

# Kids grasp large numbers remarkably young

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A study co-led by Michigan State University finds that young kids grasp large numbers better than previously believed and may be ready for more advanced math when they enter school. Credit: Michigan State University

Children as young as 3 understand multi-digit numbers more than previously believed and may be ready for more direct math instruction when they enter school, according to research led by a Michigan State University education scholar.

The study, online in the journal *Child Development* and funded by the

U.S. Department of Education's Institute of Education Sciences, has implications for U.S. students who continue losing ground internationally in mathematics performance.

"Contrary to the view that young [children](#) do not understand place value and multi-digit numbers, we found that they actually know quite a lot about it," said Kelly Mix, MSU professor of educational psychology and co-author on the study. "They are more ready than we think when they enter kindergarten."

Understanding place value is the gateway to higher math skills such as addition with carrying, and there is a strong tie between place value skills in early elementary grades and problem-solving ability later on.

"In short, children who fail to master place value face chronic low achievement in mathematics," the study states.

In several experiments, Mix and Richard Prather and Linda Smith, both from Indiana University, tested children ages 3 to 7 on their ability to identify and compare two- and three-digit numbers.

In one task, for example, children were shown two quantities (such as 128 and 812) and asked to point out which was larger. "There was significant improvement in interpreting place value from age 3 to 7," Mix said, "but it was remarkable that even the youngest children showed at least some understanding of multi-digit numbers."

Mix said the surprising findings are likely due to the fact that children in today's society are bombarded with multi-digit numbers – from phone numbers to street addresses to price tags.

Interestingly, children may be developing partial knowledge of the place value system at least partly from language, she explained. Children often

hear multi-digit numbers named while also seeing them in print, such as when parents comment on a calendar, ask their child to push the elevator buttons or look for a room [number](#) in an office building.

Previous research and teacher observations indicate children do not understand the symbols for place value – and, thus, multi-digit numbers – until well into elementary school. Typically, young students receive specialized conceptual instruction on place value, such as with place value blocks.

The researchers trained children on place value blocks and found no improvement. However, training with written symbols alone did yield significant benefits. Because of this, and the study's finding that students already recognize multi-digit numbers to some degree, Mix said more direct instruction with place value and multi-digit numbers should be considered in the early grades.

Provided by Michigan State University

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