

Utilizing Reading Strategies in the Math Classroom

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Ideas to Keep in Mind

Students who struggle with vocabulary and have difficulty interacting with text will, as a result, have difficulty learning academic content and concepts.

Change takes time. If you are interested in implementing new strategies, choose a couple to start with and add others later. Don't overwhelm yourself (and your students) by trying too many new strategies at once.

Students need repeated, spaced practice of strategies in order to internalize them and use them effectively.

CPM has many reading strategies already built into the curriculum! These include brainstorming, tool kits, student discourse in groups, student construction of knowledge, reciprocal teaching, and applications/relevance of concepts to motivate learning.

Modeling strategies for students is important. For some strategies, simply explaining the process will provide students with a clear understanding of how the strategy works. For many strategies, however, seeing how the teacher uses the strategy (as well as the types of skills and thought processes involved) helps students learn to use the strategy more effectively.

Incorporating the instruction of reading strategies in your classroom does not have to mean losing time you would normally devote to math instruction. You can teach, model, and practice reading strategies in the context of the math curriculum. Then the students have the benefit of learning strategies that will enhance their learning, and you can still cover the year's curriculum.

Strategies that Support Students' Vocabulary Development

Guidelines from Michael Graves:

- Giving students the words and having them copy definitions from the board or from a dictionary is the least effective way to address vocabulary.
- If we want students to really know the words and be able to use them, we need to give time for practice and review the words in a variety of different ways.
- Teachers should teach no more than 3-7 words per class period (even in block classes).

- Students should learn a maximum of 15-20 new words a week. (That's 15-20 total, not per class.)
- A maximum of 30-60 minutes of vocabulary instruction (for all classes) is recommended.

Banner

Students create a small banner on a regular piece of white paper, about themselves. On the banner, the statement should read as follows: "(Student name) is an expert at (activity)." Then underneath the statement, the student needs to list 10 words that are related to that activity.

Word Wall

Create a word wall of the vocabulary terms in the unit. You can either place the words on the wall at the beginning of the chapter (all at once) or add a word to the wall after it appears in the unit. Posting the words on the wall enables students to see the vocabulary each time they enter the classroom, resulting in improved comfort and familiarity with the terms.

As an extension, you can return to the word wall at the end of the unit and have students (in study teams or as a whole class) sort the words into categories. This can be done as a closed sort (in which the teacher provides the categories) or an open sort (in which students create their own categories). Grouping words into categories allows students to strengthen their understanding of the definitions and explore relationships between the words.

Vocabulary Trees

Students create "trees" for each Greek or Latin root or affix they study, filling in branches and twigs with words that use the root or affix and descriptions of where they encountered them.

Recording Meaningful Definitions

When students record definitions in their notes, tool kit, or a vocabulary journal, the definition will mean more to them if it is written in the students' words (students can share ideas for wordings during class discussion, which allows the teacher to confirm mathematical accuracy of the definition). The definition should also be accompanied by examples and nonexamples (nonexamples are very powerful for students). In fact, you can develop a format for your students to use when recording definitions. One possible format would be to divide a square into four quadrants and devote the quadrants to definition, examples, nonexamples, and a visual representation. Other quadrant titles you could consider include facts/characteristics, real-world examples, or personal associations.

Strategies that Support Students Before Learning

Brainstorm

A person's prior knowledge affects his/her comprehension of a text and understanding of concepts at hand. Brainstorming (in study teams or as a class) enables students to develop background knowledge to support the upcoming learning. (Prior knowledge can also be built through an activity.) In addition to developing a foundation for learning, student brainstorming provides the teacher with a picture of what students already know, and it can also result in student-generated questions that further motivate learning.

List-Group-Label

This strategy activates prior knowledge while also encouraging students to explore connections and relationships between ideas. Write a mathematical term (that will soon be studied in class) on the board or overhead projector and ask students to share words/phrases they associate with this word. Then have students (in their study teams) sort the resulting list of words into categories and explain the manner in which they classified the words.

Strategies that Support Students During Learning

Think-Aloud

Talking through a problem out loud with students. Students need to understand this is a strategy that they should be using at home while completing their homework, or in their study teams. Important points are: predicting what happens next, picturing the problem, making comparisons, identifying the problem, fixing the problem, and making comments/reasoning the answer.

Journals

Writing helps students process, clarify, and remember ideas. Grading and reading over a hundred journals, however, can seem like a daunting task. Laura Robb offers the following tips to keep journal reading/grading manageable:

- Read journals on a rotating basis -- focus on one class one week, another class the next week, etc.
- Circulate and read while the students are writing in class (which will help quickly identify students who need extra support).
- Ask students to select a page they want you to read, and/or occasionally select pages at random to read.
- Make your responses short and positive. Praise what students did well. Phrase a concern as a question (questions are less abrasive and extend an invitation for students to think about your concern).
- Do not correct spelling and punctuation. Focus instead on ideas and content.

Math Charades/Pictionary

Students use vocabulary words from math and play a game of pictionary. Divide the class into two teams. Randomly (toss a coin) decide who will go first. The first team has one teammate go to the board prepared to draw the first word. (All the words are provided by the teacher.) The player's team has 10 seconds to see if they can figure out what the person is drawing. If they get it within the 10 seconds, the team earns 2 points. After the 10 seconds anyone in the room, from either team, may blurt out the answer. Whichever team answers first, that team earns 1 point. The team with the most points wins.

Strategies that Support Students After Learning

Tool Kits

In addition to having students maintain a tool kit throughout the course, you can have them complete a special, separate tool kit prior to each exam. For example, two days before the Unit 3 Test, give each student a "Unit 3 Tool Kit" (a one-sided, blank tool kit xeroxed on colored paper with "Unit 3" written on the top) and instruct the students to write helpful examples, formulas, definitions, hints, etc. in the boxes in preparation for the test. This will motivate students to look through their notes, textbook, and long-running tool kit and develop skills for studying for math tests. On the day of the test, collect each student's "Unit 3 Tool Kit" *prior* to the test (so that students don't complete it during the test, which misses the point of using the tool kit as a study tool), quickly write a completion score at the top (1 point for 1 box filled in, 2 points for 2 boxes, etc), and then return the tool kits so students can refer to them during the test. The students then turn in their "Unit 3 Tool Kits" again with their tests, and the tool kit score becomes part of their test score.

Skimming Tests

Teach and encourage students how to skim a test before they start it. This allows them to see what types of questions are on the test and plan their time accordingly.

Save the Last Word for Me

Students choose a concept or problem and copy it down on the front of a note card. On the back, they explain what it means to them. (I recommend checking students' statements.) Next they get in small groups and talk about what the concepts/problems mean. After everyone has finished, the student who wrote the comment turns the card over and reads what they wrote on the back. No one else talks after that.

Recommended Reading

Barton, M. L. and Heidema, C. (2002). *Teaching Reading in Mathematics, 2nd ed.* Aurora, CO: McREL.

Gifford, M. and Gore, S. (2008). The Effects of Focused Academic Vocabulary Instruction on Underperforming Math Students. Available at www.ascd.org/academicvocabulary

Graves, Michael F. (2005). *Vocabulary Book: Learning and Instruction.* New York: Teachers College Press.

Hart, B. M. and Risley, T. R. (1995) *Meaningful Differences in the Everyday Experience of Young American Children.* Baltimore: Paul H. Brookes Publishing Co.

Robb, Laura (2003). *Teaching Reading Strategies in Social Studies, Science, and Math.* New York: Scholastic Inc.