes. It can be said that both males and females used the computer a comparable amount of time when it was offered for selection as a free-play option.

When children, male or female, approached the computer, they generally engaged in computer use and were not hesitant in any way. Every child in the study used the computer center at some point during the research.

Parents completed a closed-ended Parent Questionnaire to measure of the children's prior technological exposure and experience. Female children were shown to have similar amounts of technological exposure and experience to males. While the averages were similar, with females at 24.8 and males at 24.6 points out of a possible 77, closer inspection of the range of data was informative. Among the males, three scored in the

lower to mid-40's, while the highest female score was 36 points. In addition, one male scored less than ten points on the Parent Questionnaire, while three females scored less than ten.

Although a relationship between prior technological exposure and experience and use in the child development laboratory was not evident, some findings were noteworthy. For example, the child with the most minutes of computer use per hour of availability, at 27.41, scored only 13 points on the experience and exposure scale, which was well below the average of 24.7. Age appeared to play a greater part in the children's likelihood to use computers than gender. Three out of four of the highest computer users in the facility were the oldest children in the class. Furthermore, the two children with the lowest use in the laboratory, at 0.21 and 2.26 minutes per hour of availability, were significantly younger than the other children in the program.

All 16 of the children whose parents completed Parent Questionnaires had some type of computer exposure. The child with the lowest exposure rating only had access to a video game system which he played 0-5 hours a week. The child with the highest rating had a computer in his home, a computer he used in another setting, and a video game system.

Twelve of the 16 respondents owned a computer system. Of those 12 children, five saw an adult male as the primary user of the system, one saw an adult female as the primary user of the system, and three saw both an adult male and an adult female as equal users. The remaining respondents stated that either the child or a sibling used the computer with the most frequency. When a computer problem arose, in eight instances it was an adult male who was called on to solve the problem; and in only four instances was

it an adult female. In general, the preschool age children saw men using the computers with more frequency and used the men more to help solve their computer problems.

Limitations

The sample size of 17 children made the data impossible to generalize to preschool children as a whole. Although the data were from a culturally diverse population, it must be noted that the parents voluntarily registered their children in the child development laboratory for enrichment, not child care. These parents likely placed value on education and educational equipment and materials.

Conclusion

Both the major and the minor research questions of this exploratory study addressed gender differences in computer use, exposure, and experience with regard to preschool children. Very little difference, according to sex, was found at any point during the research. The only segment of the study in which differences were evident were in regard to modeling behavior that the children observed outside of the laboratory setting.

Children saw men modeling computer use and competency skills with greater frequency than they did women. Men were the majority of home computer users and were called on to answer computer questions in most of the families in the study. DeRemer (1990) found that men felt comfortable in control of technology and believed it should be their area of expertise. He theorized that this male attitude could influence female attitudes as children develop sex-roles and identities. The idea of male domination in computer fields then becomes a self-fulfilling prophecy, as it were. This idea of male dominance and female learned-helplessness is shared by many experts (Anderson, 1987;

Cooper, Hall & Huff, 1990; D'Amico, Baron & Sissons, 1995; Levin & Gordon, 1989; Miller, Chaika & Groppe, 1996; Newman, Cooper & Ruble, 1995).

Past research has been inconclusive in regard to the subject of computer use and preschool children, with some studies showing little or no sex differences and some studies showing strong differences. While the small population used in this study prohibited generalization to preschool children as a whole, the results do support the past research that little or no difference exists between male and female preschool children's computer use patterns, exposure, and experience (Anderson, 1987; DeRemer, 1990; D'Amico, Baron & Sissons, 1995; Dyck and Smither, 1994; Merrill, Hammons, Vincent, Reynolds, Christensen & Tolman, 1996).

Recommendations

Based on this exploratory study, several recommendations for further research on the use of computers with preschool children are proposed. The following research suggestions are recommended by the researcher:

1. A case study of a preschool child in a developmentally appropriate program over a period of several years would give researchers the opportunity to explore the use patterns of a child as she or he aged and moved through the program. The two children in this study with the lowest amounts of use of the computer in the laboratory were also the two youngest children in the facility, at the ages of 36 and 38 months. In addition, three of the four highest computer users were the oldest children enrolled in the program. This information suggests a relationship between age and computer use.
2. The observation of several facilities to provide both a larger and a more diverse population.

3. A longitudinal study that tracked the same children throughout their scholastic careers would indicate whether gender use patterns stayed consistent with the findings of this research as the children grew older. Past research has shown that even when the sexes show comparable computer use in the preschool and grade school years, when they reach adolescence and adulthood, males were using computers more often and more efficiently than were females (Anderson, 1987; Cooper, Hall & Huff, 1990; D'Amico, Baron & Sissons, 1995; Levin & Gordon, 1989; Miller, Chaika & Groppe, 1996; Newman, Cooper & Ruble, 1995).
4. Research of children's preferences of computer input devices and software packages would help early childhood professionals equip their programs to increase the computer system's effectiveness as a learning tool.

In addition to the above recommendations, the researcher considers the following points to be of importance when using computers with preschool children:

1. Adequate space and equipment for preschool children's computer use needs to be provided in the home or child development program.
2. The computer is only as good as the software used on the system. Software packages should be chosen carefully. Experts' advice should be followed on how to provide developmentally appropriate software for use with preschool children of differing ages, ability levels, sexes, and cultural backgrounds.
3. When children feel safe they will explore and, in turn, grow and learn. An adult to assist the children as they experiment with the computer system seems to be imperative for preschool children. The teacher should be available to help the children with turn-taking, deciphering screen commands, navigating the mouse, and changing software

programs. In addition, the primary user of the computer should be safe from aggressive interruptions and unwanted assistance from other children. This practice allows the more passive, and the younger children to find their place in the computer environment without feelings of intimidation.

4. Support and encouragement should be provided to both sexes as they experiment with the systems. It is easy for adults to fall into stereotypical behavior patterns and show gender preference at the computer.
5. Parent education would help the family become more aware of gender modeling behaviors at home. Modeling behavior sends a very powerful message to young children. Twice as many males were seen as primary users of the computer in homes than were females. If more adult females in children's lives used computers in front of them, they would learn that technology is for everyone.

In conclusion, computer skills are important to our society. As we move into the Information Age, those with technological abilities will be better equipped to find employment, and to excel at their chosen vocation. Past research has shown that adult men use the computer more than adult women. However, according to this study, preschool girls use the computer the same amount of time as do boys. It is important to help today's preschool computer users grow into tomorrow's adult computer users, regardless of their sex.

Sex-role modeling sends a powerful message to children. Twelve children in this study had a computer in their home. Men were seen using these computers more often and were called on to answer computer questions with a greater frequency than the women in the home. Children take their cues from adults. If more men are modeling computer use and

competency skills, it stands to reason that as children grow and form solid sex-role beliefs, they will adapt the behaviors that they see modeled by those they trust and respect.

Both boys and girls should be encouraged to be computer users. This generation of preschool children is one of the first to grow up with technology at their fingertips. Children's innate curiosity and excitement for new experiences make them natural computer users. Every child involved in this study used the computer center at some point, their past exposure to technology and experience with computers did not affect either the frequency or the duration of their use. If this initial interest in computers is nourished, there is every reason for these children to continue to feel comfortable and competent using computers when they become adults, regardless of their sex.

REFERENCES

Anderson, R. E. (1987). Females surpass males in computer problem solving: Findings from the Minnesota Computer Literacy Assessment. Journal of Educational Computing Research, 3, (1), 39-51.

Anselmo, S., & Zinck, R. A. (1987). Computers for young children? Perhaps. Young Children, 42, (3), 22-27.

Bernhard, J. K. (1992). Gender-related attitudes and the development of computer skills: A preschool intervention. The Alberta Journal of Educational Research, 38, (3), 177-188.

Billman, J., & Sherman, J. A. (1996). Observation and participation in early childhood settings: A practicum guide. Needham Heights, MA: Allyn & Bacon.

Boehm, A. E. & Weinberg, R. A. (1997). The classroom observer: Developing observation skills in early childhood settings (pp. 93-95). New York: Teacher's College Press.

Brett, A. (1994). Computers and social development of young children. Dimensions of Early Childhood, Fall 10-13.

Burg, K. (1984). The microcomputer in the kindergarten: A magical, useful, expensive toy. Young Children, 39, (3), 28-33.

Chen, M. (1986). Gender and computers: The beneficial effects of experience on attitudes. Journal of Educational Computing Research, 2, (3), 265-282.

Chrisler, J. C., White, W. L., & Morrissey, K. A. (1990). Sex and gender-role as predictors of attitudes toward computers: The gap narrows. Connecticut College Psychology Journal, 5, 38-44.

Clariana, R. B. (1990). Gender and ability differences in galvanic skin response during pair and individual computer-assisted math instruction. Journal of Computing in Childhood Education, 2, (1), 69-82.

Clements, D. H., Nastasi, B. K., & Swaminathan, S. (1993). Young children and computers: Crossroads and directions from research. Young Children, 48, (2), 56-64.

Cooper, J., Hall, J., & Huff, C. (1990). Situational stress as a consequence of sex-stereotyped software. Personality and Social Psychology Bulletin, 16, (3), 419-427.

Cozby, P., Worden, P., & Kee, D. (1989). Research methods in human development (p. 139). Mountain View, CA: Mayfield.

Crawford, S. H. (1996). Beyond dolls and guns: 101 ways to help children avoid gender bias. Portsmouth, NH: Heinemann.

D'Amico, M., Baron, L. J., & Sissons, M. E. (1995). Gender differences in attributions about microcomputer learning in elementary school. Sex Roles, 33, (5/6), 353-385.

Davidson, J. I. (1989). Children and computers together in the early childhood classroom. Albany, NY: Delmar.

Davis, B. C., & Shade, D. D. (1994). Integrate, don't isolate: Computers in the early childhood curriculum. University of Illinois: ERIC Clearinghouse on Elementary and Early Childhood Education, #EDO-PS-94-17.

DeRemer, M. (1990). The computer gender gap in elementary school. Computers in Schools, 6, (3/4), 39-48.

Dockterman, D. A. (1995). Interactive Learning: It's pushing the right buttons. Educational Leadership, 53, (2), 58-59.

Dyck, J., & Smither, J. A. (1994). Age differences in computer anxiety: The role of computer experience, gender and education. Journal of Educational Computing Research, 10, (3), 239-248.

Haugland, S. W. (1992). The effect of computer software on preschool children's developmental gains. Journal of Computing in Childhood Education, 3, 15-30.

Henniger, M. L. (1994). Computers and preschool children's play: Are they compatible? Journal of Computing in Childhood Education, 5, 231-239.

Hoot, J. (1986). Computers in early childhood education: Issues and practices. Englewood Cliffs, NJ: Prentice-Hall.

Kay, R. (1992). An analysis of methods used to examine gender differences in computer-related behavior. Journal of Educational Computing Research, 8, (3), 277-290.

Kearsley, G., & Lynch, W. (1992). Educational leadership in the age of technology: The new skills. Journal of Research on Computing in Education, 25, (1), 50-60.

King, J., & Alloway, N. (1992). Preschooler's use of microcomputers and input devices. Journal of Educational Computing Research, 8, (4), 451-468.

Levin, T. & Gordon, C. (1989). Effect of gender and computer experience on attitudes toward computers. Journal of Educational Computing Research, 5, (1), 69-88.

Lipinski, J. M., Nida, R. E., Shade, D. D., & Watson, J. A. (1986). The effects of microcomputers on young children: An examination of free-play choices, sex differences, and social interactions. Journal of Educational and Computing Research, 2, (2), 147-168.

Medinnus, G. R. (1976). Child Study and Observation guide (pp. 17-25). New York: John Wiley and Sons, Inc.

Merrell, P., Hammons, K., Vincent, B., Reynolds, P., Christensen, L, & Tolman, M. (1996). Computers in education. Needham Heights, MA: Allyn & Bacon.

Mikropoulos, T. A., Kossivaki, P. K., Katsikis, A., & Savranides, C. (1994). Computers in preschool education: An interactive environment. Journal of Computing in Childhood Education, 5, (3 /4), 339-351.

Miller, L., Chaika, M., & Groppe, L. (1996). Girls' preferences in software design: Insights from a focus group. Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, 4, (2), 27-36.

Miller, L., & Olson, J. (1994). Putting the computer in its place: A study of teaching with technology. Journal of Curriculum Studies, 26, (2), 121-141.

Miller, L., & Olson, J. (1995). How computers live in schools. Educational Leadership International, 53, (2), 74-77.

Nastasi, B. K., & Clements, D. H. (1993). Motivational and social outcomes of cooperative computer education environments. Journal of Computing in Childhood Education, 4, (1), 15-43.

National Association for the Education of Young Children (1996). NAEYC position statement: Technology and young children-ages three through eight. Young Children, 51, (6), 11-16.

Newman, L. S., Cooper, J., & Ruble, D. N. (1995). Gender and computers. II. The interactive effects of knowledge and constancy on gender-stereotyped attitudes. Sex Roles, 33, (5/6), 325-351.

Papert, S. (1993). The children's machine: Rethinking school in the age of the computer. New York, NY: Basic Books.

Ryba, K., Selby, L., & Nolan, P. (1995). Computers empower students with special needs. Educational Leadership International, 53, (2), 82-84.

Shade, D. D., Nida, R. E., Lipinski, J. M., & Watson, J. A. (1986). Microcomputers and preschoolers: Working together in a classroom setting. Computers in the Schools, 3, (2), 53-61.

Shade, D. D., & Watson, J. A. (1990). Computers in early education: Issues put to rest, theoretical links to sound practice, and the potential contribution of microworlds. Journal of Educational Computing Research, 6, (4), 375-392.

Siann, G., Durndell, A., Macleod, H., & Glissov, P. (1988). Stereotyping in relation to the gender gap in participation in computing. Educational Research, 30, (2), 98-103.

Touliatos, J. & Compton, N. H. (1988). Research methods in human ecology/home economics. Ames, IA: Iowa State University press.

Wright, J. L. & Shade, D. D. (Eds.). (1994). Young children: Active learners in a technological age. Washington, DC: National Association for the Education of Young Children.

APPENDIXES

Appendix A
Modified Event Sampling Schedule

Date_____

	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
FA													
MA													
FB													
MB													
FC													
MC													
FD													
MD													
FE													
ME													
FF													
MF													
FG													
MG													
MH													
MI													
MJ													

Appendix B
Master Spreadsheet

DAY	1	2	3	4	5	6	7	8
DATE								
AVAILABILITY								
ADAM								
ALETA								
ALLISON								
ASHLEY								
DANIEL								
ERIN								
JACOB								
JOHN								
KEVIN								
LEE								
MADELINE								
MAHIR								
NICHOLAS								
RAGE								
TABALITHA								
TOMMY								
TYLER								

Appendix C

PARENT'S QUESTIONNAIRE ON CHILD'S EXPOSURE TO TECHNOLOGY

Instructions: Please circle the answer that most closely applies to your family situation. The term " YOUR CHILD" refers to the child enrolled in the child development laboratory. Thank you.

1. Do you own a computer? YES NO

If your answer is NO, please move on to question #10

2. If so, who is the primary user of the computer?

FATHER MOTHER SIBLING CHILD

OTHER (PLEASE SPECIFY) _____

3. On an average, how many hours a week is the computer used?

0-5 6-10 11-15 15 or more

4. On an average, how many hours a week does your child use the computer?

NOT AT ALL 0-5 6-10 11-15 15 or more

5. Is your child able to use the computer alone? YES NO

6. When your child requires assistance with the computer, who is called to provide that assistance? (circle all that apply)

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

7. Does your child observe anyone in the family using the computer?

YES NO

8. Who does the child observe with the computer most often?

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

9. If a computer question arises in your home, who is generally called on to answer?

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

10. Does anyone in either your extended family or your circle of friends own a computer that your child is exposed to?

YES NO

If your answer is NO, please move on to question #14

11. Who? (circle all that apply)

FRIEND GRANDPARENT OTHER EXTENDED FAMILY

CHILD CARE PROVIDER PLACE OF EMPLOYMENT

OTHER (PLEASE SPECIFY) _____

12. On an average, how many hours a week does your child use that/those computer(s)?

NOT AT ALL 0-5 6-10 11-15 15 OR MORE

13. On an average, how many hours a week does your child observe others using that/those computer(s)?

NOT AT ALL 0-5 6-10 11-15 15 OR MORE

14. Do you own a SEGA/NINTENDO, etc? YES NO

15. On an average, how many hours a week does your child use the system?

NOT AT ALL 0-5 6-10 11-15 15 OR MORE

Thank you for completing this survey, if you have any comments please feel free to add them in this area:

Appendix D
Tabulation Instrument

PARENT'S QUESTIONNAIRE ON CHILD'S EXPOSURE TO TECHNOLOGY

Instructions: Please circle the answer that most closely applies to your family situation. The term " YOUR CHILD" refers to the child enrolled in the child development laboratory. Thank you.

1. Do you own a computer? YES 10 pts NO 0 pts
   If your answer is NO, please move on to question #10

2. If so, who is the primary user of the computer?

   FATHER MOTHER SIBLING CHILD

   OTHER (PLEASE SPECIFY) _____

3. On an average, how many hours a week is the computer used?

   0-5 2 pts 6-10 3 pts 11-15 4 pts 15 or more 5 pts

4. On an average, how many hours a week does your child use the computer?

   NOT AT ALL 0 pts 0-5 5 pts 6-10 10 pts 11-15 15 pts 15 or more 20 pts

5. Is your child able to use the computer alone? YES 5 pts NO 0 pts

6. When your child requires assistance with the computer, who is called to provide that assistance? (circle all that apply)

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

7. Does your child observe anyone in the family using the computer?

YES NO

8. Who does the child observe with the computer most often?

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

9. If a computer question arises in your home, who is generally called on to answer?

FATHER MOTHER SIBLING

OTHER (PLEASE SPECIFY) _____

10. Does anyone in either your extended family or your circle of friends own a computer that your child is exposed to?

YES 3 pts NO 0 pts

If your answer is NO, please move on to question #14

11. Who? (circle all that apply)

FRIEND GRANDPARENT OTHER EXTENDED FAMILY

CHILD CARE PROVIDER PLACE OF EMPLOYMENT

OTHER (PLEASE SPECIFY) _____

12. On an average, how many hours a week does your child use that/those computer(s)?

NOT AT ALL 0 pts 0-5 5 pts 6-10 10 pts
11-15 15 pts 15 OR MORE 20 pts

13. On an average, how many hours a week does your child observe others using that/those computer(s)?

NOT AT ALL 0 pts 0-5 1 pt 6-10 2 pts
11-15 3 pts 15 OR MORE 4 pts

14. Do you own a SEGA/NINTENDO, etc? YES 2 pts NO 0 pts

15. On an average, how many hours a week does your child use the system?

NOT AT ALL 0 pts 0-5 2 pts 6-10 4 pts
11-15 6 pts 15 OR MORE 8 pts.

Lumpkin College of Business and Applied Sciences
School of Family and Consumer Sciences
Charleston, IL 61920-3099
Office: 217-581-6076
FAX: 217-581-6090

March 27, 1997

Dear Theresa,

Through my experiences with my own children in the laboratory and as the graduate assistant to Dr. Murphy I have come to know you. Now I am asking for your help. To fulfill a portion of the requirements for a master's degree in Family and Consumer Sciences, I am working on a research project concerning preschool children and computers. The information I am gathering concerns any previous computer experience or exposure Tyler might have been involved with outside of the laboratory setting.

Enclosed is a copy of the questionnaire I am using to gather information on each child enrolled in our three, four, and five-year-old program. To save you what may be the inconvenience of paperwork, I will be in the corridor before and after your child's laboratory session during the first two weeks of April. At that time, I will ask you the questions that appear on the enclosed survey. If you prefer to respond in writing, you may complete the questionnaire and return it to either Dr. Murphy or me before April 11th.

I depend on and am grateful for your participation. However if you do not feel comfortable with the situation or have any questions, please discuss the matter with me or with Dr. Murphy. Although I must have Tyler's name for the project, the data will be number coded in my final report and will remain completely confidential. I look forward to speaking with you.

Thank you,

Mikki Meadows — Thesis Researcher

Dr. S. Jayne Ozier — Thesis Advisor

Appendix F
Scattergram of Computer Exposure and Experience and Computer Use
Graphic F1