THE EFFECT OF COMPUTER USE ON GRADE 1 CHILDREN'S GENDER STEREOTYPES ABOUT READING, WRITING AND COMPUTER USE

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Gender stereotypes about reading, writing, and computers as expressed by a sample of 120 Grade 1 children were measured with a modified version of Downey's Activity-Object Opinion Survey. The instrument was used to measure the impact of three different Grade 1 language arts programs, including the Writing to Read program and another program that allows regular access to language arts computer experiences, on gender stereotypes about reading, writing, and computer use. Results indicated that young children do not perceive reading as a female activity. For writing there was no consistent gender association. However, computer use was seen as a masculine activity by all children. Regardless of daily participation in classroom language arts computer activities over a period of 7 to 8 months, young children still perceived computer use as masculine.

Sex-role stereotypes are culturally shared expectations about gender differences in personality traits, abilities, and appropriate behaviors, "widely shared and pervasive concepts that prescribe how each sex ought to perform" (Shepherd-Look, 1982, p. 404). According to cognitive-developmental theorists, "sex-role stereotypes are preliminary and causal factors in the acquisition of sex-typed characteristics" (Weinraub et al., 1984, p. 1493). This acquisition is hypothesized to be central to the socialization process in that young children seek to validate their gender identification by striving to make their personal characteristics congruent with those standards that they perceive to be gender-appropriate (Keyes, 1983; Kohlberg, 1966). A child's perception of sex-role stereotypes not only shapes his or her gender-specific behaviors but also may become a cognitive characteristic of the child, powerfully influencing information processing so that both attitudes and comprehension are affected (Martin & Halverson, 1981). Sex-role stereotypes can shape and constrain individual development, and thus can pose a "potentially serious impediment . . . to (the) actualization of full individual potential" (Downing, Gross, & d'Heurle, 1980, p. 203) which can "stunt the expectations of both women and men" (Selsor & Hilton, 1972, p. 91).

The impact of sex-role stereotyping begins very early in a child's life, likely even in infancy (Shepherd-Look, 1982). Sex-appropriate toy preferences are established by the age of 2 (Etaugh, Collins, & Gerson, 1975; Weinraub et al., 1984). Awareness of adult sex-role stereotypes has been confirmed in 3-, 4-, and 5-year-old children (Nadelman, 1970; Reis & Wright, 1982; Schell & Silber, 1968). Sex-typed behaviors and interests not only are established early, but are "remarkably predictive of adult behavior" (Kagan & Moss, 1962; Shepherd-Look, 1982).

It is well established that sex-typed labeling of school subjects is related to students' attitudes and achievement in those subjects. Kagan found that second- and third-grade children view school as "excessively feminine" (Kagan, 1964, 1971) and concluded that this perception is an important component in the fact that boys are typically less successful overall in elementary school achievement than girls. Stein, Pohly, and Mueller (1971) also demonstrated that expectancy of success is connected to the gender-related associations of a task, with boys more influenced by the sex-typing than girls. This effect has been specifically documented with regard to reading (May & Olil, 1981). Dwyer (1973) concluded that boys' perception of school and reading as feminine is logically and empirically the most appropriate explanation for sex differences in reading achievement and further suggested that sex differences in reading are "more a function of the child's perception of these areas as sex-appropriate or sex-inappropriate than of the child's biological sex, individual preference for
the masculine or feminine sex-role, or liking or disliking of reading” (p. 811).

Unlike the situation with reading, there seems to be little discussion in the literature of gender typing associated with writing among young children, unless writing is seen generally as part of school. Kagan (1964) included “pencil” as one of the stimuli subjects in his study and found it to be one of the few school-related objects described as “masculine” by children of both sexes. However, Wilder, Mackie, and Cooper (1985) found that students at all grade levels, K-12, saw writing as more appropriate for females than for males. Given the importance of writing in early language arts experiences (Parker, 1983), it is surprising that gender associations with respect to it have not been more carefully examined.

One area in which gender differences in school achievement is currently of considerable interest is that of computer use. By junior secondary school, school computer use is seen as a "masculine" activity (Collins, 1985; Lockheed, 1985; Sanders, 1984), but most of the investigation of this sex-typing has taken place with adolescents. Woodill, Anderson, and Bernhard (1985) found no gender differences in a sample of 36 nursery school children with regard to how many times each child would ask to use a microcomputer in a classroom learning center. Johnson (1985) similarly found no gender differences in level of computer use in a sample of twenty 4- to 5-year-old children. Beeson and Williams (1985), however, found a significant difference between males and females under 5 years of age with regard to choice of computer use as an activity, with males displaying more interest than females. The variation in the results of these studies may be due to the personal choice of computer use in a school setting representing the influence of many situational variables rather than being a direct index of perceived sex-appropriateness.

Because gender typing with regard to computer use is seen as a serious detriment to the participation of secondary school females in computer-related activities, it has been suggested that early use of computers in school by all students—males and females—within the context of regular class instruction may be effective in preventing gender typing of computer use from developing (Collins, 1985; Lipkin & McCormick, 1985). Also, since mathematics is typically seen as a masculine subject (Fennema, 1984), many educators encourage the use of computers within a language arts environment rather than a mathematics context as an intervention which may help minimize the subsequent perception of computer use as masculine (Collins & Ollila, 1986; Lockheed & Frakt, 1984).

The Writing to Read (WTR) early language experience (Martin, 1984) is an approach to kindergarten and Grade 1 language arts instruction which involves daily use of classroom microcomputers and emphasizes writing activities as an integral part of language development. The Writing to Read program would seem to hold considerable potential for the prevention of masculine associations with computer use in schools because of its extensive use of language-based computer activities for all children, not just those who self-select computer use. Scott's (1986) finding that a relatively short exposure to different types of reading materials could affect students' gender stereotypes suggests that a year-long exposure to a "sex-neutral" instructional environment involving computers may have considerable impact on young children's perceptions of the gender appropriateness of both language experience and computer use. In addition, both Scott (1986) and Fogot (1985) found gender differences in the reactions of children to instructional and social interventions. It is possible that extensive use of computers in the language arts program in Grade 1 may have different effects on the male and female student involved in the experience with regard to their subsequent perceptions of the gender appropriateness of language arts and computer use.

The background of this study, therefore, reflects the consensus that early gender stereotypes about a school experience can affect children's subsequent achievement and involvement in this experience. Following from this, it is important to note gender stereotypes as early as possible and desirable to attempt interventions to forestall the development of these gender stereotypes. Because the literature with respect to young children's gender stereotypes about reading, writing, and computer use is variable in its scope and consistency of results, one of the purposes of this study is to systematically examine the gender typing associated with reading, writing, and computer use for children in Grade 1. A second purpose of the study is to explore the impact of a Grade 1 language program which makes daily use of microcomputers in a language arts context on these sex-appropriate perceptions particularly with respect to gender stereotypes about computer use.

**Method**

**Sample**

A total of 120 children from six intact classrooms participated in the study. Three different
groups, each consisting of the two Grade 1 classrooms at the participating schools, were involved in the study. Random assignment of students to classes or of classes or schools to treatment was not possible. However, the three schools were demographically similar, all from suburban, middle-class neighborhoods in Victoria, British Columbia. Approximately 8 to 10% of the children in each group were Native Indian; the remainder of the children were Caucasian. There were no exceptional children in terms of learning or physical handicaps in the classes. Although a specific survey was not made with respect to the presence of a computer in the home, the teachers' familiarity with the families and neighborhoods of the children was such that they were fairly confident that none of the children were home computer users. All six teachers were female, with at least 7 years' experience teaching at the Grade 1 level.

The first group, WTR-Computer Intensive, consisted of two intact Grade 1 classes (24 males, 27 females) from a school in which a Writing to Read (Martin, 1984) laboratory was installed. These children participated in the full WTR program, which includes daily use of microcomputers and electric typewriters throughout Grade 1 within the language arts period. All children had equal daily access to the computers, and the software used involved only words, sounds, and graphics. Children worked in pairs at the computers. The second group of children, the Traditional group, involved two intact Grade 1 classes (20 males, 20 females) from a second elementary school. These children had no computer experiences, outside of or within their regular language arts program. The third group of children, the Computer-Augmented group, included two Grade 1 classes (18 males, 11 females) from a third elementary school. These children also had access to a Writing to Read laboratory, but used the computers and the WTR materials as an adjunct to their regular language instruction, rather than as a regular, integrated part of the daily language experience. However, when they did use computers, only language-related experiences were available.

Instrument

An adaptation of Downing's Activity-Object Opinion Survey (Downing & Thomson, 1977) was used for the study. The survey consisted of a booklet of 16 sketches, 8 of objects without a stick-figure present and 8 of stick-figures participating in an activity. An example of a page from the test booklet is given in Figure 1. Four of the sketches were designated as reading related, four involved writing, and four included a microcomputer. The sketches in each content domain were all different and included two where a stick-figure was shown interacting with a pertinent stimulus item, such as a book, a pencil, or a microcomputer, and two where the stimulus item appeared without a stick-figure in the sketch. Also included were sketches of a truck, a doll, a stick-figure painting at an easel, and a stick-figure bouncing a striped ball. Downing claimed that the stick-figures were gender neutral and could not be identified as either male or female (Downing & Thomson, 1977).

Two forms of the booklet were prepared so that the sketches appeared in different orders with
"stick-figure" and "object" sketches alternating, as well as content domains. Each booklet page also contained line drawings of a little boy and a little girl. Two sets of booklet pages were prepared so that the boy and girl would each appear as the topmost figure an equal number of times for each of the stimulus sketches.

The subject's task was to consider each sketch and indicate if a boy or a girl would be more likely to be substituted in the picture instead of the stick-figure, or, in the object-only sketches, who the child would choose as most likely to be playing with the object. Downing and Morrison (1977) justified this forced-choice methodology on the basis of "psychological theories of unconscious motivation" where an option of "no opinion" might allow an avoidance response masking "unconscious or emotional" areas (p. 151). They argued that a subject's choices should balance out between boy and girl if there is no consistent stereotype underlying the choices. The instrument, without the computer drawings, has been used in a variety of studies (May & Ollila, 1981), including an international study involving children and adults in Canada, Israel, Denmark, Japan, England, Finland, and the United States (Downing et al., 1979).

A group of 25 senior and graduate students administered the test on a one-to-one basis with each child. There was no reason to expect any experimenter effects. One of the two picture orders was randomly assigned to each child. The booklet was placed on a small table between the experimenter and child. The experimenter opened the booklet to the first page, pointed to the pictures of the boy and girl, and asked the child "What is this a picture of?" All children were successful in identifying the male figure as a boy and the female figure as a girl. Then the experimenter proceeded through each page of the booklet, saying "What do you think will use the book (pencil, crayon, doll, etc.)? The little boy (pointing to the boy) or the little girl (pointing to the girl)?" "Boy" was mentioned first half of the time; "girl" mentioned first on alternate sketches. The child would indicate his or her choice by pointing and the experimenter would circle the selection on the booklet page. Without exception, the children seemed to understand the task and responded quickly to each stimulus item. The children did not indicate discomfort at having to make a forced-choice response. For each item, a response of boy received a score of 1 and girl received a score of 0; thus, a score of 4 would mean the boy was associated with each of the set of four related items, and a score of 0 would indicate a girl had been chosen each of the four times. Consequently, a score of 2 would be interpreted as no particular gender association, as it would occur when boy and girl choices were made the same number of times. The Writing to Read and Traditional samples were tested in September; all children were tested in May. Owing to school scheduling difficulties, the Computer-Augmented classes were tested only in May.

**RESULTS**

**Instrument validation**

Students' responses to the four toy items were examined first in order to assess the reliability and validity of the instrument as a tool to investigate the presence of sex-stereotypes. If students responded as expected with respect to toy gender typing, the validity of the instrument for gender typing associated with reading, writing, and computer use could be better supported. According to previous research, sex-typing of toys occurs as early as the second year (DeLucia, 1963; Weinraub et al., 1984), with balls and trucks perceived as appropriate for boys and dolls for girls. Painting, however, does not seem to have a consistent gender association (Shapiro, 1985) for young children. The children's responses replicated these results. "Ball" and "truck" were seen as masculine by a majority of the children (for ball, 87% of the boys, 75% of the girls; for truck, 82% of the boys, 92% of the girls) "doll" was seen as feminine by 91% of the boys and 92% of the girls; and "painting" was not strongly associated with any gender stereotype overall (59% of the boys and 62% of the girls associated it with girls).

Because of the fit of these results with the predicted responses, the instrument was judged to be reliable and the assumption of its validity as a measure of gender stereotypes related to reading, writing, and computer use was supported.

**Gender stereotypes results.**

Pre and post gender typing scores (means and standard deviations) for students by group and sex within group are given in Table 1 for each of the three variables—reading, writing, and computer use. Scores that are significantly different from neutral are marked with an asterisk. As noted earlier, each variable can assume a value of 0 to 4, depending on how many times, out of four, the child chose a boy as the "most likely" user or doer of computing, reading, or writing.
Thus a score of 2 suggests no gender related expectation, in that it is obtained when a boy was chosen twice and a girl chosen twice. A score greater than 2 indicates that a boy was chosen more times out of 4 than was a girl, a score of 4 that a boy was chosen at each opportunity and a score of 0 that a girl was chosen at each opportunity.

A series of three 2(sex) x 3(language group) analyses of variance with posttest reading, writing, and computer use gender stereotype scores as dependent variables was conducted in order to compare all three of the language arts program in May, when two of the groups had been using computers in a language arts context for the entire school year. Table 2 shows the results of these analyses. No significant effects for sex or language group were found for either reading or writing, or for the interaction of sex and language group for any of the reading, writing, or computer-use scores. A significant sex effect was found for stereotypes about computer use (male mean = 2.56, female mean = 2.07), but no language group effect or interaction was present (WTR mean = 2.28, Traditional mean = 2.38, Computer-Augmented mean = 2.38). Males in each group associated computer use with boys, t < .05. Females in each group also reflected this trend, but not at the .05 level of significance.

In order to test for a time effect, a similar analysis was conducted, 2(language group) x 2(sex) x 2(time), for the two language groups Writing to Read and Traditional — on whom repeated measures on gender stereotypes in September and May were available. There was no time effect (df = 1,81; F = .04; p < .05) nor was there any interaction involving time, sex, or language group.

**DISCUSSION**

Like May and Olilia (1981), Shapiro (1985), and Downing and Thomson (1977), this study did not find reading to be perceived as a feminine activity for young children. In addition, no consistent gender association with writing was evident in the results. In contrast, computer use was seen as a masculine activity, more strongly by young boys than by young girls. Sex differences in perceptions of gender typing of computer use were present even at the beginning of the Grade 1 year. Gender typing of computer use was more fully articulated as a stereotype, especially among young boys, than were gender stereotypes about reading and writing. It appears that the first-grade boys have already learned the culturally transmitted message: Computers are for boys.

Many hope that the early and consistent use of computers in a language context will help prevent the development of masculine identification with computers (Collis & Olilia, 1986; Lockhead & Frakt, 1984). Unfortunately, this study does not lend support to this assumption. Grade 1 children who interacted daily with microcomputers in the classroom setting on an equitable, cooperative basis in the context of language arts did not evolve to any different level or pattern of gender stereotypes about computer use than did children in ordinary language arts programs.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Gender Typing of Grade 1 in Different Language Arts Programs: Means and Standard Deviations</th>
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<td></td>
<td>WTR</td>
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<td></td>
<td>(N = 51)</td>
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<tr>
<td>Subject</td>
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<tr>
<td>Reading</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>2.25 (1.21)</td>
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<tr>
<td>Females</td>
<td>1.61** (1.08)</td>
</tr>
<tr>
<td>Writing</td>
<td></td>
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<tr>
<td>Males</td>
<td>2.29* (1.01)</td>
</tr>
<tr>
<td>Females</td>
<td>1.95 (1.06)</td>
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<tr>
<td>Computer Use</td>
<td></td>
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<tr>
<td>Males</td>
<td>2.37** (.98)</td>
</tr>
<tr>
<td>Females</td>
<td>2.09 (1.01)</td>
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</tbody>
</table>

Scores are means of children's responses to each set of four stimulus items. Each choice of "boy" was coded 1; each choice of "girl" was coded 0. Thus, scores could range from 0-4, with neutral = 2, more for boys > 2 and more for girls < 2. Standard deviations are given in parentheses.

*Indicates response significantly different from neutral, p < .05.

**Indicates response significantly different from neutral, p < .01.
The inclination to see computers as masculine was present at the start of Grade 1 for all three language arts programs represented in this study, and did not change after 7 to 8 months of classroom computer use. It did not seem to matter that all students were given equal access to computer time, in a language (rather than mathematics) situation, and with female teachers as their computer reference people. The tendency to see computer use, more than reading or writing, as more likely to be for boys than for girls, still occurred. Using a computer, either intensively in the Writing to Read classrooms or as a regular adjunct to language instruction, did not result in any difference in students' stereotypical perceptions.

These results are discouraging, especially in contrast to other studies which support the impact of interventions on gender stereotyping (Scott, 1986). If a pupil's level of sex-role stereotyping becomes a cognitive characteristic that influences subsequent information processing, attitudes, comprehension, and interest (Martin & Halverson, 1981), then the early appearance of masculine-typing of computer use demonstrated in this study, as well as the apparent resistance of this perception to the influence of school environment, suggests that gender related differences in subsequent computer use are likely to continue for students as they move through school. Further research is needed to test the persistence of this gender stereotyping as computer use becomes increasingly more commonplace in society; it appears larger changes in social perceptions may need to occur before classroom interventions can effectively influence gender stereotypes about computer use.

**REFERENCES**


