The Benefit of Employing Pre-Reading in Teaching Algebra II Language Minority Students

William Horkan
J.E.B. Stuart High School
Fairfax County (VA) Public Schools
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Abstract

This action research study explores the effectiveness of pre-reading sheets in improving ESL students’ ability to comprehend an Algebra II text. Pre-reading sheets dissect the material to be taught. The answers to the questions on the sheets come directly from the text or from knowledge obtained in previous lessons. The study using this pre-reading strategy was conducted over a two-year period involving approximately 150 students in six classes. Fifty students (control group) did not use the reading sheets. One hundred students (experimental group) used the reading sheets. Test scores provide the data for the experiment. On four of the six sets of data analyzed, the experimental group posted significantly higher scores than the control group. Virginia Standards of Learning (SOL) scores are also analyzed to determine if there is a similar difference in the scores of the two groups. Preliminary findings suggest that in addition to contributing to increased test scores, pre-reading sheets aid students, especially current and former ESL students, in developing increased study skills, in practicing their reading and writing, and interpreting charts and graphs.

The Problem

For the last few years, Fairfax County Public Schools has put in place a program of reading and writing across the curriculum. Through this program, many good examples are given to promote writing in science, history, government and other classes. However there are very few examples given for mathematics, and of the few that are given, all take up too large a percentage of class time. With the advent of the Standards of Learning tests, time in class both for lecture and class work is at a premium. While promoting reading and writing in mathematics is a noble goal, it cannot take away from in-class comprehension of mathematical concepts which must be the primary focus. Therefore the problem becomes: How to incorporate reading and writing into math class, while still promoting comprehension and not detracting from instruction and class work time?

The Solution

The solution to this problem is found in the use of reading sheets. Reading sheets are 4-5 questions written in sentence form referring to the section of the text that is about to be taught (see example 1). The reading sheets are given out at the beginning of class and students are given approximately five
minutes to finish answering the questions (answers must be given in complete sentences). The reading sheet basically takes the place of a warm-up exercise.

The Advantages

There are many advantages to using reading sheets in math classes. The first and main advantage to the use of reading sheets is that they force the students to read the text before the lecture. According to many study guides, this is one of the most important study skills a student can employ. David E. Heyd in Calculus: Study and Solutions Guide states:

Read the section in the text for general content before class. You will be surprised at how much more you will acquire from the lecture if you are aware of the objectives of the section and the types of problems that will be solved. If you are familiar with the topic, you will understand more of the lecture, and you will take fewer (and better) notes.¹

The second advantage of the reading sheets is that they promote writing by requiring students to answer the questions in complete sentences. After initial resistance (“Mr. Horkan, this is math class!!!”), students do attempt to answer the questions in complete sentences. At this time, any spelling or sentence structure errors can be corrected. These reading sheets in no way replace English lessons, however, they are a good reinforcement of English lessons, especially with ESL students.

A third advantage of using reading sheets is that they maintain the interest of struggling students. Often, when a student is struggling in math class and can’t answer several questions, the student will shut down. Only a cursory knowledge (from reading the text) is needed to answer the questions from the reading sheets. By being able to answer these questions, struggling students stay involved in the class. Also, by including the reading sheets as part of the class work grade, students who don’t generally do well with class work have a chance to slightly improve their grade by keeping up in the text.

¹ Heyd, David E. p.iii
Example 1

Read section 6.1. Answer in complete sentences.

1. What is a relation?

2. What are four ways of describing a relation?

3. What is a function?

4. What are two tests you can use to determine if a relation is a function?

5. Why is the average life span of a $100 bill much longer than that of a $1 bill?
The Study

Despite the advantages of using reading sheets in Algebra 2 classes, the main focus of a math class is math comprehension. If by incorporating reading sheets, students’ comprehension decreases, the reading sheets are not worth all of the advantages they present. A two-year action research study was done on Algebra 2 students to see the effect of the reading sheets on the comprehension levels of students. In the first (control) year, 50 Algebra 2 students were tested on the first five units of the class (comprising the first semester). Reading sheets were not utilized with the control group. In the second (experimental) year, 100 Algebra 2 students were tested on the same five units. For this year, reading sheets were utilized for units 1, 3 and 4. For units 2 and 5, the text was not used and therefore reading sheets were not utilized. For both years, objective multiple-choice tests were used to determine the level of student comprehension. The results follow.

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<th>1</th>
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The Results

On the three tests in which the reading sheets were used in the experimental group, test averages were 3.3 to 5.3 points higher in the experimental group. On the two tests in which reading sheets were not used in either group, test averages were 0.4 to 0.8 points lower in the experimental group. The fact that the only units in which the experimental group had higher
test averages were the ones in which reading sheets were utilized show that reading sheets do have a positive effect on test scores.

The Conclusion

The use of reading sheets in Algebra 2 classes has a slightly positive effect on comprehension in students. The reading sheets keep struggling students involved in class and force all students to learn important study skills, including pre-reading and interpreting skills. Most importantly, the use of reading sheets incorporates reading and writing into math class without losing valuable lecture or practice time. By completing reading sheets, students get valuable practice in reading and writing outside of English class without detriment to math instruction.

References