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ASPECTS OF READING INSTRUCTION IN MATHEMATICS

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Many secondary school students of mathematics experience great difficulty in the reading of verbal problems. Even a number of otherwise able readers have difficulty in reading verbal problems effectively unless provision is made by the mathematics teacher to help them master the special reading skills of mathematics.

This article explores some special reading skills needed to interpret verbal problems effectively and some ways in which a mathematics teacher can best provide for the individual reading differences of his students.

Specialized Reading Skills in Mathematics

Secondary school students of mathematics must understand a number of reading skills if they are to be able to interpret verbal problems most effectively. Perhaps the most important of these reading skills is the ability of the students to interpret correctly the specialized vocabulary and symbolism used in mathematics. Sometimes this skill is difficult to attain because a number of mathematics textbooks contain their own vocabulary which may be somewhat different from that used by other textbooks.

Reading in mathematics is very intensive, and each word often must be inspected with great care. Mathematical reading usually is careful and analytic. The reading should be done in a word-by-word manner and usually rereading is required before students have sufficient grasp of a verbal problem to be able to solve it correctly. Mathematical reading usually is slow.

Students of mathematics should be able to read and follow directions accurately since such directions often must be carried out in correct sequence if a problem is to be solved correctly. They also must be able to pick out the most important details in each verbal problem as this will aid them in solving it. Further, students must be able to visualize a problem in their minds before trying to find its solution.

Students of mathematics should be critical readers; they should be able to evaluate what they read. In mathematics critical reading requires that students be able to judge the relevant data for the solution of a problem. They also should be creative readers or able

to apply what is read for problem-solving. Obviously, correct problem-solving ability is the ultimate goal of mathematical reading.

Providing for Individual Reading Differences

A mathematics teacher can greatly help secondary school students in developing their ability to read verbal problems by giving assignments while also considering the special reading skills of mathematics. A more effective way can be found to assign verbal problems than the following: “Do problems 1, 3, 4, 7, and 9 on pages 16 and 17.”

One good way to help students effectively interpret verbal problems is by the use of an adaptation of the Survey Q3R study technique designed by Robinson of Ohio State University(1). Each teacher of mathematics can vary this study technique in the way that he wishes to do so, but the following is one way that it can be used in reading verbal problems.

- (1) *Preview*—Skim the entire problem to get a general impression or idea of what the problem is about.
- (2) *Question*—Pose three questions before the problem is carefully read. These questions either can be posed silently or written down.
 - (a) What is the question or questions being asked for?
 - (b) What facts are needed for solution?
 - (c) What order of steps is necessary for the solution?
- (3) *Read*—Read the entire problem very carefully with the three questions in mind. After reading, write down the answers to the questions that were posed. Read to clarify the question, identify the facts needed for a solution, and determine the steps needed in solving the problem.
- (4) *Review*—Reread the problem quite carefully to check on the understanding of it and to insure awareness of all the factors influencing the answer.
- (5) *Reconstruct*—Retell the problem in one’s own words making sure of what was asked for. The solution for the problem can also be estimated.

In general, teachers of mathematics can give additional help to their students in reading verbal problems by following some method of presentation. The teacher first can introduce the new vocabulary and symbols that are needed to interpret a problem effectively. Students can write the term or symbol in a vocabulary notebook with a group-formulated definition. The teacher can relate new concepts

in the assignment to previously learned materials. The teacher also can illustrate examples of the kind of problems that the students will be expected to solve and help them to visualize the problems. The teacher further can show the relevance of the problems to the students' own lives.

A mathematics teacher undoubtedly will experience some difficulty in providing for the individual reading differences of the students in a class. However, there are some ways in which the teacher can best help all readers to achieve success in reading verbal problems.

In many instances mathematics textbooks are not graded in reading difficulty; therefore, it may be impossible to use an easier reading textbook in some mathematics courses. Occasionally, however, the same concepts are presented in higher or lower level textbooks. In such instances, an excellent solution to the problem of individual differences may be found in their use.

Able readers can rewrite difficult verbal problems for slower readers. Students with reading difficulties often may be able to solve these problems correctly since they are written with simpler sentence structure and somewhat less technical terminology. Group work also can be employed effectively with abler students leading groups which contain slower readers. Occasionally an able student can demonstrate a verbal problem quite effectively. The mathematics teacher sometimes may formulate mimeographed worksheets which cover the same basic concepts. However, different students can work problems with different sentence structure and symbolic language.

Summary

The reading of mathematical verbal problems is very difficult for a number of students. Many otherwise good readers are disabled in reading verbal problems. Some specialized reading skills in mathematics are the understanding of vocabulary and symbolism, the ability to read analytically, the ability to follow directions correctly, the ability to visualize the problem, critical reading ability, and creative reading ability.

A mathematics teacher can give help to secondary school students in the solving of verbal problems by the use of an adaptation of the Survey Q3R study technique. This technique directs students to preview the problem, pose questions to be answered, read the problem carefully, review the problem, and retell the problem. Some consistent method for the presentation of verbal problems by the teacher also may help students to solve them more effectively.

There are several good methods to provide for the individual reading differences of mathematics students. If possible, graded textbooks can be used very effectively. Rewritten verbal problems, specially formulated verbal problems, and group work can also help to meet individual reading needs.

1. Robinson, Francis P., *Effective Study*, New York: Harper and Brothers, 1946.