ABSTRACT
                To investigate sex-stereotyping associated with
computer use, a study was made of effects of gender and age on
preschool children's involvement with computers during a school
period allowing children to choose from among five alternative
activities. A group of 16 boys and 16 girls was divided by age, with
the resulting categories consisting of 17 children under and 15
children over 5 years of age. Data were collected by observing
classroom activities in 30-minute periods, 3 days per week, for 5
consecutive weeks. Observers recorded each instance that a subject
chose the computer activity. Results of a univariate analysis of
variance for gender, age, and the interaction between these two
factors revealed a statistically significant difference between males
and females in the choice of the computer activity only for children
under 5 years of age. It was concluded that the findings lend support
for the practice of providing experiences with computers for
preschool children. Implications of the findings for sex-stereotyping
were briefly noted. (RH)

THE EFFECTS OF GENDER AND AGE

ON PRESCHOOL CHILDREN'S CHOICE OF THE

COMPUTER AS A CHILD-SELECTED ACTIVITY

by

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INTRODUCTION AND REVIEW OF THE LITERATURE.

Papert (1980:181) cautions, "Educational innovators must be aware that in order to be successful they must be sensitive to what is happening in the surrounding culture and use dynamic cultural trends as a medium to carry their educational interventions." What is happening in the surrounding culture is ". . . the computer age . . . ." (Smith, 1981:83). Computers have already become indispensable to science, business and government and are becoming a part of the home life. Now computers must be utilized as tools for the education of children (Billings, 1980).

At what age should we introduce students to the computer? Hanna (1980:11) has recommended, "In a fast-growing computer society, literacy will eventually encompass computer literacy. We should give children early access to computers so they understand what the equipment can do--and perhaps more important what computers cannot do." But what does early mean?

Brace (1982:52) has suggested, "There aren't really enough studies around to say definitely that CAI (Computer Assisted Instruction) might have an even greater effect on younger--elementary school--children, but one set of recently conducted studies suggests that under certain circumstances it would indeed." An even earlier starting age is advocated by Palamara (Long, 1982:312), "The preschool level provides an

excellent psychological conditioning period to introduce
computers . . . I found three-, four-, and five-year-old
children to be very inquisitive and open to new concepts.
During the early years, they can quickly develop a perception
and appreciation of computers."

Thus, to remain a model preschool program for pre-
service teachers, a computer was added to the resources of the
early childhood learning center. The preschool program focuses
on play as the young child's natural way of learning. "Interac-
tion with computers and computer programs can be a component in
children's play and in a productive learning environment"
(Sanders, 1981:1).

Previous research has shown that many of the play
activities of preschool children are sex-stereotyped (see Table
1). Would the computer be perceived as a sex-stereotyped
activity? "One group that merits special attention is female
students. Female students inherit a handicap (for the most part
culturally derived) in the form of anxiety about computers and
related technology. Computers, commonly viewed as 'number
crunchers' are characterized by some--along with mathematics--as
a male domain" (Winkle, 1982:315).

Research on the computer as a sex-stereotyped activity
is limited, as is all research on computers in education. Most
research literature, rather than reporting findings, stresses the

TABLE 1

PREVIOUS STUDIES REPORTING SEX DIFFERENCES

IN PLAY ACTIVITIES OF YOUNG CHILDREN

Study	Sex	Findings
Williams & Beeson (1982)	Males	Blocks, wheeled vehicles, sand/water
	Females	Art Projects
Rubin (1977)	Males	Blocks, wheeled vehicles
	Females	Art activities
Tizard, Philps & Plewis (1976)	Males	Tires, crates, wheeled vehicles
	Females	Climbing frame
Harper & Sanders (1975)	Males	Blocks
	Females	Arts and crafts
Coates, Lord & Jakabovics (1975)	Males	Blocks
	Females	Dolls, formal games
Cramer & Hogan (1975)	Males	Blocks, vehicles
	Females	Dolls, furniture
Clark, Wyon & Richards (1969)	Males	Blocks, wheeled vehicles
	Females	Dolls, art activities
Shure (1963)	Males	Blocks
	Females	Doll area, art
Vance & McCall (1934)	Males	Blocks
	Females	Housekeeping
Parten (1933)	Males	Blocks, trains, kiddie-kars
	Females	Art activities, house play

need for research and identifies areas of study (Spencer and Baskin, 1981; Kearsley et al., 1983).

Two studies have produced conflicting findings. In the Granite system, more boys than girls used the computer at all levels. Scheingold (1981:9) reported, "At the elementary level the male/female ratio was 1.6 to 1, while at the high school level this number had increased to 3.5 to 1." The second study (Swigger et al., 1983) found no significant difference between males and females three to five years old in the number of sessions at the computer or the amount of time on the computer.

The dearth of consistent findings on sex-stereotyping associated with computer use and the researchers' previous studies of other play activities led to the initiation of the following study.

PROCEDURES

The purpose of the study was to investigate the effects of gender and age on preschool children's choice of the computer as a child-selected activity.

The subjects of the study were thirty-two children enrolled in a preschool program in a midwestern university. There were sixteen males and sixteen females. The children were divided into two age groups: children under five which included children forty-five to fifty-nine months of age and children over five which

included children sixty to sixty-seven months of age. There
were seventeen children under five years of age and fifteen
children over five years of age (see Table 2).

TABLE 2

SUBJECTS BY GENDER AND AGE

	Under Five Years of Age (45-59 Months)	Over Five Years of Age (60-67 Months)	Total
Males	6	10	16
Females	11	5	16
Total	17	15	32

The research was conducted during child-select time.
This is a specified time in the preschool program when children
may select an activity of their choice. Each day the children
have a choice of five activities. The activities available are
those traditionally found in preschool programs such as blocks,
sand and water, wheeled-vehicles and art activities (Rubin, 1977).
This school year the computer was added as another child-selected
activity.

An observational instrument was developed by the
researchers. Each time a subject chose the computer as a child-
selected activity, it was recorded (see Appendix A). The data
were collected for five consecutive weeks during the spring. The

preschool program was in session three days a week for a total of fifteen observational periods. Each observational period was comprised of thirty minutes for a total of four-hundred and fifty minutes. The data were collected by two graduate assistants. The data were analyzed using a univariate analysis of variance.

RESULTS

The results of the univariate analysis of variance for gender, age and their interaction are given in Table 3.

TABLE 3

UNIVARIATE F-RATIOS FOR GENDER, AGE, AND INTERACTION OF GENDER AND AGE

Source	DF	SS	MS	F	P
Gender	1	144.71	144.71	2.95	.10
Age	1	26.78	26.78	.55	.47
Gender X Age	1	252.04	252.04	5.14	.03
Error	28	1373.96	49.07		

The overall mean for males was 10.75 and for females 6.88. The null hypothesis of no difference between preschool males and females in the choice of the computer as a child-selected activity could not be rejected (p .10).

The overall mean for children under five years of age was 8.53 and for over five years of age 9.06. The null hypothesis of no difference between children under five years of age and over five years of age in the choice of the computer as a child-selected activity could not be rejected (p .47).

The null hypothesis of no interaction effect of gender and age in the choice of the computer as a child-selected activity was rejected (p < .03). There was a statistically significant difference between males and females under five years of age in the choice of the computer as a child-selected activity (F=7.84; p < .01). As shown in Figure 1, the mean for males under five years of age was 15.50 and for females under five years of age 5.55. However, there was no statistically significant difference between males and females over five years of age (F=.25; p .62). As shown in Figure 1, the mean for males over five years of age was 7.90 and for females over five years of age 9.80.

For ancillary information, the data were analyzed by distribution of subject's frequency of the computer as a child-selected activity (see Table 4). One child did not choose the computer as a child-selected activity and another child choose the computer twenty-seven times during the fifteen days.

DISCUSSION

Although many studies have reported sex differences in the activities of young children (Table 1), this study and the

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Under Five Years   Over Five Years
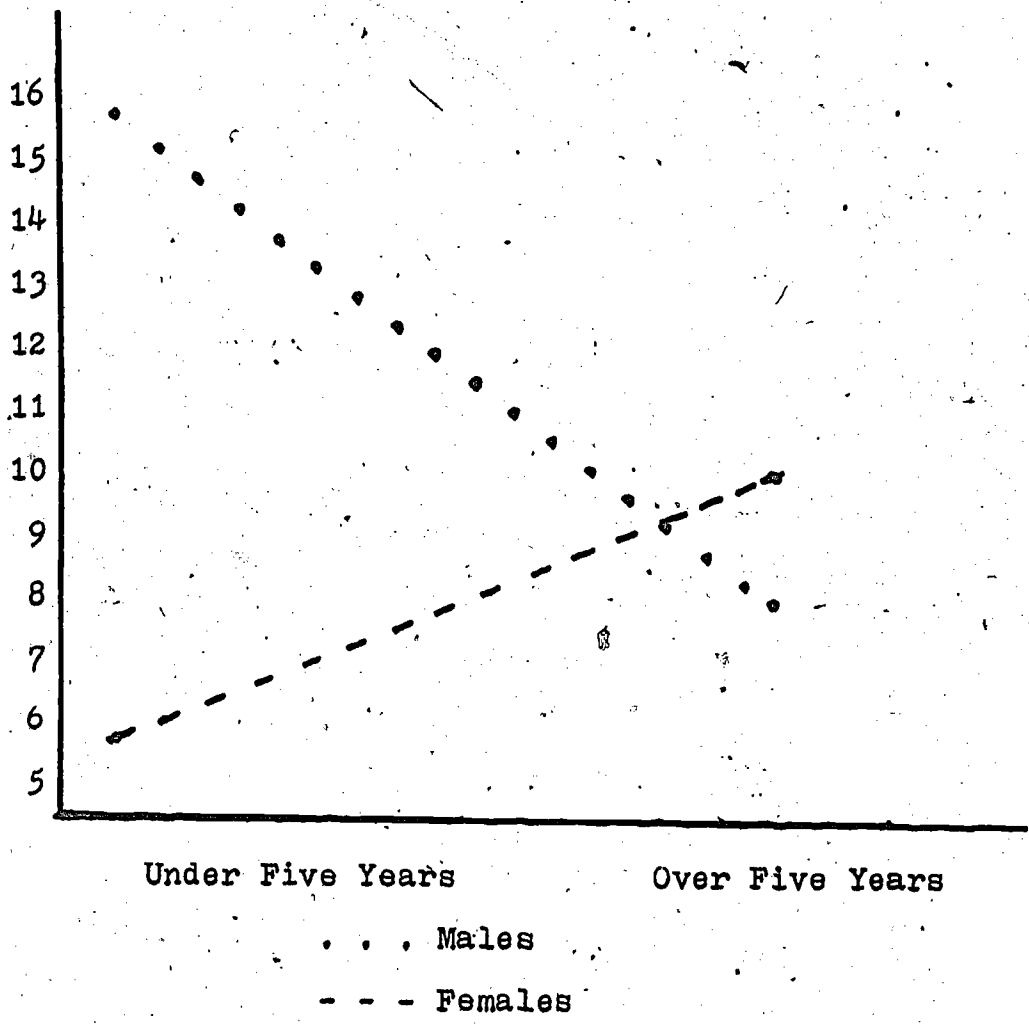
. . . Males

- - - Females

FIGURE 1

PLOT OF FOUR MALE-FEMALE
AND UNDER/OVER FIVE MEANS

TABLE 4

DISTRIBUTION OF SUBJECT'S FREQUENCY OF THE

COMPUTER AS A CHILD-SELECTED ACTIVITY

Frequency of Computer Choosen As A Child-Selected Activity	Number of Subjects
25-27	1
22-24	3
19-21	1
16-18	1
13-15	3
10-12	2
7-9	6
4-6	6
1-3	8
0	1

one previously discussed (Swigger et al., 1983) indicate there
is no difference between males and females in the use of the
computer. While there may be no computer sex-stereotyping in
preschool children, it has been observed in elementary school
children (Scheingold, 1981). This suggests that children do
learn through cultural experiences to view the computer ". . .
as a male domain" (Winkle, 1983:315).

The lack of significant differences in the use of the
computer between children under five years of age and those over

five years of age, in this study, lends support to the practice
of introducing preschool children to the computer as advocated
by Palamara (Long, 1982).

However, after drawing the above conclusion about the
main effects of gender and age on the choice of the computer as
a child-selected activity, the effect of gender and age inter-
action is difficult to interpret. The finding that children
under five years of age displayed computer sex-stereotyping
while those over five years of age did not is contrary to what
would have been expected. There is a need for further research
to clarify the effect of gender and age on the choice of the
computer as a child-selected-activity.

BIBLIOGRAPHY

Billings, Karen. "Microcomputers in Education: Now and in the
  Future." Microcomputing (June, 1980):100-102.

Brace, Gerald. "What the Research Shows." Electronic Learning
  (November/December, 1982):51-54.

Clark, Anne H., Wyon, Sally M.; and Richards, M.P.M. "Free-Play
  in Nursery School Children." Journal of Child Psychology
  and Allied Disciplines 10 (1969):205-216.

Coates, Susan, Lord, Mae, and Jakabovics, Evelyn. "Field
  Dependence-Independence, Social-Non-Social Play and Sex
  Differences in Preschool Children." Perceptual and Motor
  Skills 40 (1975):185-202.

Cramer, Phebe, and Hogan, Katherine A. "Sex Differences in Verbal
  and Fantasy Play." Developmental Psychology 11 (1975):145-154.

Hanna, Sandra. "Let the Cookie Monster Help." Instructional
  Innovator (November, 1980):10-11.

Harper, Lawrence V., and Sanders, Karen M. "Preschool Children's
  Use of Space: Sex Differences in Outdoor Play." Developmental
  Psychology 11 (1975): 119.

Kearsley, G., Hunter, B., and Seidel, R. J. "Two Decades of
  Computer Based Instruction Projects: What Have We Learned?"
  T. H. E. Journal (February, 1983):88-96.

Long, Sandra M. "The Dawning of the Computer Age: An Interview
  with Ronald Palamara." Phi Delta Kappan (January, 1982):311-
  313.

Papert, Seymour. Mindstorms: Children, Computers and Powerful
    Ideas. New York: Basic Books, Inc., 1980.

Parten, Mildred B. "Social Play among Preschool Children."
    Journal of Abnormal and Social Psychology 28 (1933):136-
    147.

Rubin, Kenneth H. "Play Behaviors of Young Children." Young
    Children 32 (1977):16-24.

Sanders, Tobie S. "Children and Computers: A Partnership for
    Play and Learning." A Paper Presented at the Annual
    Conference of the National Association for the Education of
    Young Children. Detroit, Michigan. (November, 1981): 1-6.

Sheingold, Karen. "Issues Related to the Implementation of
    Computer Technology in Schools: A Cross-Sectional Study."
    ED 205 165 (February, 1981):1-20.

Shure, Myrna Beth. "Psychological Ecology of a Nursery School."
    Child Development 34 (1963):979-992.

Smith, Paula. "The Impact of Computerization on Children's Toys
    and Games." Journal of Children in Contemporary Society.
    (Fall, 1981):73-83.

Spencer, Mima and Baskin, Linda. "Classroom Computers: Do They
    Make a Difference?" Classroom Computer News (November/
    December, 1981):12-15.

Swigger, Kathleen M., Campbell, James, and Swigger, Boyd K.
    "Preschool Children's Preferences of Different Types of CAI
    Programs." Educational Computer Magazine (January/February,
    1983):38-40.

Tizard, Barbara, Philps, Janet, and Plewis, Ian. "Play in
Pre-School Centres--I. Play Measures and Their Relation to
Age, Sex, and I.Q." Journal of Child Psychology and
Psychiatry and Allied Disciplines 17 (1976):251-264.

Vance, Thomas F., and McCall, Louise T. "Children's Preferences
among Play Materials as Determined by the Method of Paired
Comparison of Pictures." Child Development 5 (1934):267-277.

Williams, R. Ann, and Beeson, Betty Spillers. "Sexism, Play and
Children's Learning." Journal of Children and Youth (Fall,
1982):34-36.

Winkle, Linda Wyrick, and Mathews, Walter M. "Computer Equity
Comes of Age." Phi Delta Kappan (January, 1982):314-315.

Child's Name	Date														
	4/11	4/12	4/13	4/18	4/19	4/20	4/25	4/26	4/27	5/2	5/3	5/4	5/9	5/10	5/11

Observer _____

APPENDIX A

OBSERVATION SHEET

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BALL STATE UNIVERSITY / MUNCIE, INDIANA 47306-1099

TEACHERS COLLEGE.
Department of Elementary Education

APPENDIX B

April 5, 1983

LETTER OF PERMISSION

Dear Parents:

We will be conducting a study to determine what children choose to do during child-selected activities. Our study will begin on April 11th and continue until May 11th.

While the children are participating in the regular child-selected activities, observers will keep a checklist on the activities chosen.

All information about an individual child's selection of activities will be kept confidential. Also, you may withdraw your child from this study at any time and without prejudice.

If your child may be included, please sign below and return it to us by Monday, April 11, 1983.

Thank you.

Sincerely,

Dr. Betty Beeson

Dr. Ann Williams

I give permission for my child's _____
                                            (name of child)
participation in Dr. Beeson's and Dr. Williams' study.

Parent Signature _____

Date _____