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ABSTRACT

Adults who utilize trade books when working with children should be aware of the differences in gender portrayal of adults in children's science trade books. This paper describes the results and implications of a gender representation study of the visuals in children's science trade books identified as outstanding by the National Science Teachers Association in 1976 and 1993. The humans shown in the visuals in these books were evaluated not only for the frequency of male and female representations but also for the type of portrayal. The evaluation of each human found in a visual included the (a) content category (biological or physical), (b) physical activity, (c) location, (d) occupation, (e) tool use, and (f) personal interactions among the humans. Significant differences in the frequency and type of portrayal of males and females were found between content categories within a single year and between years. Some of the changes in gender portrayal observed between the two years mirror changes in gender role found in society during the past 17 years. The significant differences which reflect society were seen in three categories-age, activity level, and occupations. Age and occupation differences are described in this paper.
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presented to the
Global Summit on Science and Science Education
on December 28, 1996

Patricia L. Waller and Gail G. Smith

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This presentation described the results and implications of a gender representation study of the visuals in children's science trade books identified as outstanding by the National Science Teachers Association in 1976 and 1993. The humans shown in the visuals in these books were evaluated not only for the frequency of male and female representations but also for the type of portrayal. The evaluation of each human found in a visual included the (a) content category (biological or physical), (b) physical activity, (c) location, (d) occupation, (e) tool use, and (f) personal interactions among the humans. Significant differences in the frequency and type of portrayal of males and females were found between content categories within a single year and between years. Some of the changes in gender portrayal observed between the two years mirror changes in gender role found in society during the past seventeen years. The significant differences which reflect society were seen in three categories: age, activity level, and occupations. Age and occupation differences were described in this presentation. Those adults who utilize trade books when working with children should be aware of differences in gender portrayal of adults in children's science trade books.

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Introduction

In the elementary classroom, students are exposed to two types of science books: textbooks and trade books. In recent years, with the introduction of the Whole Language Approach in elementary classrooms, trade book use has increased. Although there have been studies of gender representation on science textbooks, little has been done on science trade books. Comparative studies to determine if changes have occurred in gender representation are not available.

During the past 30 years, there have been major efforts to achieve equal representation of females and males in society. Laws were enacted: the Civil Rights Act of 1964 prohibited sex discrimination in employment and Title IX of the Elementary Secondary Education Act of 1972 provided for equal educational opportunities for both sexes to name just two. Publishers of textbooks issued statements about their intent to publish materials which provided gender fair representation of men and women. Therefore, it seemed appropriate to make a comparison study based on an approved

list generated by the National Science Teachers Association: "Outstanding Science Trade Books for Children" (OSTBC) published each March in *Science and Children*.

The Study

The study consisted of a review of all the visuals in all the books listed in the 1976 and 1993 lists of NSTA "Outstanding Science Trade Books for Children." The books were separated into two groups by content category: biological science (those which involved the study of living things, such as, botany and zoology) and physical science (those which involved the non-living world, such as, chemistry and geology). Each visual with a human was evaluated not only for identification of sex but also age, level of physical activity, location, occupation, and tool use. Table 1 shows the Coding Data Sheet used by the evaluators. Comparisons were made within a year between content categories and between years (1976 and 1993). There was an 86% intercoder agreement between the two coders who evaluated the visuals. Table 2 summarizes the population of visuals used in this study. A total of 2,895 humans were evaluated.

An overview of these data indicates a surprising change. As seen in Graph 1 between 1976 and 1993, the average number of pages per book on this list dropped from 74 to 42 but the number of visuals remained the same. This indicates that the visuals have become a more important part of these books in more recent years. The ratio of males to females (approximately 2:1) in these visuals has remained unchanged as shown in Graph 2. However, a look at the frequency of females and males by content category in Graph 3 reveals a difference in the ratio. In 1976, the ratio of

males to females in the both content categories was 2:1 but in the 1996 book list the ratio for biological science books was 1.5:1 and physical science books was 3.5:1. In the biological science, the number of males and females increased by approximately 60%. However, in the physical science books, males decreased by only 38% compare to the drop in females by 63%. Table 3 shows the ratio of males to females by content category and age. Interestingly, the ratio of boys to girls on each list is 1:1 for both years with the physical sciences books on the 1993 list showing a lower boy to girl ratio (0.6:1). It appears that the adult male is the most frequently represented person in both years on this book list.

Books can offer examples of role models for children. Therefore, a look at the occupations presented in these books seemed appropriate. Graph 4 shows that in the biological science books more occupations were identified in the more recent books but on the other hand fewer occupations were shown in the more recent physical science books. In both categories, more scientists were shown in the more recent books. In Graph 5, the sex of the scientists pictured in the books revealed that there was only one female scientist shown in the 1976 books and that was in a physical science book. In the 1993 books, the females make up approximately 15% of the scientists represented. Interestingly, Culotta (1993) indicates that 15% of the engineers and Ph.D. scientists are female.

Conclusions

This study of the books identified by NSTA in the OSTBC lists of 1976 and 1993 produced the following conclusions:

1. Visuals are more important in more recent books.
2. Males are shown more frequently than females in both years.
3. Boys and girls are represented with equal frequency.
4. Adult males are the most frequently represented person in both years.
5. The ratio of males to females is higher in the physical science books than in the biological science books.
6. There are more role models for both boys and girls in the more recent books.

Implications

This information is important for those who use these books: teachers, librarians, parents. First, in the more recent books, visuals have a more important role. Second, gender representation is not equal in these outstanding trade book lists but the more recent books do show a shift to more equitable representation. Third, adults who use these books should guide students to evaluate the visuals. This presentation shows only a few of the characteristics which were evaluated in this study. However, these findings are important in light of our efforts in encourage more girls to pursue careers in science.

Reference

Culotta, E. (1993). Women struggle to crack the code of corporate culture. Science, 260, 398-404.

Table1

Visual Analysis Data Sheet

BOOK ID:

PAGE NUMBER:

Visual Type: Illustration / Photograph

Ind #	Sex of Individual			Age of Individual			Activity		Location			Description of Activity
	F	M	U	A	C	U	A	Pa	ID	OD	O	

A= Action, movement ID= Indoors O= Other

Pa= No action or movement OD= Outdoors

If Other and you can identify write identification here:_____

Ind #	Sex of Individual			Tool Used			Name of Tool	Description of Occupation
	F	M	U	HM	I	HT		

KEY: HM = Heavy machinery: automobiles, earthmoving equipment, jackhammer, tractor
I = Instruments: measuring devices, computer, microscope, TV monitors
HT = Hand tools: hammers. pen/pencil, rake, screwdriver

Use table below only for visuals with 2 or more people

Ind #	Sex of Individua			Personal Interaction Categories			Specific Interaction					Description of Interaction
	F	M	U	COM	NCO	IND	DIR	LIS	SER	BSR	OTHER	

Key: COM= Competitive NCO= Non-competitive IND= Independent of others in the visual
DIR= Directing; showing another LIS= Listening; observing another
SER= Serving; helping; giving BSR= Being served; being helped; receiving

Table 2

Characteristics of the OSTBC Listed in 1976 and 1993

YEAR	NUMBER OF BOOKS	NUMBER EVALUATED	VISUALS	VISUALS WITH HUMANS	HUMANS EVALUATED
1976	87	59	3,375	758	1,441
1993	96	60	3,792	661	1,454
TOTAL	183	119	7,167	1,419	2,895

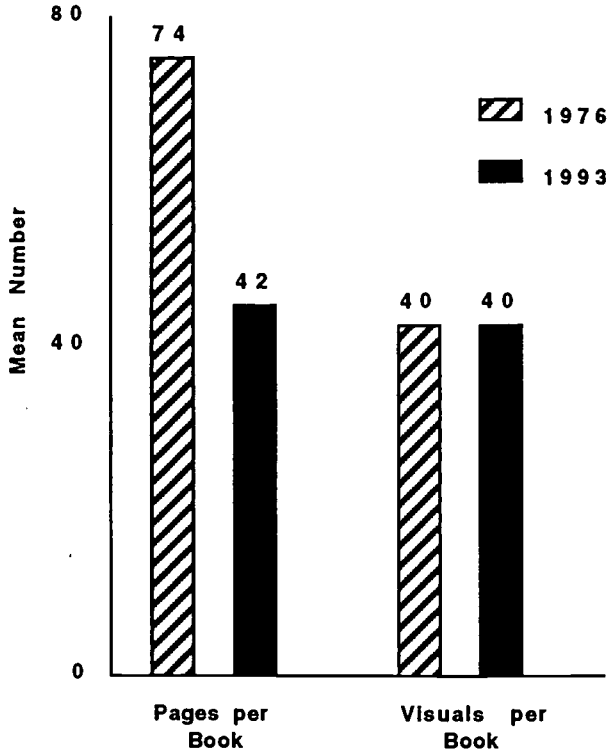
Table 3

Male:Female Ratios for the Significant Differences in Age Category

	ALL BOOKS		BIOLOGICAL SCIENCE		PHYSICAL SCIENCE	
	1976	1993	1976	1993	1976	1993
OVERALL RATIO	2:1	2:1	2:1	1.5:1	2:1	2:1
BY AGE						
ADULTS	3:1	3:1	2.2:1	2.2:1	3.6:1	5.5:1
CHILDREN	1:1	1:1	1.2:1	1.2:1	1.2:1	0.6:1

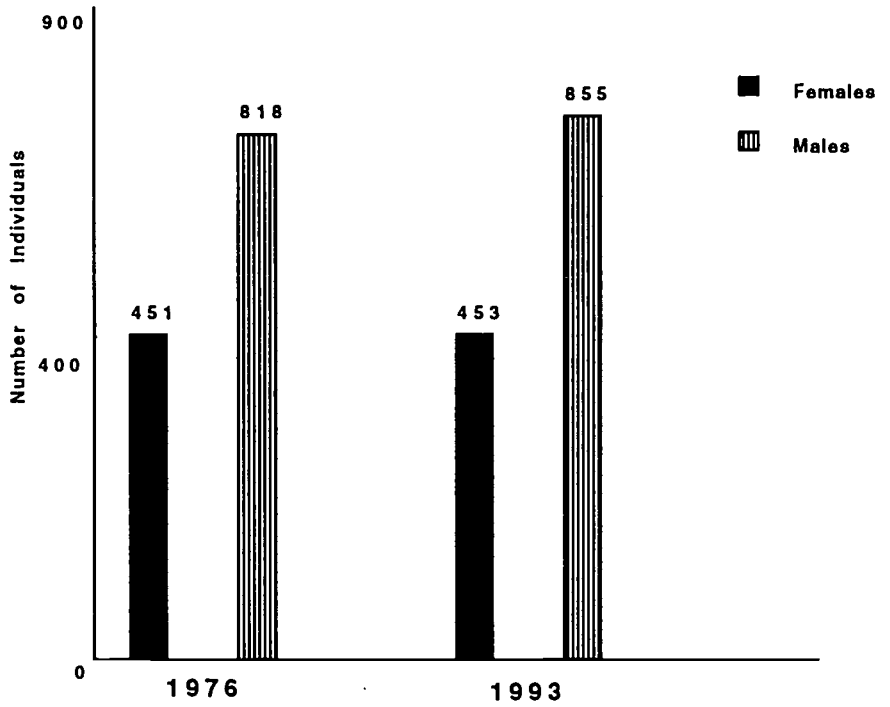
GRAPH 1

Mean Number of Pages and Visuals in 1976 and 1993 OSTBC Lists



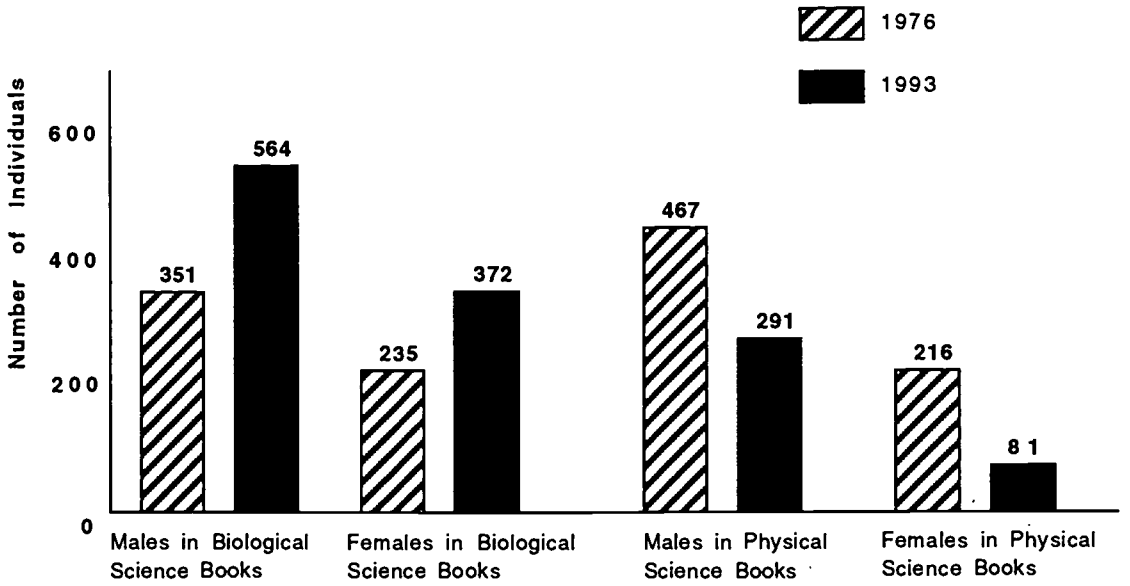
GRAPH 2

Total Number of Males and Females Portrayed in Visuals in the 1976 and 1993 OSTBC Lists



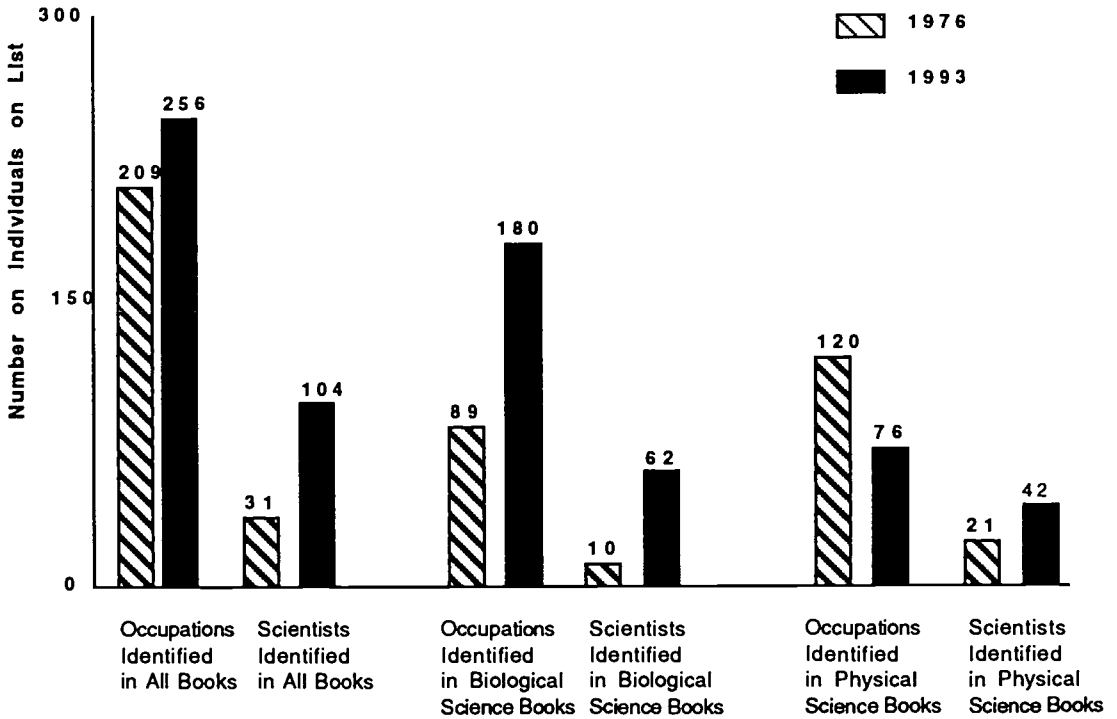
GRAPH 3

Number of Females and Males Portrayed by Content Category in 1976 and 1993 OSTBC Lists



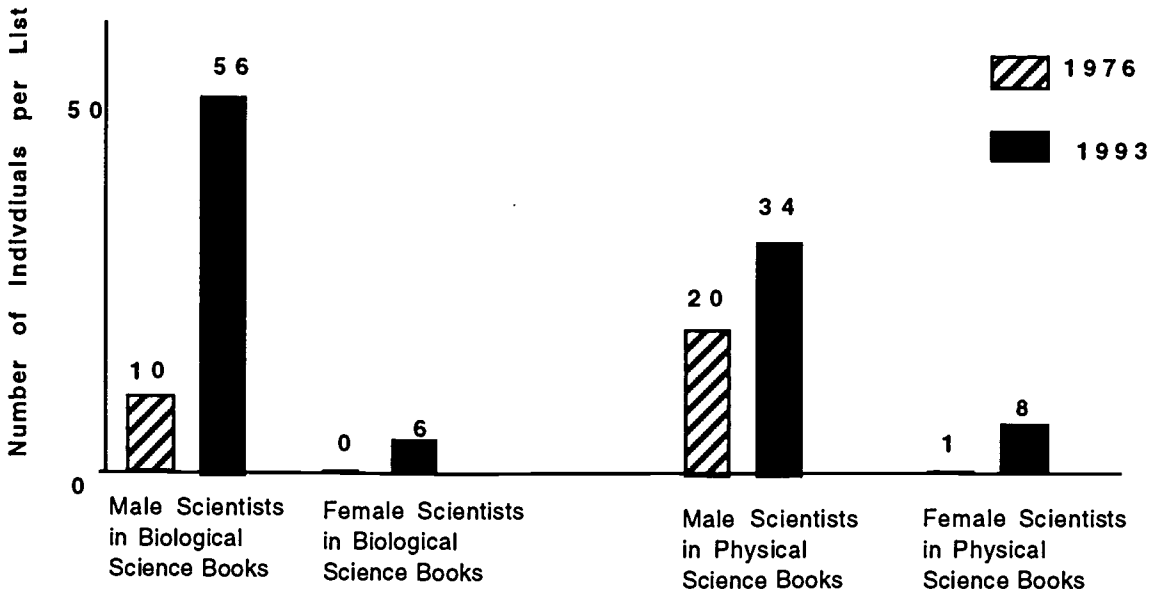
GRAPH 4

Identified Occupations in the 1976 and 1993 OSTBC Lists



GRAPH 5

Scientists in 1976 and 1993 OSTBC Lists by Science Field



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