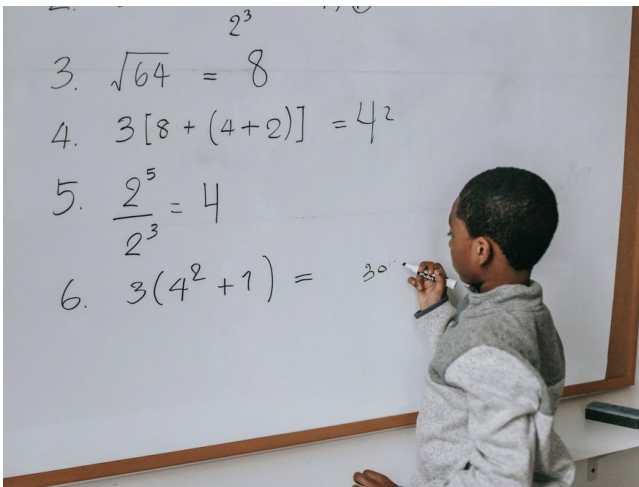


Mathematics Interventions in U.S. PreK–12 Education Improve Student Learning

A Brief Summary of “Heterogeneity in Mathematics Intervention Effects: Evidence From a Meta-Analysis of 191 Randomized Experiments”



What is the aim of this review?

Since the early 1990s, mathematics education reformers developed and evaluated many interventions to support students in mastering more rigorous content.

This systematic review and meta-analysis examined the variation in mathematics intervention effects for U.S. PreK–12 grade students by identifying what types of mathematics interventions work, for whom, and under what conditions.



What studies are included?

This review included studies that are randomized control trials (RCTs) designed to improve the teaching or learning of mathematics among U.S. grade PreK–12 students. Only English-language studies published between January 1992 and August 2017 were included.

In total, this review included 191 RCTs that represent more than a quarter of a million students in the U.S.



What are the main findings of this review?

Most mathematics interventions targeted elementary school students (72%) who were economically disadvantaged (57%) and who attended schools in urban settings (72%).

The mathematics interventions were most often instructional or pedagogical strategies (50%) and replacement curriculum units (40%), and least often supplemental time interventions such as tutoring outside of normal classroom instructions (10%). Most interventions also lasted longer than 4 hours

“A quarter century worth of experimental evidence shows that mathematics interventions in U.S. PreK–12 education improve student learning across a wide range of program types, student demographics, and outcome domains.”

(80%) and longer than 4 weeks (77% of studies).

The review found that mathematics interventions generally work and have positive effects on students’ mathematics achievement. The probability that a mathematics intervention positively affects student learning is about 75%. However, the effects varied across studies.

Supplemental time interventions were moderately more effective in increasing student achievement than curriculum or pedagogical/instruction interventions. In addition, interventions delivered by a teacher or interventionist (e.g., researcher) had average

effects that were about three times as large as effects from technology-delivered interventions.

Measures developed by researchers, which tend to have more specific concepts aligned to the intervention, produced larger effects than standardized measures (e.g., state assessments).



What do the findings in the review mean?

Mathematics interventions in U.S. PreK–12 education improve student learning across a wide range of program types, student demographics, and outcome domains. Supplemental time interventions that include additional time outside of the classroom and interventions delivered by a teacher or interventionist are particularly promising. However, much remains unknown about sources of variation in mathematics intervention effects. Systematic replications of this experimental research is critically needed to advance our understanding of what works and for whom.

WHAT IS MOSAIC?

The Methods of Synthesis and Integration Center (MOSAIC) is a center that supports methods innovation for projects that synthesize evidence across multiple studies to inform stakeholders and create evidence-based solutions in education, health, international development, social welfare, and the workforce.

ABOUT THIS BRIEF

This brief is based on Williams, R., Citkowicz, M., Miller, D. I., Lindsay, J., & Walters, K. (2022). Heterogeneity in mathematics intervention effects: Evidence from a meta-analysis of 191 randomized experiments. *Journal of Research on Educational Effectiveness*. <https://doi.org/10.1080/19345747.2021.2009072>



American Institutes for Research®
1400 Crystal Drive, 10th Floor
Arlington, VA 22202-3289
+1.202.403.5000 | MOSAIC.AIR.ORG