

Study shows approach can help English learners improve at math word problems

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English learners are the fastest-growing minority in U.S. schools. While they face many of the same challenges as their peers, when it comes to mathematics, they are not only learning to work with numbers but doing so through the dynamic of a second language that presents new difficulties, especially with word problems. University of Kansas researchers have published a study that shows how an evidence-based method of helping students understand the language and information of word problems can boost their math achievement. The evidence-based practice can also enhance student math skills, oral language development and reading comprehension abilities, the authors write.

Michael Orosco, associate professor of special education, and Naheed Abdulrahim, Chancellor's Fellow and doctoral [student](#), both at KU, published a study in the *Journal of Teacher Education and Special Education* that uses comprehension strategy instruction with 78 English learner students in a West Coast school district. Scores and achievement improved for the students, indicating the strategy can help boost word problem-solving skills for the students, and the authors recommend teacher preparation programs train future teachers in using such approaches.

"Word problems show up in our curriculum every day, straight through from kindergarten to 12th grade," Orosco said. "They're all about problem-solving. You want them to find the correct answer, but you also want them to learn to form problem-solving models. With this strategy, we're trying to make it simple for teachers. It's all about reading comprehension and vocabulary development."

The study used comprehension strategy instruction that helped students understand factors of a math word problem beyond the numbers. The authors include the following sample word problem: "Esmeralda was shopping at the mall. She visited four different stores. She bought a new pair of

shoes and a new purse. She spent a total of US\$45. The purse cost US\$10. How much money did Esmeralda spend on a new pair of shoes?"

Some students may not experience difficulty in computing the math to arrive at the correct answer. However, English learners are likely to face the challenge of processing information contained in a word problem in the English language, such as understanding the meaning of the word "pair" and the verb "spend." They would need this background knowledge to deduce that the number of stores visited does not influence the answer.

The study had teachers use a strategy in which the teacher first restated the question and helped students understand what it was about, then helped them determine what was relevant information versus irrelevant information, such as sentences that were needed and not needed to solve the problem. Students then collaborated in pairs to apply the strategies they learned, and finally they practiced independently to apply the approach to more word problems. Pre- and post-testing showed statistically significant improvement in students' calculation accuracy, word-problem accuracy and reading comprehension.

The results show the value of focusing on comprehension with word problems, and the authors recommend teacher preparation courses train future teachers to use such approaches, especially with English learners.

"What makes this study important is it shares evidence-based practices that are working for children learning English and is having some good success in pushing the field forward," Orosco said.

The strategy model is available for interested educators as a lesson plan example in the article's appendix.

Orosco and Abdulrahim make several specific

recommendations for [teacher](#) preparation programs to better educate future teachers to use such approaches, such as providing them with evidence-based practices and matching them with pedagogy, helping them understand how reading, writing and math are all related and providing encouragement and instruction on using more word problems.

Word problems and the strategies the authors studied to teach them are vital for numerous reasons. Among them, many students and teachers alike have a "math phobia," and students often plateau in math achievement around fourth grade. For English learners, that can happen even earlier or lead to minority students being placed unnecessarily in special education, Orosco said. Such a plateau results in students not only scoring poorly in math but seeing roadblocks to well-paying careers in fields such as engineering and the sciences, among others. Comprehension [strategy](#) instruction addresses math, reading, writing, vocabulary and, perhaps most importantly, reading comprehension. Improvements in those areas lead not only to better test scores but also to students who are able to solve [problems](#) in other areas of life.

"In the U.S., we're just programmed to hate [math](#), and we don't teach a lot of problem-solving," Orosco said. "It's a skill you're not born with, it's just got to be taught. When our kids don't understand something in class, our teachers need to find a way to be able to help them get it."

More information: Michael J. Orosco et al. Examining Comprehension Strategy Instruction With English Learners' Problem Solving: Study Findings and Educator Preparation Implications, *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children* (2018). [DOI: 10.1177/0888406418770787](#)

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