

Empowering preschool children with the language of math adds up to stronger skills

October 11 2016, by Amy Patterson Neubert



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Teaching preschool children simple math-related vocabulary and concepts, such as "more," "a lot," "some" and "fewer," improves their mathematical skills, according to a new study from Purdue University.

"This approach is not new, but we believe this is the first study to show that intentionally teaching and exposing young children to such language concepts makes a difference in their ability to learn basic [math skills](#)," said David Purpura, an assistant professor of human development and family studies. "We found that when children were read stories with age-appropriate [mathematical language](#) and pictures, and then discussed these specific concepts in small groups, they scored higher on math tests for not just these specific words, but also math skills that were not covered in the books."

The results are published in the *Journal of Research on Educational Effectiveness*.

Mathematical language is one of the strongest predictors of children's early mathematical success, so Purpura wanted to determine how effective early exposure to mathematical language could be for children ages 3-5.

Forty-seven Head Start [preschool children](#) participated in the study, and half of them met three times each week in small groups to be read one of six books. Each book emphasized an average of 38 quantitative or spatial language concepts through its storyline, pictures and the questions that were asked.

The other children proceeded with their regular teaching curriculum. Eight weeks later all children were tested, and those exposed to the math language and those exposed to the math language concepts outperformed the others on math-specific language as well as math skills. Even though children who participated in the reading groups were not directly taught math concepts such as counting or adding, their skills in these areas improved more than the skills of children who didn't participate in the reading groups.

"Exposure to math language opens the door to learning and understanding these important early math skills," Purpura said. "It's difficult to ask a child to compare quantities if they don't know what 'more' or 'fewer' means. If they can understand 'before' and 'after,' they are more likely to know, or be able to understand, what number comes after three. When children learn this language in a math context, it acts as a springboard to learn about other mathematical concepts."

The intervention was more than just reading a book with mathematical concepts and pictures, Purpura said. The readers also were trained to comment on items related to mathematical language as they read the book, and then ask the [children](#) specific questions. For example, "How do we know the girl has more than the boy?" or "Is the bird above or below the tree?" There was no direct instruction on counting, number naming or related math skills.

The six books used in this study were "Many is How Many?" by Illa Podendorf, "Albert is Not Scared" by Eleanor May, "Just Enough Carrots" by Stuart J. Murphy, "Rosie's Walk" by Pat Hutchins, "Albert's Bigger than Big Idea" by Eleanor May and "Little White Rabbit" by Kevin Henkes. Purpura collaborated with Purdue graduate students Amy R. Napoli, Elizabeth A. Wehrspann and Zachary S. Gold.

More information: David J. Purpura et al. Causal Connections Between Mathematical Language and Mathematical Knowledge: A Dialogic Reading Intervention, *Journal of Research on Educational Effectiveness* (2016). [DOI: 10.1080/19345747.2016.1204639](https://doi.org/10.1080/19345747.2016.1204639)

Provided by Purdue University

Citation: Empowering preschool children with the language of math adds up to stronger skills

(2016, October 11) retrieved 22 September 2024 from

<https://medicalxpress.com/news/2016-10-empowering-preschool-children-language-math.html>

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