

Effects of Teachers' Mathematical Knowledge for Teaching on Student Achievement

Heather C. Hill, Brian Rowan, and Deborah Loewenberg Ball
University of Michigan

This study explored whether and how teachers' mathematical knowledge for teaching contributes to gains in students' mathematics achievement. The authors used a linear mixed-model methodology in which first and third graders' mathematical achievement gains over a year were nested within teachers, who in turn were nested within schools. They found that teachers' mathematical knowledge was significantly related to student achievement gains in both first and third grades after controlling for key student- and teacher-level covariates. This result, while consonant with findings from the educational production function literature, was obtained via a measure focusing on the specialized mathematical knowledge and skills used in teaching mathematics. This finding provides support for policy initiatives designed to improve students' mathematics achievement by improving teachers' mathematical knowledge.

KEYWORDS: educational policy, mathematics, student achievement, teacher knowledge.

In recent years, teachers' knowledge of the subject matter they teach has attracted increasing attention from policymakers. To provide students with "highly qualified teachers," the No Child Left Behind Act requires teachers to

HEATHER C. HILL is an associate research scientist in the School of Education, 610 East University #1600, University of Michigan, Ann Arbor, MI 48109; e-mail: hbill@umich.edu. Her areas of specialization include educational policy, instruction, and teachers' content knowledge.

BRIAN ROWAN holds the Burke A. Hinsdale Collegiate Professorship in Education in the School of Education, 610 East University #3112, University of Michigan, Ann Arbor, MI 48109; e-mail: browan@umich.edu. His areas of specialization reside at the intersection of organization theory and school effectiveness research.

DEBORAH LOEWENBERG BALL is the William H. Payne Collegiate Professor in Education in the School of Education, 610 East University #1600, University of Michigan, Ann Arbor, MI 48109; e-mail: dball@umich.edu. Her areas of specialization include the study of efforts to improve teaching through policy, reform initiatives, and teacher education.
