

## The Effect of Personalized Word Problems

**By Janis M. Hart**

Many students have difficulty converting a word problem into the necessary mathematical form needed to solve the problem. They seem unable to create a mental representation that links the text of the word problem to appropriate mathematical expressions.

Personalizing the text of word problems is an effective way to tap into students' background knowledge. By including people known to the students and using a context for the story that involves the students' background experience, we can help bridge the gap between existing and new knowledge. Personalizing word problems will help motivate students to choose the correct mathematical process needed to solve a problem, even when they may not have the ability to apply the process correctly.

To test the effectiveness of personalizing word problems, I conducted a study in a sixth-grade class of thirteen boys and eight girls. The effect on students' attitudes toward solving word problems and the effect on students' ability to solve problems when presented in a personalized context were examined.

To begin to assess students' attitudes, I gave them a Word Problem Attitudinal Survey, which I had developed. It was administered prior to the beginning of the study, and a similar questionnaire was given at the conclusion. The survey consisted of eight statements to which the student stated his or her level of agreement by responding on a scale of 1 (strongly disagree) to 5 (strongly agree). To the statement "I find word

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problems interesting," eleven students responded with a 1 or a 2 rating. To the statement "Word problems are a lot of fun to work on," ten students responded with a 1 or a 2 rating. Clearly, half the class found word problems uninteresting or did not enjoy working on them!

Over the eight weeks of the study, I alternated weeks of instruction in problem solving using standard textbook problems one week and rewritten personalized problems the next. At the end of each week, I assessed students' achievement.

The following are two examples of textbook problems and their personalized versions that were used in the study. The textbook versions are the following:

- One lumber yard logged 267 Sitka spruce trees in 3 days. If each day's count was the same, how many spruces were logged per day? (Fennell 1988)
- The Ace Investment Company wants to own  $\frac{5}{6}$  of the stock of Michaelson Home Appliances. The Ace Company already owns  $\frac{1}{3}$  of the Michaelson stock. How much more Michaelson stock must Ace buy? (Fennell 1988)

The next two problems are the personalized versions:

- Ms. Hart, Mrs. Doberdruk, and Mr. Oravec at 267 cookies all together while they were at 6th grade camp. If they each ate the same amount of cookies, how many did they each eat?
- Eric wants to own  $\frac{5}{6}$  of all the NFL football cards ever printed. He already owns  $\frac{1}{3}$  of them. How much more of the total group of cards must he buy?

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As I rewrote the textbook problems in a personalized context, I maintained all numbers from the original problem and kept the required mathematical operations. In personalizing the lumber problem, I used three teachers known by students and I changed the context to one that the students might find enjoyable, interesting, and humorous.

The first set of problems required students to divide 267 by 3. The personalized version asked students to count names to determine that the number 3 was needed in the calculation. In addition, determining the divisor and the dividend was more difficult in the personalized problem, since I switched the order and gave the divisor first. Despite the fact that personalized problems often required more thinking by students, both their attitudes and achievement were better than those when using textbook problems.

As the study progressed, it was clear to me that students preferred solving personalized word problems over "bland" textbook versions. Their enthusiasm and interest grew as I presented humorous stories or made them applicable to the students' lives. I was pleasantly surprised to see the students perk up when solving problems that involved their immediate environment. The classroom, other students, teachers, the cafeteria, and the entire school were popular topics in the word problems.

At the conclusion of the study, I condensed student data from quizzes given to assess achievement on word problems. The total points for the class on the four assessments of textbook problems was 420, whereas the total on the assessments of personalized problems was 475. By personalizing word problems, I was able to activate students' schemata, enabling them to connect old knowledge with new. When the context of the story was no longer a barrier to comprehending the problem, the students were

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more successful at writing the necessary mathematical expression, thus leading to higher achievement.

A student questionnaire at the end of the study revealed that students were more motivated when solving personalized word problems and that their attitude toward practicing problem-solving skills also improved. These improvements were reflected in students' comments about preferences for personalized word problems, such as "Because I know the people" from Rachel, "Because it was funny" from Roman, and "Because it made me think a little" from Michael.

Of the twenty-one students questioned, only three preferred a textbook problem to its personalized counterpart. When I asked the students which type of problem they believed they were better able to solve, only five chose the textbook problems.

By using personalized word problems, more students can build the mental representation that links the text of the word problem to the strategies needed to solve it. As an added bonus, most students are energized by these problems and motivated to work on them. Two important aspects of problem solving are students' attitudes and achievement. My experience with this study has shown that presenting word problems in a personalized form positively affects the students' ability to solve the problem.

For more information on this study, contact Janis M. Hart, Madison Middle School, 1941 Red Bird Road, Madison, OH 44057.

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Having seen an advanced copy of this manuscript, **Francis (Skip) Fennell**, the author of the referenced textbook series, adds this thought: "Bravo! Personalizing word problems makes great sense. Altering the context of such problems provides teachers with the opportunity to link word problems with other topics and/or subjects. I encourage all teachers to constantly seek ways to make their curriculum and materials they use to deliver it as lifelike and real as possible."

Edited by **Dan Dolan**, Project to Increase Mastery of Mathematics and Science, Wesleyan University, Middletown, CT 06457, and **Mari Muri**, Connecticut Department of Education, Hartford, CT 06145.

## **About the Author**

**Janis Hart** is a sixth-grade mathematics teacher at Madison Middle School, Madison, OH 44057. She received her master's degree in education from John Carroll University, Cleveland, Ohio, and is interested in integrating reading and writing in the mathematics classroom.