

# First-grade teachers using ineffective instruction for math-challenged students

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First-grade teachers in the United States may need to change their instructional practices if they are to raise the mathematics achievement of students with mathematics difficulties (MD), according to new research published online today in *Educational Evaluation and Policy Analysis*, a peer-reviewed journal of the American Educational Research Association.

["Which Instructional Practices Most Help First-Grade Students with and without Mathematics Difficulties?"](#) by Paul L. Morgan of Pennsylvania State University, George Farkas of the University of California, Irvine, and Steve Maczuga of Pennsylvania State University, examined nationally representative groups of first-grade students with and without MD to determine the relationship between the instructional practices used by [teachers](#) and the mathematics achievement of their students.

The study, funded by the U.S. Department of Education and the National Institutes of Health, found that first-grade teachers in classrooms with higher percentages of students with MD were more likely to be using ineffective instructional practices with these students.

When first-grade classes had larger percentages of students with MD, their teachers were more often using non-traditional instructional practices, in which students use manipulatives, calculators, movement, and music to learn mathematics. The researchers found these types of practices were not associated with achievement gains. These practices were ineffective for both MD and non-MD students.

Instead, the researchers found that only use by first-grade teachers of more traditional, teacher-directed instruction—in which teachers used textbooks, worksheets, chalkboards, and routine practice to instruct students in mathematics facts, skills, and concepts—was associated with achievement gains for students with MD.

According to study findings, the most effective instructional practice that first-grade teachers could use for students with MD was to provide them with routine practice and drill opportunities to learn mathematics. The findings held true for first-grade students who had shown either persistent or transitory MD in kindergarten. Results were extensively controlled for students' prior mathematics and reading achievement, family income, and other factors.

"Use by first-grade teachers of non-teacher-directed instruction is surprising and troubling, given our findings and what prior research has shown about the instructional needs of students with MD," said lead study author Paul L. Morgan. "It suggests that first-grade teachers are mismatching their instruction to the learning needs of students with MD."

"Our findings suggest that students with MD are more likely to benefit from more traditional, explicit instructional practices," Morgan said, "This is particularly the case for students who are more likely to persistently struggle to learn mathematics."

"Effectively instructing students with MD at an early age matters immensely to their future academic achievement and opportunities in life," said Morgan. "We know that students who continue struggling to learn mathematics in the primary grades are highly likely to continue to struggle throughout elementary school. Others have reported that students who subsequently complete high school with relatively low mathematics achievement are more likely to be unemployed or paid

lower wages, even if they have relatively higher reading skills."

For students without a history of MD, teacher-directed instruction is also associated with achievement gains. However, unlike their schoolmates with MD, the mathematics achievement for these students is also associated with some, but not all, types of student-centered instruction, which focuses on giving students opportunities to be actively involved in generating mathematical knowledge. Student-centered activities associated with achievement gains by first graders without MD include working on problems with several solutions, peer tutoring, and activities involving real-life math. Students without MD benefited about equally well from either more traditional teacher-directed instruction or less traditional student-centered instruction.

While previous research has identified instructional practices that can be used by elementary school teachers to increase reading achievement for those with and without reading difficulties, very few empirical studies have tried to identify instructional practices being used by teachers that are effective in increasing the mathematics achievement of their [students](#) with and without MD.

For their study, the researchers analyzed survey responses from 3,635 teachers and data from a subsample of 13,393 children in the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99, a nationally representative dataset maintained by the U.S. Department of Education's National Center for Education Statistics.

Provided by American Educational Research Association

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