Running Head: READING AND WRITING IN MATHEMATICS

Reading and Writing in Mathematics

Kari Pratt

Minnesota State University – Mankato

Mathematics surely is one of the most interesting and challenging classrooms to incorporate reading and writing, however, it is critical for the success of students. Because reading and writing are tools that we use for learning, students must be able to work with the words found in each content area. Although it would be easy to pawn the reading and writing instruction off to the English teacher, it is each content area teacher that will best be able to teach reading and writing for that subject (Moore, Moore, Cunningham, and Cunningham, 2003). For this reason, reading and writing instruction should be incorporated into each content area as often as possible.

The five areas of reading and writing include phonemic awareness, phonics, fluency, vocabulary, and text comprehension. Although all five are important, at a middle school and high school level, most focus is on fluency, vocabulary, and text comprehension. For this reason, greater emphasis will be placed on those three areas, specifically in the mathematics content area.

Phonemic Awareness and Phonics

In the early elementary grades, teachers will spend time on phonemic awareness and phonics. Phonemic awareness is the ability to hear the sounds in words and distinguish between them. Phonics, on the other hand, is interpreting the relationship between the sounds of spoken language and the letters that represent those sounds in written language (International Reading Association, 2002). Phonics instruction is sometimes supplemented with decodable texts because they give students multiple opportunities to read words that exemplify the links between letter combinations and their pronunciations (Jenkins, Vadasy, Peyton, and Sanders, 2003).

Fluency

We often times think of fluency in regards to students who are English language learners. However, in a reading context, fluency refers to the ability to read with speed and accuracy. It also involves using proper expression without conscious attention. Simply recognizing words accurately does not necessarily mean that students will fluently be able to identify those words. One way to improve a student's fluency in mathematics is to introduce repeated readings, where students read a story problem several times (International, 2002). As students re-read the problem, they may gain insight as to the operations necessary to solve the problem.

Once students are able to decode the words in a passage more automatically, they will be able to focus their attention on the ideas within that passage (Moore et al, 2002). This ability would ideally be attained by all students so that they can focus on the ideas of a passage, especially in mathematics. One way to help students reach this point is to model how to read the problem, in other words, read the story problem out loud with proper expression and pauses. Hearing the expression and the pauses helps the student become more comfortable with how they should be reading the problems. Another strategy is to increase the student's time spent in independent or recreational reading (International, 2002). Although there are not as many opportunities for students to check out books from the library about math topics for recreational reading, math teachers can provide students with opportunities to read math word problems. Over time, the time that is spent on helping students read and solve word problems will help increase their fluency in math.

Vocabulary

Vocabulary is an area of reading that is important to all content areas, and especially in math classrooms. Because math vocabulary is not used in everyday life, it is often difficult for students to relate to the words and really connect to their meanings. In fact, many math vocabulary words have multiple meanings, or are words that are common to other subjects, but have a different meaning in math. Also, new vocabulary words are frequently introduced and then associated with a symbol, which is then used in mathematical expressions. On a brighter note, many math words have regularly occurring morphemes which can be taught to help students recall or decode words and their meanings (Moore et al, 2002).

Introducing too many new vocabulary words can be overwhelming for students, especially when they have several different content classes throughout the day where they may also be learning new words. For this reason, teachers need to be selective in which words to introduce and prioritize those that should be learned by the entire class. In the math classroom, there are several strategies that can be used to help students acquire new words. One is to have students experience what they are learning about through hands-on problems or the use of manipulatives and models (Moore et al, 2002). A second is to have students work with a new concept or vocabulary word in multiple ways, using words, symbols, pictures, and models. Moving between all four of these areas allows students to formulate a deeper understanding of the material. Other ways to help students learn and remember new words and concepts include creating analogies for words, creating a symbol board with simple definitions, and reviewing with games such as Around the World (Moore et al, 2002).

Text Comprehension

The mathematics classroom provides an enriching and sometimes frustrating experience for students in the area of text comprehension. Although many of the passages students will read while in math are short and concise, they are usually jam packed with information that must be interpreted and performed correctly in order to obtain the correct answer. In many cases, students know the words that they are reading in word problems and textbooks, however they struggle with performing operations in the proper order.

There are several strategies that can be used to help students with text comprehension. One of the simplest is to encourage students to read problems slowly and carefully (Moore et al, 2002). Often students get so caught up in reading the problem that they forget to pay attention to what it is saying, but rather focus on getting to the end of the problem quickly. This is problematic when students are working on multi-step problems. To help students pick up on key phrases, one strategy is to have the students strike out words that are not important to the computation. The GIST activity can also be used, where students restate what the problem says in a specified number of words, shorter than the original statement (Moore et al, 2002).

A third strategy related to text comprehension is to occasionally have students read an explanation out of their math textbook, and then as a group, describe to the teacher how to solve that type of problem. This strategy can be phased out over time as students become more familiar with comprehending math texts. They will soon be able to read and explain the process in groups, and eventually be able to read and comprehend the text themselves without going through a group discussion at all (Moore et al). This

ability will be beneficial for students when they are struggling with math at home and require support beyond their parent's abilities.

As with all five areas of reading, the level of support that students will require within any content area will vary, especially in mathematics (Moore et al, 2002). Students need continuous support and encouragement. Many strategies for vocabulary and text comprehension that students will learn in their math classes will carry over to their science classes and potentially other subjects as well. These strategies will also help students as they learn how to study and read content area literature outside of the classroom. Having confidence in reading and writing within content areas can really encourage students to become independent and lifelong learners. For this reason and many others, it is vital that we incorporate reading and writing into all content areas as often as possible.

References

International Reading Association. (2002). *Evidence-based reading instruction: Putting the National Reading Panel report into practice* (p. 3-4, 35-36, 83-84, 112-113, 137-138, 183-184). Newark, DE: Author.

Jenkins, J.R., Peyton, J.A., Sanders, E.A. & Vadasy, P.F.. (2003). Decodable text – Where to find it. *The Reading Teacher*, 57, 185-189.

Moore, D.W., Moore, S.A., Cunningham, P.M., & Cunningham, J.W. (2003). *Developing Readers and Writers in the Content Areas K-12* (4th ed.). Boston: Allyn & Bacon.