SEX DIFFERENCES IN COMPUTER USAGE BY
PRESCHOOL CHILDREN

THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

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The purpose of this study was to determine whether sex differences could be observed in computer use among preschool disadvantaged children. Each of the twenty-two three- and four-year-old children were administered the Bardwell-Sietsema Sex Stereotype Scale to obtain a measure of sex role identification. Subject's choice of a pre-programming or academic-oriented software program as well as actual time at the computer were also carefully recorded over a five week period.

Data supports the following: there does not appear to be a relationship between sex role stereotyping and computer use among three and four year old disadvantaged children, stereotypical sex role identification exists between three and four year old disadvantaged children, the amount of time spent at the computer during free choice periods does not differ between boys and girls, and there is no difference between boys and girls in terms of choice of academic or pre-programming software.
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CHAPTER I

Introduction

For several years, computers have played a major role in the business world. Over the past decade, these devices have begun establishing their presence in secondary and higher education. Today, computers are rapidly moving into the curriculum of increasingly younger children.

A recent report by Quality Data Inc. 1985, indicated that in the 1984-1985 school year, eighty-four percent of public elementary schools were using computers for educational purposes (5). In addition, major computer companies are now expanding educational applications specifically for very young learners (4).

Along with the rapid influx of computers into the curriculum of younger children are growing concerns regarding the developmental appropriateness of these devices in the most formative years (3, 2, 5). One problem which has begun to bring about special concern has to do with the relationship between sex role stereotyping and computer usage (6). Sanders (1984) found that boys are more dominant users of computers by the middle school years (6). If this data and numerous commercials with fathers engaged in shared pleasures with their sons at the computer continue, girls may be at a serious disadvantage in future career choice.
Little is currently known about computer use between boys and girls in the preschool years. Swigger, et. al. (1983) and Beeson and Williams (1983) found there to be no differences in the time spent at the computer between boys and girls (1, 7). The above studies, however, were conducted at university lab school facilities which are difficult to generalize to the population at large. In addition, Sanders (1984) findings that differences did exist in the general population by middle school suggests that differences may exist in non-lab facilities (6).

The current study was designed to explore the relationship between sex role stereotyping and computer usage among a group of disadvantaged preschool children in a Head Start program in a large metroplex community. Data from this study may assist teachers of young children in their interactions with future computer users to assure that equal opportunity exists with these technological tools.

Statement of the Problem

Sex role stereotyping occurs in many areas of society. The problem this study will be concerned with is whether this type of stereotyping is present and if so, how it affects computer usage by young children.

Purpose of the Study

The purpose of this study was to determine whether sex differences play a role in computer usage among
preschoolers and if so, what that role might mean for the development of curricula in which computers are involved.

Hypotheses

To carry out the purpose of the study, the following hypotheses were tested.

1. There will be a significant difference in the identification with stereotypical/traditional sex roles by boys and girls.
2. There will be a significant difference in the types of software programs, academically-oriented/pre-programming, chosen by girls and boys.
3. There will be a significant difference in the amount of time spent by girls and boys at the computer.
4. There will be a significant difference in computer use regardless of sex, depending on the child's association with stereotypical/traditional sex roles.

Significance of the Study

Computers are becoming increasingly common in preschool programs. To make more professionally justifiable decisions, it is vital that knowledge in the area be increased. This increase in knowledge could provide needed direction for using computers to their fullest potential. Specifically, the study will determine what sex differences, if any, exist
in computer use among disadvantaged children in a preschool setting. This information will assist teachers in designing a computer curriculum most beneficial to developing children.

Basic Assumptions

It was assumed that the children involved in the study would attend school on a regular basis and choose to interact with the computer during free choice time. It was also assumed that software used in the study would be developmentally appropriate for the participants.

Limitations

Only two programs were used for the study. The results, concerning choice of programs are therefore limited by the small number of programs available for used.

Definition of Terms

1. Academic Software: computer programs which provide opportunity for presentation of basic skills relative to the school curriculum. Skills such as math and language.

2. Disadvantaged Children: those children who come from low income households, as defined by the Head Start guidelines, (e.g. a family of two earning less than $7050.00 per year; a family of three earning less than $8850.00; a family of four earning less than $10,650.)
3. Pre-programming Software: computer programs which require the child to give the computer instructions to perform various functions not pre-determined by the program.

4. Preschoolers: three and four year old children enrolled in a group setting.

5. Regular Attendance: school attendance at least sixteen of the twenty days of the study.
CHAPTER REFERENCES


CHAPTER II

REVIEW OF LITERATURE

Computers in Early Childhood Education

In the last few years, many younger children have begun using computers. At first, usage was limited to high school and college students. However, today even preschool children are being exposed to computers in the classrooms. Although it is not widespread, in time, computers are likely to be a common device in child care settings.

The San Francisco Bay Area School is one example of a kindergarten program using computers. From October 1980 to May 1981, the students at San Francisco used the Commodore PET microcomputer. Computers were used in three major areas: basic mathematics, visual discrimination and name and telephone number practice. No other curriculum areas were deleted due to the computers' presence since the computers' purpose was to serve as another vehicle for learning.

The children involved in this program had little or no prior experience with computers. Initially, children had difficulty sitting still; but with more exposure to the computers, they became more comfortable. They increased their time with the computer from fifteen to thirty-five minutes per sitting.
When this computer program was initiated the children were very embarrassed at giving incorrect answers. They were concerned that they would be humiliated in front of everyone. They eventually realized that no one else would know of their mistakes, thus they became more confident, even though they continued to make some mistakes. Not publicizing the children's mistakes to the rest of the class helped them feel more comfortable about answering questions of which they were not sure of the answers.

With increased usage, the children began to display usual behavior. They began to purposely answer incorrectly. Four interpretations given for this behavior were

a) children could be exhibiting natural, playful behavior;
b) they might be exercising the freedom not to do as expected;
c) they might be testing the computer to see if it could tell that they really knew the answer when they were only pretending not to know it;
d) they might simply be feeling "smarter" than the computer (26)

In each of the six programs, Type Zero to Ten, Missing Number, Count Blocks, What's Different, My Name and My Telephone Number, importance was placed on the child's ability to work at his own pace. Time limits were not imposed, thereby removing the pressure to answer questions quickly.

This project demonstrated that kindergarten children are able to learn to use computers and this use may help them to excel in specific areas of the curriculum. Post-testing
revealed that computer-wise children scored higher in certain areas than those who did not use them. One area involved the ability to count blocks, in which all the children in the computer group scored significantly better than the children in the non-computer group (17).

Hallworth and Brebner reviewed studies of programs, ranging from kindergarten to college age students, which use computer assisted instruction. These studies verified the importance self-paced instruction had on both the slow learners and the average student. With the pressure to answer quickly removed, the slow learners were less frustrated with their computer lessons. The more advanced students also benefited because they could proceed at their individual paces. This finding is consistent with the study done at San Francisco Bay Area School.

Studies are beginning to explore the effects of computers upon children as young as three and four years. Hungate (1982), for example studied children at The Bing Nursery School at Stanford University. Children in this study showed improvement in their reading skills with only three weeks of computer usage. These skills included concepts such as above, below, left and right (17).

Besides using computers to help children learn basic skills, Sheingold suggests portraying life experiences on the computer. Children, for example, can learn through the
computer how baby chicks develop and/or watch real chicks develop with the use of an incubator. This type of usage can help children associate computers and the real world (27).

In addition to relaying real life experiences, computer use has been shown to develop programming abilities in the very young. Programming requires certain skills from the child, such as how to solve a problem. The child must be able to analyze a task, understand how to sequence instructions and use logic. These skills are beneficial for computer usage and valuable in everyday life experience.

Hines (1984) attempted to determine the programming abilities of five year old children. The kindergarten children in this particular study passed a pretest dealing with number identification and letter recognition. For this study, programming was defined as "the ability to give a series of commands in response to a problem, name them and recall the program by name at a later time." (16, p. 11) Three instruments were administered before and after the study:

a) a test of number and letter identification, spatial concepts and number quality
b) an interview with the child on the child's attitudes toward the computer and their understanding of its operation
c) nine Piagetian tasks of conservation, seriation and classification (16)

Some programming post-tests were administered to these students involving connecting the dots on the screen using correct commands. The various dot post-tests increased in
complexity. The children also were asked to create three different shapes without using the monitor.

In all three areas of the instrument, the children showed improvement and increased understanding. One child even moved from preoperational to the concrete operations stage. In the interviews concerning the children's understanding of computers, each child's conception of the computer changed. All children responded to these post-test questions with much more understanding.

Of the five children studied, only one performed less than half of the required programs. The remaining children completed the programming with two of them being independent programmers (16). Individual attention promoted this understanding and should be a part of a program using computers although teaching a child programming may not be the goal. This study helps to demonstrate that children as young as five years old, with knowledge of letters and numbers, can learn to do simple programming.

The use of computers with this age group is not only for the purpose of learning specific academic skills, but also to expose children to a technology which will certainly be a major part of their lives.

Computer Software

Finding appropriate software for any age group can be a difficult task. When dealing with three to six year olds,
the task is even more difficult. Lack of software for this age group seems to be the biggest reason for the difficulty (27). Though software availability is increasing, many are of poor quality.

Cost of developing software is high. Companies which produce software concentrate on markets which can afford the cost. Educational software is used mostly by personal computer owners. Forty-six percent of these owners use the computer as a teaching tool for their children (10). Educational programs for children are thus limited since funds are not as readily available as they are in the business world.

Lack of quality software has resulted in problems for research with the very young. Thus, researchers are frequently required to develop their own software for testing. Since the specific nature of such software is seldom reported (e.g. 31) replicability is not possible for other researchers. To develop consistency, then, research is needed with generally available software programs or programs which are clearly similar. Some commercial publishers (e.g. Spinnaker and The Learning Company) are attempting to produce a better quality of software so that future research may be more consistent (27).

Besides the limited amount of quality software available, commercials for the software tend to portray the users of the programs stereotypically. The television
advertisements are usually directed toward use by boys rather than girls, and the packaging of software is also directed toward use by boys (22).

Sex Role Stereotyping

The concerns of sex role stereotyping are as present in the use of computers with children, as in any other area of their development. In the play of children as young as two or three years, stereotyped behavior can be observed (35).

Preschool age children have already begun associating themselves with sex roles. In some instances, there could be a difference between the types of activities boys and girls participate in. There are activities which are often considered and observed as being boy dominated, as well as those which are girl dominated.

Roopnarine designated the following activities to be male-typed: play with vehicles/transportation toys, chase/climb, ball games, male costumes, hammering and building with blocks. Also designated were those activities considered female-typed: art activities, dance/sing, female costumes, doll play/dollhouse, and kitchen activities (24).

Cox (1984), found there to be no differences between preschool males and females when studying sex role identification (8). To determine the sex role identification of the children involved in this study, Cox used the Bardwell-Sietsema Sex Stereotype Scale. Other studies have
also used the Bardwell-Sietsema Sex Stereotype Scale and found similar results (Delsanter 1983, Isaacks 1980 and Walker 1982).

Vener and Snyder (1966) studied 120 30-60 month old children and found no difference in their identification of sex appropriateness of various stereotyped items (32). In a study conducted by Beuf (1974) there were no sex differences found in career aspirations of three to six year olds (2). The preceding studies involved children from middle class backgrounds. No studies were found which were conducted with preschool children from disadvantaged backgrounds.

There are many ways in which children's play becomes sex-typed. Parents, schools, television, books, and toys are some of the areas which influence sex typing in children's play and learning. Steps must be taken to attempt to reduce these forms of stereotyping to eliminate the discrimination which is prevalent in society today.

By educating parents and encouraging them not to treat their children differently based on their sex is a very important first step. From birth, parents respond differently to their offspring according to their sex (11). As parents become more knowledgeable, this area of stereotyping could be diminished.

Though decreasing, school dress codes requiring girls to wear dresses is only one way in which the schools foster
stereotypical behavior. By wearing dresses, physical
development and play for girls is limited (6). Those
teachers who encourage active play for boys and passive play
for girls are also influencing sex role related behavior.

In regard to television, books and toys, parents can
play an important role in eliminating sexist activity (6).
By taking some extra time in choosing the programs watched on
television and the books read, some of the effects of the
stereotyped behaviors portrayed can be diminished. The
packaging of toys is often the cause of sexist usage. Sex
role stereotyping can be lessened by eliminating sexist
advertising and packaging. Educating parents to encourage
children to play with all toys is another method of
accomplishing this task.

Computers and Sex Roles

A study conducted at the North Texas State University
Nursery School was used to determine preschool children's
preference of the type of computer assisted instruction
available. This study compared computer usage by girls and
boys. Girls were found to prefer drill-and-practice
programs, while boys seemed to prefer creative problem
solving, such as using the Logo Turtle to create designs. In
addition to their gender, their identification with
stereotypes made a difference in their preference (31).

Children who identified less strongly with stereotypes
tended to prefer the Logo type activities. Those identifying with strong stereotypes preferred drill-and-practice programs. Although this occurred with both sexes, no explanation was suggested.

The Children and Technology Project (CAT) at the University of North Carolina at Greensboro studied children in a university based nursery school program and day care program to determine whether there is a sex difference in preference for the computer (21). In the first study girls spent significantly more time at the computer than boys. In the second study, there was no significant difference. This data is of importance since computer usage in elementary and secondary schools is male sex-typed. Perhaps the inclusion of computers in preschool classrooms can alleviate the sex-typing found later with older children.

In a study done by Beeson and Williams with preschool children enrolled in a midwestern university program, there was also no difference between girls and boys in their use of the computer (1). This study corroborates that of Swigger et al. (1983). The results of these studies suggest that the sex-stereotyping which occurs in elementary and secondary schools could be culturally learned rather than an inherent acquisition.

Most of the studies are done with children at university based preschools since there are still few other preschool programs which have access to computers. In 1968, a study
was conducted to determine whether computer assisted instruction can help disadvantaged children with recognition of words and letters. Though dated, this project is one of few which studied four and five year old children from disadvantaged backgrounds using computers (14).

Circumstances were not the best. The children were brought to a room with only the computer and a chair and worked with the computer on an individual basis. The computer also had a slow response rate which appeared to be somewhat frustrating to the children.

The results suggest that the CAI system helps boys more than girls in letter and word recognition. When considering the disadvantaged, boys did better than girls. The improvements were also found to be greater among disadvantaged boys, as opposed to privileged ones. Since in the primary grades, boys are somewhat disadvantaged in comparison to girls and the results showed improvements in boys, a CAI system seems to be an asset to educational programs with young children, both disadvantaged and privileged.

Though research is limited in the area of computer usage with preschool age children, that which has been conducted reveals differences in usage. Results from the studies performed are contradictory in many cases. Further research could help explain the differences and perhaps provide
educators with insight into computer use with very young children.

Additional research is necessary in the area of computer usage among all types of preschool children. Many studies have been conducted with middle class children. It is time that research be conducted with children from different socio-economic backgrounds. This type of research will enable educators to act in a well informed manner, thus being able to use computers to their fullest potential.
CHAPTER REFERENCES


22. Perry, D. G., "Does Early Sex Typing Result From Children's Attempts to Match Their Behavior to Sex Role Stereotypes?" Child Development, vol. 55, no. 6, December 1984, pp. 2114-2121.


CHAPTER III

PROCEDURES FOR COLLECTING DATA

Sample

The sample selected for the study were selected from Project Head Start. This program is a federally funded project designed to provide disadvantaged children with learning opportunities which are usually afforded those from higher socio-economic levels. Children involved in this study were from lower socio-economic backgrounds. Families either met the financial requirements of the Head Start guidelines, or were allowed into the program through recommendation from authorities such as the Child Protective Services. The sample consisted of twenty-two three and four year old children. TABLE I is a description of the sample used in the study.

TABLE I
Description of the Sample

<table>
<thead>
<tr>
<th>Age</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 year olds</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>4 year olds</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>
As can be seen in TABLE I, there were ten three year olds, and twelve four year olds in the sample studied.

Sample Selection

Permission to conduct this investigation was obtained from the Executive Director of the Dallas Head Start. (Appendix A) Since the cooperation of the staff was crucial for the study, the Executive Director was asked to select one representative classroom from the ten centers in the Dallas project with teachers who would be likely to cooperate with the study.

Instrumentation

Software

The software used by Head Start is commercially available. For the purpose of this study, two types of software were selected: pre-programming and academic. FACEMAKER, was chosen as the pre-programming type and EASY AS ABC was chosen for the academic.

FACEMAKER, part of the SPINNAKER Early Learning Series, enables the child to choose from a variety of facial attributes to create his or her own face. After completing this portion of the program, the child is able, through the use of simple instructions, to make the face smile, wink, frown or wiggle its ears. By making the face perform the various gestures, the child is performing pre-programming
functions on the computer. The computer performs specific functions based upon the child's choices and instructions.

EASY AS ABC, developed by SPRINGBOARD, is an academically oriented software program. This software contains a series of five games that introduce the alphabet. Through the use of the programs, the child has the opportunity to learn: letter recognition, alphabetical sequence, and upper and lower case letters. Colorful animated graphics are present throughout the games.

**Observation Checklist**

A checklist form was developed for the collection of the data. (Appendix B) Through observations which were performed by the Head Start teachers and/or aides during the regular daily routine, data were collected. The child's name, the type of program chosen by the child, and the time of entry and exit were recorded.

**Bardwell-Sietsema Sex Stereotype Scale**

To determine the children's identification with sex roles, the Bardwell-Sietsema Sex Stereotype Scale was used. (Appendix C) This assessment was chosen because there were no other scales available which would be appropriate for use with the age group involved. Determining sex role identification was important in studying whether this identification effected computer usage.
In using this scale children were tested individually by being shown a series of pictures which depicted stereotypical activities. The children were asked to point to either the boy or the girl based on their perception of whether the activity shown was a boy or girl activity. The pictures used for this study were of stick figures which portrayed neither gender.

**Procedure**

The study itself took place from October 21, 1985 through November 22, 1985. The researcher randomly chose five days during these five weeks to go to the center to assure that the data were being documented properly. The researcher noted no errors during these visits.

During data collection children were free to use the computer during inside activity time. Only one computer in the classroom was available for use by the children. The computer was one of several common learning centers available (dramatic play, water play, etc.). The decision to participate with the computer was made by each child individually daily.

To be certain that the children involved in the study were comfortable with and understood the software used, the researcher demonstrated both programs to all children. Demonstrations were given in groups of three. The process of
familiarizing the children with the two types of software took place during the first few days of the study.

Analysis of Data

To determine the results of the study, a statistical analysis was made for each of the following hypotheses:

Hypothesis 1: a t-Test was used to determine sex role identification of the children in the study.

Hypothesis 2: a Chi-Square test was used to test whether the type of programs chosen was related to the sex of the subjects.

Hypothesis 3: an independent samples t-Test was used to determine if males or females chose to spend more time at the computer.

Hypothesis 4: a Chi-Square test was used to determine if the type of program chosen was a function of sex role identification.

The .05 level of significance was considered adequate for determining significance in comparisons made for this study.
STATISTICAL ANALYSIS AND INTERPRETATION

Chapter IV presents findings related to the four hypotheses advanced in Chapter I. Findings are presented in the following order: (1) findings relating to the difference in sex role identification between boys and girls, (2) findings relating to the difference in the types of programs chosen by boys and girls, (3) findings relating to the difference in the amount of time spent by girls and boys at the computer, and (4) findings relating to the difference in computer use regardless of sex, depending on the child's association with stereotypical or traditional sex roles.

Hypothesis One

To test the hypothesis that there will be significant differences in stereotype scores between boys and girls, a $t$-Test was computed. Results are reported in TABLE II.

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>mean</th>
<th>SD</th>
<th>$t$</th>
<th>Decision $t .95$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>13</td>
<td>22.62</td>
<td>2.84</td>
<td>2.53</td>
<td>Reject H 0</td>
</tr>
<tr>
<td>Girls</td>
<td>9</td>
<td>13.38</td>
<td>9.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Since a t value of 2.53 was found (p > .05), the null hypothesis was rejected. Boys exhibited significantly higher score than girls on the sex role stereotyping instrument. This indicates that boys had more stereotypical images of sex roles than girls.

Hypothesis Two

To test the hypothesis that there will be a significant difference in the types of programs chosen by girls and boys, a Chi-square test was computed. Program preference was determined by the type of program chosen most often by each subject. One male child was omitted from this analysis because his choice of programs was evenly divided between the Pre-programming and Academic types of programs. Related findings are presented in TABLE III.

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Programming</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Academic</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Chi-Square = 1.64, p > .05
The Chi-square test of significance revealed a Chi-square of 1.64 (p > .05) which was not significant at the designated .05 level. Thus, choice of program was not related to sex differences.

Hypothesis Three

To test the hypothesis that significant difference exists in the amount of time spent by boys and girls at the computer, a t-Test was computed. Data pertaining to Hypothesis Three is found in TABLE IV below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>mean</th>
<th>SD</th>
<th>t</th>
<th>Decision t .95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>13</td>
<td>17.92</td>
<td>23.90</td>
<td>1.31</td>
<td>Accept H0</td>
</tr>
<tr>
<td>Girls</td>
<td>9</td>
<td>23.23</td>
<td>29.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since a t value of 1.31 was not significant at the .05 level, the null hypothesis was retained. No significant difference in the time spent at the computer by the boys and girls of this study was found. Although not significant at the .05 level, the observed t was approaching significance (p < .20). The lack of significance may have been accounted for by the large variation in scores among the children in
the study. TABLE V portrays the mean minutes at the computer among the age groups.

**TABLE V**

**MINUTES SPENT AT THE COMPUTER BY THREE AND FOUR YEAR OLD BOYS AND GIRLS**

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>n</td>
<td>T</td>
<td>n</td>
</tr>
<tr>
<td>Three Year Olds</td>
<td>145</td>
<td>4</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td>Four Year Olds</td>
<td>88</td>
<td>5</td>
<td>257</td>
<td>5</td>
</tr>
</tbody>
</table>

As can be seen in TABLE V, a large variation in time spent exists. The range of time spent by boys and girls was three to eighty-eight minutes. It was likely that this large range of time resulted in large standard deviation and thereby affected the observed $t$. In light of this large range variation and small $n$, caution should be taken in interpretation of this non-significant finding.

**Hypothesis Four**

To determine if there was a significant difference in computer use, regardless of sex, depending on the child's association with stereotypical/traditional sex roles, a Chi-Square test was computed. The mean score was calculated using the children's scores on the Bardwell-Sietsema Sex
Stereotype Scale. Only those who chose to participate with the computer were studied for this hypothesis. Placement in the Chi-Square was determined by the scores the children involved received, as well as the program each child chose. A high score being above 20.5 and a low score being below 20.5. Findings are reported in TABLE VI.

TABLE VI

AFFECTS OF SEX ROLE IDENTIFICATION ON PROGRAM CHOICE

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Programming</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Academic</td>
<td>1</td>
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Chi-Square = .25, p < .05

When comparing mean scores on the Bardwell-Sietsema Sex Stereotype Scale to their choice of programs, a designated Chi-Square of .25 was obtained. These data suggest that there is no significant difference in the types of programs chosen based on the children's scores on the sex role scale.
CHAPTER V

Summary, Conclusions, Discussion and Recommendations

This study was undertaken to determine whether sex differences play a role in computer use among preschoolers and if so, what that role means to the development of curricula in which computers are involved. Sex role stereotyping was measured by the Bardwell-Sietsema Sex Stereotype Scale. Results of this scale were used to determine whether identification with sex roles effected computer use.

Summary

Twenty-two children, ages three to four, enrolled in a Head Start program in a large metroplex area, were subjects for this investigation. There were thirteen boys and nine girls in the group. The Executive Director selected the classroom for the study based upon her views of the likely cooperation of the staff and their interest in the study.

Each child was tested individually by the researcher using the Bardwell-Sietsema Sex Stereotype Scale to determine sex role identification. Children were studied twenty days over a four week period. Children's choices of computer programs and time spent at the computer were carefully documented.
Statistical analyses were conducted to test hypotheses related to the study. Data resulted in retention of the following hypothesis:

1. There will be a difference in sex role identification between boys and girls, as measured by the Bardwell-Sietsema Sex Stereotype Scale.  
   (Hypothesis 1)

The data supported rejection of the following hypotheses.

1. There will be a significant difference in the types of programs chosen by boys and girls.  (Hypothesis 2)

2. There will be a significant difference in the amount of time spent at the computer by boys and girls.  (Hypothesis 3)

3. There will be a significant difference in computer use regardless of sex, depending on sex role identification.  (Hypothesis 4)

Conclusions

The following conclusions may be drawn within the limitations of this study.

1. There does not appear to be a relationship between sex role stereotyping and computer use among three and four year old disadvantaged children.

2. Stereotypical sex role identification exists between
three and four year old disadvantaged children.

3. The amount of time spent at the computer during free choice periods does not differ between boys and girls.

4. There is no difference between boys and girls in terms of choice of academic or pre-programming software.

Discussion

In this study, the hypothesis that there will be a significant difference in the identification with stereotypical/traditional sex roles by boys and girls was accepted. This finding is not consistent with findings reported in Chapter II.

Beuf (1974) studied children between the ages of three and six years and found there to be no sex differences in career aspirations. Kuhn, Nash and Brucken (1978), in their study of seventy-two two and three-year old children also found no sex differences in sex role stereotyping. Likewise, Cox (1984) found there to be no significant difference in the identification of sex roles by males and females. Other studies using the Bardwell-Sietsema Sex Stereotype Scale also found there to be no differences when comparing the scores of boys and girls (Delsanter 1983, Isaacks 1981, and Walker 1982).
A possible reason for the discrepancy between findings of this study and that of the previously conducted studies could be that the others were performed with children from middle class backgrounds. Children in this study came from disadvantaged backgrounds. Identification with stereotypical sex roles could be, in part, due to socio-economic backgrounds. Children from low socio-economic backgrounds may have more exposure to stereotypical sex roles than those from middle class homes. There could be more emphasis placed on the specified roles of each parent, those roles being traditional.

Results of Hypothesis II supported the rejection of the hypothesis that there would be a significant difference in the types of programs chosen by boys and girls. The data indicate that there was no difference in the types of programs chosen by boys and girls.

Data collected from Swigger, et. al. (1983) revealed a significant difference in the types of programs chosen by boys and girls. Girls tended to prefer drill-and-practice programs, while boys preferred creative problem-solving programs. The children involved in the Swigger, et. al. study were enrolled in a university based lab school. Children attending this program were mostly from middle class backgrounds.

Some possible explanations for the conflicting data could be the following.
1. The difference in socio-economic backgrounds could make a difference in the types of programs preferred by boys and girls.

2. Sheingold (1983) suggested that the portrayal of real life experiences on the computer, children can be helped in their learning of basic skills. This could explain why only three children chose the academic software and the remaining children chose the pre-programming software. The association with real faces could have made the children's interest in this software higher.

3. Definitions of the software differ between the studies performed. The definition of software used in the Swigger, et. al. (1983) was defined as: (1) that which was designed to introduce prereading skills such as alphabet and number recognition, and (2) those which were designed to encourage cognitive development through creative problem-solving. These two definitions differing somewhat with those of this study in that each program used dealt with more skills than in this study. Therefore, the choice of software may be a function of the definition and format of the programs used.

The third hypothesis was also rejected. The data revealed no significant difference in the amount of time
spent by boys and girls at the computer. Swigger, et. al. (1983) corroborated this finding. The children in this study spent nearly equal amounts of time at the computer. A study conducted by Beeson and Williams (1983) also corroborates these findings. Beeson and Williams (1983) studied preschool children at a university based program.

Two studies of the Children and Technology Project (CAT) conducted at the University of North Carolina had conflicting results. In the first study, girls spent significantly more time at the computer than boys. In the second study, there was no significant difference in the amount of time spent.

The following reasons for the discrepancy between the above studies are possible.

1. The length of the studies varied. For example, the study conducted by Swigger, et. al. (1983) lasted three weeks. The CAT project Study I lasted only two weeks and Study II lasted three weeks with only four days per week studied. The current study lasted five weeks. Observations were recorded five days a week.

2. The socio-economic backgrounds of the children involved in each study differ. This could effect the results obtained.
Hypothesis 4 was also rejected. There was no significant difference in computer use, regardless of sex, depending on the child's association with stereotypical or traditional sex roles.

Swigger et al. (1983) found there to be a difference in computer use based on sex role identification. Children who identified strongly with stereotypical sex roles for both males and females preferred drill-and-practice programs.

Reasons for the results could be the following.

1. The size of both studies were small, making it difficult to accurately analyze the data.

2. The difference in the samples could also have influenced the outcomes. Socio-economic backgrounds could be of importance when considering the data.

3. There were differences in the sex role identification assessments used by the studies performed. The assessment used by Swigger, et al. (1983) was designed by one of the authors, no reliability mentioned. This assessment could differ considerably from the Bardwell-Sietsema Sex Stereotype Scale, thus perhaps explaining any differences in the data collected.

Recommendations

The following recommendations for further study in the area of computer use with young children are presented.
1. More studies in the use of computers by young children should be performed with children from disadvantaged backgrounds. This would help educators to be better informed regarding possible differences relating to children from different socio-economic backgrounds. Studies previously performed used university based programs for the collection of the data. There is a need for further research with disadvantaged children so comparisons can be made with earlier studies, thus facilitating the taking of necessary measures needed to put this new educational tool to the best possible use.

2. There is a definite need for more quality software for use with young children. Only one good example of a commercially available pre-programming type of software was found for use with this study. Clements (1985) discussed the preference to control animated action as being a quality important to young children using computers. This attribute, as well as those discussed in Chapter II, should be included in future software. Having more choices of computer programs could influence the data collected.

3. Increasing the length of future studies is another recommendation. Most studies lasted only a few weeks, thus limiting the amount of data that could
be collected. If more time was allotted to future studies, perhaps more information could be analyzed. The average time spent at the computer by the children in this study was only approximately twenty minutes. This short length of time is greater than that of most studies. Future studies should consider greater periods of time to assure adequate treatment application. More could be investigated by increasing the time and by having more quality software choices available.

4. Future studies should also be careful to document important aspects of treatments used in the studies. It is important to have the ability to compare results of similar research. To do so, documentation of specific software and computer interaction is of great importance.
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Books


Articles


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Perry, D. G., "Does Early Sex Typing Result From Children's Attempts to Match Their Behavior to Sex Role Stereotypes?," Child Development, vol. 55, no. 6, (December 1984), p. 2114-2121.


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APPENDICES
Appendix A

October 2, 1985

Wanda Smith  
Project Director  
Project Head Start  
2208 Main Street  
Dallas, Texas 75201

Dear Ms. Smith,

Dr. Hoot indicated earlier in the year that you were one of the few Head Start programs in the country exploring computer use with preschool children. He also indicated that you are interested in evaluating the effectiveness of computer use in projects.

I am currently working on my thesis at NTSU and would like to direct my efforts toward exploring sex differences in computer use by evaluating preschoolers. I would like very much to conduct my study at one of your centers. If you are willing to allow me to conduct the attached study at one of your centers, please sign below and return this letter to me at your earliest convenience.

Thank you for the fine work you are doing on behalf of children and for considering my request.

Sincerely,

Denise Henriott

I give my permission for Denise Henriott to conduct her thesis concerning sex differences in computer usage by children in the Dallas Head Start Program.

Signature: [Signature]  
Date: 10/5/85

Wanda Smith  
Project Director  
Project Head Start Program
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Appendix C

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<td>3. Skateboarding</td>
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<td>4. Running</td>
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<td>5. Knowing directions</td>
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<td>6. Swimming</td>
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<td>7. Leading</td>
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<td>8. Horseback riding</td>
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<td>9. Academic inclination</td>
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<td>13. Bicycling or rope jumping</td>
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<td>14. Playing with doll carriage or toy car</td>
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<td>15. Sewing or model building</td>
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<td>16. Fence walking or swinging</td>
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<td>17. Hunting or knitting</td>
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<td>18. Block building or housekeeping</td>
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STEREOTYPED RESPONSES: 36
PERCENTAGE OF STEREOTYPED RESPONSES