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# Teaching Reading Skills in the Mathematics Classroom

by

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There are two purposes to this article. The first is to provide a brief but generalized report on the problems of teaching reading in the mathematics class. The second is to provide a set of specific techniques from which the mathematics teacher may choose, to potentially improve the reading skills of students.

Reading is fundamental to all disciplines and it is especially important in mathematics, where words, symbols, and pictures are combined and condensed on the printed page. Reading instruction provides a unique set of difficulties for the mathematics teacher. Most mathematics teachers realize the importance of reading instruction, yet they also feel frustrated when attempting to improve students' reading comprehension. Let us examine some of the difficulties of teaching reading in a mathematics classroom.

## General Difficulties

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For the average child in pre-algebra, a reading assignment may prove difficult because students encounter reading problems unique to mathematics.

For example, words in mathematics have very precise meanings. Some words signal a process (such as add, subtract, multiply or divide), while others increase the student's comprehension of the problem (with words such as before, increase, of, for, or compare). Few words are wasted, and the students must concentrate on reading and also on the conceptual relationships implied. Paragraphs often must be reread, and for some, this is a slow and difficult ordeal. In addition, some words used in mathematics which appear to be everyday words have special mathematical meanings. Examples are: radical, times, rational, mean, range, and (if one includes computer mathematics) bit, job, run and hardware.

The reading level required by mathematics books is usually high, even in junior high school texts.

But, with pressure to publish "modern" textbooks, emphasis upon content has caused the readability level of material to be too high.

Not only is the level too high, but there is also too great a range within the text. Some selections examined fell within the fourth-grade-and-below category while others would be appropriate for a college graduate student.<sup>1</sup>

For the average student of mathematics, some reading assignments prove difficult. For the poor reader, these assignments prove to be impossible. What the reader brings with him when he opens the text determines, to a large degree, what he takes from it. The mathematics teacher should be aware of special reading problems in mathematics and should prepare the student for meeting problems inherent to mathematics materials. The key is that the mathematics teacher must be aware:

1. The teacher should be aware that the student may have (or has had) a sense of frustration in reading mathematics. The student's past experience may have been discouraging, and the student must be given a feeling of success through slow but patient work in reading.
2. The teacher should be aware that teaching reading in the mathematics class can make a difference in the student's overall mathematical ability. The mathematics teacher can be an effective reading teacher.

Call and Wiggin pointed up the need for reading instruction in mathematics classes. They conducted a study to determine whether there is a correlation between a student's ability to solve word problems in second year algebra and the presence or absence of special reading instruction. The results, they said, indicated that the students receiving reading instruction in their classes did better in problem solving than those who did not.<sup>2</sup>

3. Finally, the teacher should be aware of specific techniques from which he may choose to meet the needs of the class, be it regents, non-regents, pre-algebra, eleventh year mathematics, or even calculus.

Many suggestions for improving reading comprehension are included below.

## Specific Techniques for Improving Reading \_\_\_\_\_

Many mathematics teachers realize the importance of reading ability in mathematics and assign a passage from the text as part of a student's homework. For the poor reader, little is usually accomplished by this. The poor reader may

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<sup>1</sup>Frank Smith, "The Readability of Junior High School Mathematics Textbooks," *The Mathematics Teacher*, LXII, No. 4 (April 1969), p.290.

<sup>2</sup>David L. Shepherd, *Comprehensive High School Reading Methods* (Columbus, Ohio, 1973), p.252.

become discouraged and not do the reading. To ensure that the student "does" the assignment, the teacher may give a quiz the next day on this reading assignment. This quiz, however, may actually discourage the poor reader who tried to do the reading but who could not completely master it. The quiz is, therefore, "after the fact" where reading instruction is concerned. The student should be prepared ahead of time for all he will meet in the reading selection. Of course, the teacher should read and analyze the assignment the day before to anticipate difficulties.

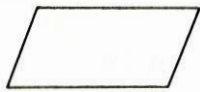
Here are some techniques for improving reading:

### 1. VOCABULARY

An important aspect of the reading assignment is new vocabulary words. The teacher may introduce new vocabulary words by (a) writing the words on the board and going over their meaning, or (b) having the students keep a "mathematics dictionary" in their math notebooks. A corner of the board may be reserved for new vocabulary words each day. The teacher may also prepare word puzzles using math words listed in the student's notebook.

### 2. DIAGRAMS

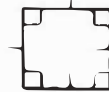
In many cases, one picture is worth a thousand words; and the teacher should refer to diagrams often in defining words.



Parallelogram



Rectangle



Square



Isosceles Trapezoid

### 3. REWRITING

Rewrite a paragraph using words the students may better understand. Even asking the students themselves to rewrite a paragraph, using their own words, may be helpful. The brighter students in the class may come up with a clear and mathematically acceptable interpretation of the paragraph. Such an assignment can be a good "Do Now" assignment. It may be helpful to mimeograph results for future reference.

### 4. DIRECTIONS

Stress the importance of following directions. Read important instructions aloud and discuss the wording of test questions. Underline key words. Give an easy quiz in which following directions is important.

### 5. VERBALIZATION

The teacher should try to develop improved questioning techniques. Ask the student to not simply work out the problem, but to explain what was done. Involve the class in such discussions. Ask questions such as "How did you get from step 2 to step 4?" rather than "What is the answer?"

Ask students to write out the steps used in solving problems.

For example: If the length of a rectangle is 10 feet and the width is 5 feet, find the perimeter.  
Reread the problem.

step 1 Find \_\_\_\_\_

step 2 Given \_\_\_\_\_

step 3 Formula \_\_\_\_\_

step 4 Check \_\_\_\_\_

#### 6. DRILL AND REVIEW

Have students underline certain words, reread certain paragraphs in class, and review topics already covered, thereby keeping the material fresh in the students' minds.

#### 7. OUTSIDE REPORTS

There are many interesting books on mathematics from mathematical recreations to mathematics in literature. Assign outside readings for extra credit. One very popular and enjoyable mathematics book is *Mathematics in Everyday Things*, by William Vergara.

It is helpful to show how mathematics can be applied to everyday situations.

#### 8. CONTESTS AND GAMES

Contests may work especially well in motivating students. Contests are also very good on "short" school days or on a day just before a vacation. Scrambled letters, matching columns, fill in the blanks, code words, word association, and other word games may be appropriate.

#### 9. QUESTION THE STUDENTS

Ask the students for reasons why they think verbal problems are difficult. List these reasons and discuss with your students techniques for overcoming difficulties.

The problems associated with teaching reading are very complex. There are many factors, physiological as well as psychological, which affect one's reading ability. Students with severe reading problems should be scheduled for special reading classes.

Presented here was a brief overview of what a mathematics teacher can do to help improve the reading comprehension of some students. Awareness of the problems and the knowledge of some techniques for helping students should be a part of the repertoire of any mathematics teacher.

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