

Developing Practical Measures to Inform Instructional Improvement Initiatives in Mathematics

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Background

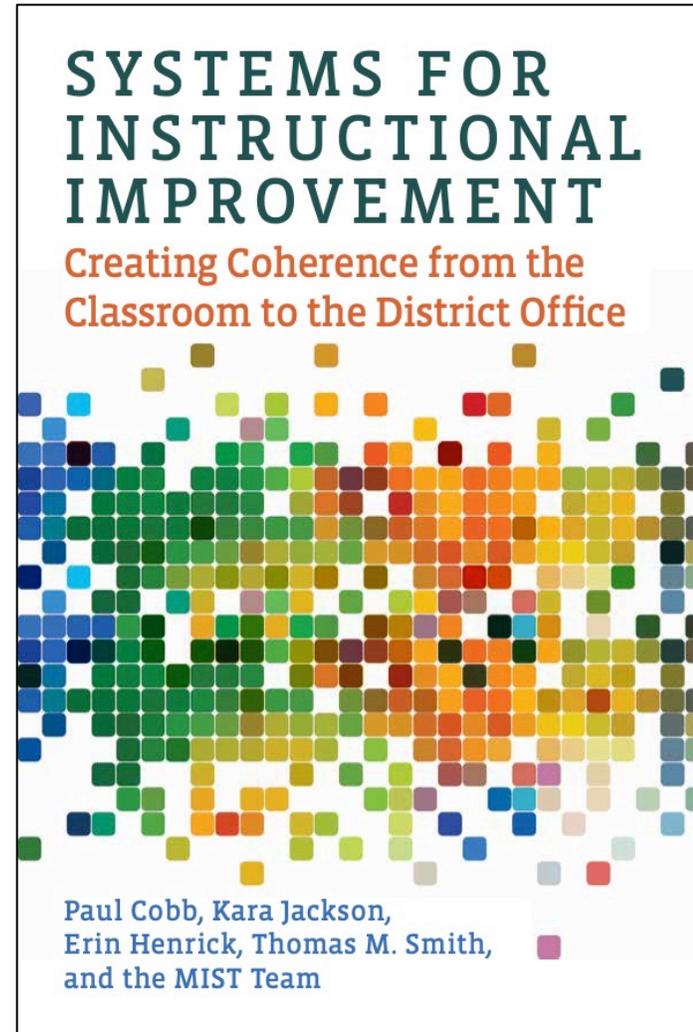
- Three Research Practice Partnerships (RPPs) working to improve the quality of middle-grades mathematics instruction
 - Conduct research with rather than on practitioners
- Outline our perspective on practical measures
 - Supporting improvements the quality of mathematics teachers' content-specific instructional practices and students' learning
- CCRS – challenging non-routine tasks
 - Requires students to develop new mathematical capabilities
 - Figure out which procedures to use by analyzing tasks and identifying underlying mathematical relations

Background

- Supporting students' development of these new capabilities requires significant changes in most teachers' instructional practices
 - Introduce or launch rigorous mathematical task(s)
 - Small group or individual work
 - Whole class discussion
 - Teacher presses students to:
 - Explain and justify their reasoning
 - Make connections between different solutions
- Substantial teacher learning – requires sustained support

What Does it Take to Improve the Quality of (Mathematics) Teaching on a Large Scale?

- Identifying potentially productive instructional improvement strategies
 - Theory of action for instructional improvement at scale
- Implementing improvement strategies reliably across a range of school and district contexts
 - Improvement science
 - Practical measures



Long-term Goal: A System of Practical Measures

- Practical measures of high-leverage aspects of classroom instruction/ learning environments that prior research has linked to student learning
 - Rigor of instructional tasks
 - Launch
 - Small group work
 - Whole class discussions
- Practical measures of supports for teachers' learning
 - Content focused coaching
 - Teacher collaborative meetings

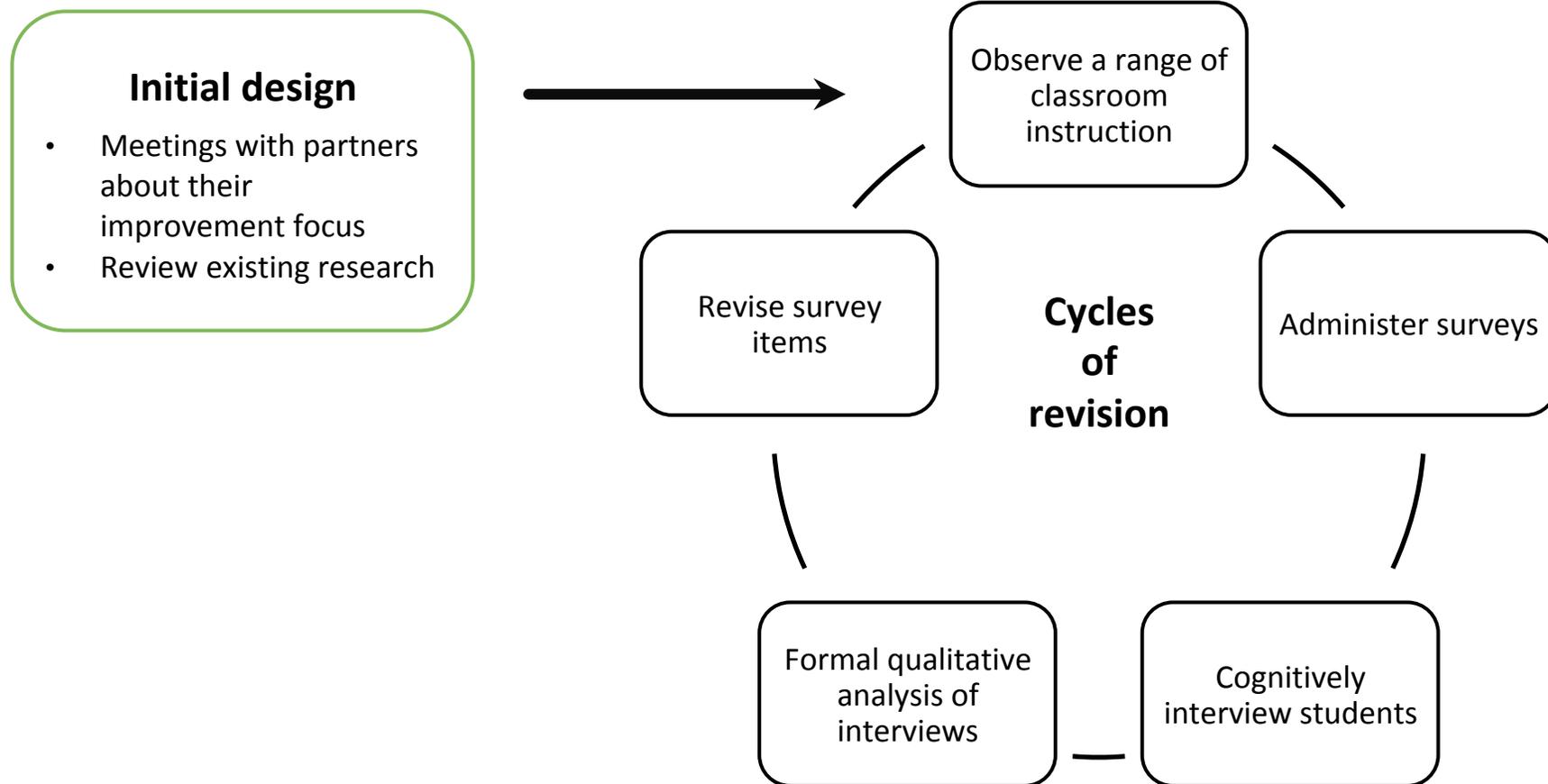
Illustration: Launch Practical Measure

- High-quality launches enable all students to begin working productively on tasks:
 - Clarify key contextual features of tasks
 - Clarify key mathematical ideas in tasks
 - Develop common language to describe key features
 - Maintain cognitive demand of tasks
 - Avoid suggesting a particular solution method to students

Illustration: Launch Practical Measure

- **Item 1:** Can you picture what is happening in the problem(s)?
 - **Item 2:** Do you understand what you're supposed to figure out?
 - **Item 3:** Are you ready to get started?
 - **Item 4:** List any words in the math problem(s) that you do not understand
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- Specific items as *indicators of improvement*

Developing the Practical Measures of Instruction



Predicting Future Outcomes

- The outcomes being predicted are typically proximal
 - The practical measures of instruction focus on *the current lesson*
- Launch measure:
 - Predicts whether students will be able to work productively on challenging instructional tasks *in this lesson*
- In the context of instructional improvement work, this is a strength:
 - The resulting data are directly actionable

Using the Practical Measures of Instruction

- Unreasonable to assume teachers will be able to respond productively to feedback on their own
- The practical measures of instruction need to be embedded in supports for Ts' learning
 - Coaching and teacher collaborative meetings

Using the Practical Measures: Coaching

- Coaches work with teachers in their schools:
 - Work one-on-one with teachers in their classrooms
 - Facilitate teacher collaborative meetings
- Investigating whether practical measures can be *levers for* and well as *indicators of* improvement

Practical Measures as Levers for Improvement



- Productive debriefing meetings: Coach presses and supports teacher to connect:
 - Content learning goals
 - Students' reasoning
 - Classroom observations
 - Students' work
 - Instruction
 - Classroom observations
 - Practical measures

Practical Measures as Levers for Improvement

- Practical measures data a resource for productive debriefing meetings
 - Specificity of feedback – key aspects of a launch
 - Students' responses frequently unexpected
- Nature and quality of the evidence of instruction
 - Negotiating improvement goals

Practical Measures as Levers for Improvement

- Instrumental uses: Decisions and actions are made by following prescriptive rules (e.g., assign students below a certain test score to tutoring)
- Coach-teacher debriefing meetings an instance of a *conceptual use of data* that seeks to *explain* by connecting data to local action

(Moss, 2016; Murnane, Sharkey, & Boudett, 2009)

- “It is here that the primary potential of using data to improve schooling lies”

(Moss, 2016, p.237)

Practical Measures as Levers for Improvement

- Conceptual explanations connect:
 - (Evidence of) students' reasoning to (evidence of) instruction
 - Can formulate testable conjectures about how to improve instruction
- Conceptual explanations characteristic of:
 - High-quality formative assessment
 - Productive teacher collaborative meetings
 - High-quality professional development
- Contribution of the practical measures
 - Nature and quality of the evidence of instruction
 - Data support conceptual explanations that seek to explain

Using Practical Measures at Multiple levels of the System: District Leaders

- District math specialists:
 - Design and lead teacher professional development
 - Support coaches' learning
 - Develop curriculum frameworks and guides

Using Practical Measures at Multiple levels of the System: District Leaders

- Measures of instruction provide feedback on impact of improvement initiatives across schools and classrooms
 - Inform focus of coaching and teacher collaborative meetings, design of pull-out professional development
 - Inform improvement of resources (e.g., curriculum guides)
- Differences by grade level, by school
 - Inform allocation of resources

Validity in Use

- Validity theory focuses on intended interpretations and uses of data
 - Overlooks important aspects of how data actually informs and impacts teaching and learning
- A comprehensive validity theory in education needs to:
 - Attend to the ways in which education professionals actually use data in their work
 - Attend to the ways in which educational organizations support data-informed practice at different levels of the system

(Moss, 2016)

Conditions that Influence Actual Use

- Identifying and specifying the conditions that need to be in place for particular practical measures to be used productively should be a key concern of validity theory
 - These conditions are consequential for the impact of the measures
- The ways in which practical measures are interpreted and used are influenced by both:
 - Users' purposes, perspectives, and understandings
 - The contexts in which they work