



HANLONMATH

MATHEMATICAL SYSTEMS, INC.

Math Content Based Professional Development



Reading Math: The Hidden Skill Behind Student Achievement

Let's be clear, we cannot increase proficiency rates or student achievement in mathematics if the students cannot read mathematics – if they cannot translate English to math and math to English. All of today's high stakes tests are made up of word problems – reading – students have to know how to read mathematics and identify relevant information.

Reading math texts is very different from reading a novel. When reading a novel, your eyes move very uniformly from left to right across a page. When reading a math text, the eye movement might suggest students are on drugs. Math is not read chapter by chapter, section by section, page by page, paragraph by paragraph, or even sentence by sentence, we read math one phrase at a time.

As students read a math document/assignment, their eyes will dart back and forth from their reading a phrase, to a diagram/illustration, to the example, back to the diagram, then back again to the examples before going back back to the reading. They will generally re-read a phrase a number of times before they feel comfortable enough to continue reading. And, all this must occur with pencil and paper to be effective.

Unfortunately, even students who have experienced success in mathematics don't like or feel comfortable reading their math text. They want it explained to them. Students who have not experienced success in math see reading a math text as futile, a waste of their time, and very intimidating.

Reading a math text is different from reading a novel. Students and their parents might not realize that, so classroom teachers have to teach students to read mathematics so they can understand what they are reading and feel comfortable that they are able to learn math by reading and convey that to parents.

Before assigning the reading in mathematics, teachers should explicitly introduce new vocabulary and notation. Teachers should also preview the reading and connect the reading to previous knowledge. And, after the students have read the assignment, teachers should check for student understanding of the reading and correct their understanding – just as they do with homework problems.

Some classroom teachers have argued that students cannot read math, therefore they do not give students assignments that include reading. If you think about that for a moment, you realize that is an ill-conceived conclusion. By not assigning reading, students will be less able to read and their reading ability will continue the downward spiral.

The reason so many students are not good problem solvers – test takers – is they don't give themselves a chance to succeed. They read a problem once, then almost give up immediately. Students also have to be taught to be problem solvers. That is, how to read a word problem and pull out information like professionals do: doctors, lawyers, accountants, food servers, etc. Information, a problem, is presented to them, then they ask questions to get more information to be able to provide the best information – answers.

Generally, I provide students a procedure like below, depending upon grade level and topic, to be successful problem solvers. All those different procedures have one thing in common, that is, they require students to read the problem at least six times pulling out information at each step.

Example:

For solving problems in one variable, I use this procedure.

1. Read the problem to identify type (generic, uniform motion, work, mixture, geometry, etc.).
2. Reread to determine what you are looking for and label.
3. Reread to identify the smallest quantity as x (my preference).
4. Reread again to determine other quantities in terms of x .
5. Reread again to make an equation.
6. Reread again to make sure you are answering the question asked!

Again, this procedure has minor modifications based on grade level and problem types. What does not change is the need for multiple readings to extract information to ensure students are learning how to solve problems.

To ensure students are learning how to problem solve, they get points based on how they answer the above questions. For 10-point word problems, students get zero credit for determining the type. They earn 3 points for identifying what they are looking for. They get 3 points for labeling those quantities algebraically, they get 3 points for making an equation, and only 1 point for the answer.

As an example:

Grading Word Problems – 1 Variable

10 points

3 points identifying what you are looking for

3 points for expressing those algebraically

3 points for writing an equation

1 point for the correct answer

3 Pts

Fred

Ted

3 Pts

$2x + 3$

x

3 Pts

$(2x + 3) + x = 24$ or $\text{Fred} + \text{Ted} = 24$

1 Pt

$2x + 3 + x = 24$

$3x + 3 = 24$

$x = 21$

$x = 7$

Ted got 7 correct and

Fred had 17 correct.

*N.B. x is generally **never** the answer on standardized tests, the answer is when you answer the question being asked!*

Site administrators and superintendents should ensure that their math staff is teaching students to read and solve problems in the content areas. As administrators observe instruction, they should see evidence of reading assignments, see the new vocabulary and notation being introduced and in

student notes. They should hear teachers previewing and connecting the reading or checking and correcting their understanding of what has already been read. And they should see evidence of the new vocabulary being emphasized on tests and quizzes. If school administrators are not checking for this, they should not expect an increase in student proficiency rates or achievement levels. Reading, it's kinda important, it's the hidden skill behind increasing student achievement in math.

Call [702.218.3875](tel:702.218.3875) or [contact us](#) today to learn more about professional development resources for math educators and administrators.