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# DO READING ABILITY AND SEX DIFFERENCES MAKE A DIFFERENCE IN SCIENCE ACHIEVEMENT?

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## Introduction

Educators, parents and politicians of late have all been concerned with test scores, especially declining test scores. Much debate has taken place concerning whether, in fact, there has been a decline in the level of student performance or, rather, whether there has been a change in the population of students taking a given test. Many explanations have been tendered concerning reasons for the possible decline in test scores. This study was concerned with science scores from one Iowa high school. Specifically, this study sought to determine if there was a decline in science test scores and to determine what variables account for most of the variance in standardized science test scores.

## Design of Study

Members of the sophomore classes of 1973 ( $n=121$ ) and 1977 ( $n=84$ ) were chosen for this study because they represented the same time interval as that chosen by the National Assessment of Educational Progress (NAEP) for their science assessment. Scores from the natural science test of the *Iowa Tests of Educational Development (ITED)* were used to address the score decline question. A survey of the literature indicated that there were several possible variables that might account for the variance in the science achievement scores. Based upon previously reported studies, it was decided to examine sibling order, sex, reading level, mathematical ability, vocabulary level and I.Q. as possible determinants of science achievement. Data were key-punched and Pearson product-moment correlation, t-test, and multiple regression were used to examine the data.

## Findings and Discussion

A t-test between the ITED natural science scores for the 1973 and 1977 sophomore classes indicated that there was no score decline.

A summary of the t-test comparison of the ITED natural science scores for the sophomore classes of 1973 and 1977.

Year	df	Mean	df	F	P
1973	203	58.3	26.6	1.09	0.66
1977		61.9	27.8		

In light of the downward trend of science scores, as reported by NAEP (1978) and others, it would be reasonable to anticipate the 1977 scores to be lower than the 1973 scores. The opposite was observed. The 1977 sophomore class demonstrated a growth of more than three and one-half points. The difference is not statistically significant because of the large amount of variability in each set of scores.

Multiple regression was used in an attempt to isolate those factors which contributed most to the ITED natural science score.

**A summary of the multiple regression analysis of the ITED natural science scores with respect to the variables ITED reading, ITED quantitative thinking, ITED vocabulary, IQ, sex and sibling order.**

Independent Variable	multiple r	r square	r	% of Dependent Variance Explained
<i>ITED reading</i>	0.88	0.77	0.88	77.0
<i>Sex</i>	0.89	0.80	-0.07	2.7
<i>IQ</i>	0.89	0.80	0.59	0.3
<i>Sibling order</i>	0.90	0.80	0.05	0.1
<i>ITED vocabulary</i>	0.90	0.80	0.72	0.1
<i>ITED quantitative thinking</i>	0.90	0.81	0.62	0.0

The ability of the student to read proved to be the most significant variable, explaining 77.0 percent of the variance in the ITED natural science score. An indication of the consistent relationship between an ITED natural science score and the corresponding ITED reading score can be obtained by examining a correlation matrix. These two sets of scores yield a Pearson product-moment correlation of 0.876, significant at the 0.001 probability level. This correlation between science and reading is well documented. Some studies have demonstrated that the study of science can improve reading ability (Barufaldi and Swift, 1977).

The sex of the student is the second most important variable. Females scored 3.7 points below the grand mean on the ITED natural science test, while males scored 5.5 points above the grand mean, a difference of 9.2 points. This pronounced difference parallels the decline in science achievement for females (NAEP). When one considers the fact that much of the variability in science scores can be accounted for by reading ability, it would be logical to assume that females, who as a group read better than males, would score higher. This is not the case, however. A possible explanation for this is that by the time children reach kindergarten, and regardless of their family background, the cultural stereotypes of the roles of men and women have been learned from television and their peers (Trotter, 1975). At the high school level, teachers, administrators, counselors and parents reinforce the diminishing interest in science of the capable female (Shapley, 1975).

### Conclusions

This study indicates that in at least one Iowa high school, science achievement, as measured by the ITED natural science exam, is alive

and well. It also supports the proposition that every teacher should be sensitive to the reading needs of the student. Further the study supports the efforts of those educators who are trying to develop a non-sexist educational program for our schools.

### References

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- Shapley, Deborah. Obstacles to Women in Science. *Impact of Science on Society* 25 (April-June, 1975): 155-123.
- Trotter, Robert J., Sexism is Depressing. *Science News* 108 (September, 1975): 173-174.

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