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Impact Sheet

Cobb, P. & Jackson, K. (2021). An Empirically Grounded System of Supports for Improving the Quality of Mathematics Teaching on a Large Scale. *Implementation and Replication Studies in Mathematics Education*, *1*(1), 77–110. DOI: 10.1163/26670127-01010004.

1 Problem Addressed

Mathematics teachers needs systemic support for incorporating equity-driven inquiry-oriented practices into their teaching. Although professional development is essential, it might not be sufficient. There is increasing evidence even when professional development is of high quality, it frequently has only limited impact on classroom mathematics instruction at scale. We should therefore learn from long-term implementation initiatives aimed at sustainable educational change. In order to make such cumulative experience transferable and generalizable, there is a clear need to synthesize and theorize the lessons learned from specific initiatives.

Cobb and Jackson's (2021) paper addresses these needs by providing an overview of an eight-year project, in which the research team established research-practice partnerships with four large urban districts in the US. In this work, they iteratively test and refined conjectures about key aspects of a comprehensive support system for mathematics teachers' ongoing improvement of their instruction. The resulting empirically grounded *theory of action* for improving mathematics teaching at scale consists of three top-level components: a coherent instructional system, school leaders' practices as instructional leaders in mathematics, and district leaders' practices in supporting the development of school-level capacity for instructional improvement. This article focuses on the first of these components—a coherent instructional system.

2 What Is Implemented?

Cobb and Jackson built on Newmann et al.'s (2001) analysis of instructional program coherence. The coherent instructional system that they propose

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attends to: (1) goals for students' mathematics learning and a vision of high-quality mathematics instruction, (2) instructional materials and assessments, (3) supports for teachers' learning, and (4) supports for currently struggling students.

In discussing these four issues, they capitalize on conceptual tools and findings from past studies including:

- instructional practices that support students' systematic engagement with tasks of high cognitive demand;
- teachers' mathematical knowledge for teaching;
- formats for supporting teacher professional growth, including teacher collaboration and one-on-one coaching;
- resources for formative assessment.

3 How Was the Implementation Conducted?

The research team was not involved as leaders or instructors in professional development courses, nor in other forms for support for mathematics teachers and students. Instead, the team conducted a comprehensive set of design-research studies on the implementation processes. Based on past research and experience, the team prepared an initial set of conjectures spanning instructional resources, teacher professional development, teacher collaboration, school leadership, and district leadership. The essence of the work with the four districts was to provide district leaders with ongoing feedback about how their instructional improvement strategies were playing out in schools and classrooms, and to make recommendations on how to revise those strategies to make them more effective. The team developed a process for determining which of their recommendations district leaders attempted to implement. In the course of this work, the team developed measures of teacher-participants visions of high-quality mathematics instruction and of their views of their students' current mathematical capabilities. Indicators of progress in improving teachers' perspectives, knowledge and practices were based on these two measures, on assessments of teachers' mathematical knowledge for teaching, and on analyses of video-recordings of teachers' instruction conducted using the Instructional Quality Assessment tools.

4 Implications and Significance

Cobb and Jackson (2021) present a remarkably rich picture of their efforts to understand what it takes to improve the quality of mathematics instruction

on a large scale. They elaborate on the complexity of the implementation processes and conclude that each of the well-known means for improvement of mathematics instruction was crucially important but not sufficient by itself. These means included professional development aimed at developing teachers' mathematical knowledge for teaching, development or adoption of high-quality instructional materials that included tasks of high cognitive demand, diverse forms of support for in-service mathematics teachers, and additional supports for currently struggling students. Multi-focal efforts that are oriented by a vision of high-quality instruction and that coordinate supports for teachers, school leaders, and district leaders are needed. Researchers can provide ongoing research-based feedback and can act as brokers between different stakeholders and as agents of strategic vision on processes and results of action.

The lessons learned are formulated in terms of the emerging theory of action for instructional improvement in mathematics at scale, which can usefully be adapted for similarly-motivated projects in different countries. The developed format for research-practice partnership is instructive for situations in which a relatively small research team strives to support significant change of mathematics instruction at a relatively large scale.

Reference

Newmann, F. M., Smith, B., Allensworth, E. & Bryk, A. S. (2001). Instructional program coherence: What it is and why it should guide school improvement policy. *Educational Evaluation and Policy Analysis*, *23*(4), 297–321. https://doi.org/10.3102/01623737023004297.