



Research on K-12 math professional development falls short

WHAT THE STUDY SAYS

Researchers conclude that schools and school districts have limited causal evidence on which to base decisions about mathematics professional development. This study identified only five studies from more than 900 that met all the criteria, including the What Works Clearinghouse evidence standards, the highest standards for measuring the effectiveness of professional learning. The paucity of effective studies leaves practitioners and policymakers without clear guidance for decisions related to K-12 mathematics professional development.

Question

The study sought to answer a single research question: What does the causal research say are effective math professional development interventions for K-12 teachers aimed at improving student achievement?

Methodology

The authors established four criteria for conducting a literature search for K-12 mathematics professional

Joellen Killion (joellen.killion@learningforward.org) is senior advisor to Learning Forward. In each issue of JSD, Killion explores a recent research study to help practitioners understand the impact of particular professional learning practices on student outcomes.

At a glance

Researchers examined 910 studies of professional development to identify effective K-12 mathematics interventions. Overall, the study concludes that there is limited guidance based on causal research to guide mathematics professional development interventions for K-12 teachers.

THE STUDY

Gersten, R., Taylor, M.J., Keys, T.D., Rolffhus, E., & Newman-Gonchar, R. (2014). *Summary of research on the effectiveness of math professional development approaches* (REL 2014-010). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. Available at <http://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=391>.

development. The research:

1. Focused on mathematics professional development to improve K-12 teachers' content knowledge and instruction to improve student learning in mathematics;
2. Was conducted between January 2006 and June 2012 or identified in *Reviewing the Evidence on How Teacher Professional Development Affects Student Achievement* (Yoon et al, 2007), a study that examined 1,300 studies of the effects of professional development on student achievement to determine which met the What Works Clearinghouse evidence standards;
3. Included K-12 math teachers and students only in the United States; and
4. Employed a randomized control or quasi-experimental research design.

Of the original 910 studies identified, 643 met the Phase 1 screening criteria. The second phase screening criteria included an intervention, program, or product for mathematics professional development for K-12 mathematics and employed either an experimental or quasi-experimental research design. After the Phase 2 screening, 47 studies remained.

Phase 3 screening criteria filtered out 15 studies that did not focus specifically on the effectiveness of math professional development and those that did not employ a quasi-experimental or experimental research design. Effectiveness studies examined whether the professional development led to improvements in student achievement.

Of the 32 remaining studies, five studies met the What Works Clearinghouse evidence standards with or without reservation, meaning they

WHAT THIS MEANS FOR PRACTITIONERS

Researchers provide additional confirmation that practitioners have little guidance from experimental or quasi-experimental research studies to guide decisions about K-12 mathematics professional development. Studies that meet What Works Clearinghouse evidence standards are obviously limited. The number of studies failing to employ effectiveness measures that meet What Works Clearinghouse evidence standards calls to question both the quality and intensity of professional learning intervention and the usefulness of past and current research designs.

Experimental and quasi-experimental studies of professional development require substantial investments and will continue to be infrequent and produce limited effects without better

designed interventions, additional investments, and more consistency among researchers on what effective professional learning is.

Additional experimental studies may be useful to provide deeper understanding about the effectiveness of professional learning, particularly if they are spread across content areas and employ professional learning interventions that meet all the Standards for Professional Learning.

Until these opportunities occur, researchers must continue to study the effects of professional development using other research designs. Practitioners must both analyze and implement effective professional learning. Practitioners, too, must commit to evaluate and share the results of professional learning to expand the field's knowledge and refine its practice.

used either a quasi-experimental or experimental research design. Of the five, two resulted in positive impact on student learning, one had limited impact, and two had no impact.

Analysis

Researchers used multiple screening phases to examine the pool of research studies identified. Researchers used the What Works Clearinghouse evidence standards as a screening tool because the standards describe the highest quality in determining the effects of professional development.

In the third phase, What Works Clearinghouse-certified reviewers examined each study using the *WWC Procedures and Standards Handbook (Version 2.1)*. A second reviewer examined each study for compliance with the evidence standards with or without reservations. A senior reviewer verified the accuracy of each review and reconciled any discrepancies. The study, while using the What Works Clearinghouse criteria, is not considered a What Works Clearinghouse study.

Results

An initial identification of 910 studies resulted in five studies that met the rigorous evidence standards for determining effects on student

achievement. Of the five studies, two demonstrated a positive impact on student math performance. One resulted in limited effects on student math performance. Two demonstrated no impact on student math performance.

Limitations

Several shortcomings of the study exist. Two of the reported professional development interventions that failed to impact teaching practices and student achievement were incorporated into a single study. In this study, researchers treat the two interventions as separate studies, noting that each intervention is a separate study.

The report is a significant limitation of this study. The depth of the report leaves questions about the research methodology and the review process. For example, did each phase of the screening employ two reviewers and a senior reviewer?

The report provides inadequate information about the professional development and assumes that all treatments of professional development were of equal quality and intensity. For example, did the professional development incorporate math content and pedagogy, modeling, coaching, implementation support, or other features associated with effective

professional development? Including more information about the nature of professional development will not change the results of the studies, but it might provide information more useful to practitioners.

The report fails to specify if the five studies met the What Works Clearinghouse evidence standards with or without reservations. This information, if included, would provide guidance for both researchers and practitioners alike.

Both researchers and practitioners interested in understanding the effects of professional development would likely be interested in knowing how researchers measured the effects of professional development on student achievement.

The study question focused on causal research as the criteria. Researchers identified a considerable pool of studies. What conclusions can be drawn about the effects of mathematics professional development across all forms of research? What information can be gleaned from examining professional development studies that used other research designs?

A question lingers about the reason for this study not being identified as a What Works Clearinghouse study despite its use of the established evidence standards. ■