Coaching to Promote Teacher Learning of Ambitious Mathematics Instruction

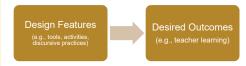


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Current Approach to Research on Coaching

"High-quality" coaching:

- · Modeling (Ellington et al., 2017)
- · Co-teaching (Campbell & Griffin, 2017)
- · Debriefing (Gibbons et al., 2017)
- · Discussing lesson videos (Kraft & Hill, 2020)
- · Deep & specific conversations (Russell et al., 2020)
- > Focus on "Design Features"



Limitations of the current research approach:

Effectiveness depends on faithful implementation

- · limits adaptation
- · limits scaling-up

Research

Lack of theoretical explanations for why and how effective coaching "works"

· limits contribution to theory development

Overcoming the Limitations of the Current Research Approach



Conjecture Mapping

"A means of specifying theoretically salient features of a learning environment design and mapping out how they are predicted to work together to produce desired outcomes." (Sandoval, 2014)

Requires making explicit the mediating processes:

· important for adaptation

Coaching for Ambitious Mathematics Instruction



Design Conjectures:

Tools and Materials

Noticing and Wondering Tool

Activity Structu

· If teachers participate in a pre-lesson conference with the Teacher Challenges Tool, then they will be engaged in challenges with ambitious mathematics instruction.

Conjecture Map of Our Coaching Model

Engaging teacher in challenges with

Generalization of practices aligned

- If teachers participate in a post-lesson conference with the Noticing and Wondering Tool, then they will be engaged in challenges with ambitious mathematics instruction.
- · If a pre-lesson conference is conducted through Invite-Rehearse-Suggest, then coaching will build on teacher thinking.
- · If a post-lesson conference is conducted through Invite-Rehearse-Suggest, then coaching will build on teacher thinking.
- · If a pre-lesson conference is conducted through Generalization, then teachers will generalize practices aligned with ambitious mathematics
- If a post-lesson conference is conducted through Generalization, then teachers will generalize practices aligned with ambitious mathematics instruction.

Theoretical Conjecture:

· If coaching (1) engages teachers in challenges with ambitious mathematics instruction, (2) builds on teacher thinking, and (3) generalizes practices aligned with ambitious mathematics instruction, then teachers (a) develop "meaningful understanding" of ambitious mathematics instruction, (b) increase their capacity to plan and enact ambitious mathematics instruction, and (c) develop (positive) beliefs about the importance of ambitious mathematics instruction in supporting students' learning.

References

Campbell, P. F., & Malkus, N. N. (2011). The impact of elementary mathematics coaches on student achievement. The Elementary School Journal, 111(3), 430-454.

Ellington, A., Whitenack, J., & Edwards, D. (2017). Effectively coaching middle school teachers: A case for teacher and student learning. The Journal of Mathematical Behavior, 46, 177-195

Gibbons, L. K., Kazemi, E., & Lewis, R. M. (2017). Developing collective capacity to improve mathematics instruction: Coaching as a lever for school-wide improvement. *The Journal of Mathematical Behavior*, 46, 231–250.

Kraft, M. A., & Hill, H. C. (2020). Developing ambitious mathematics instruction through web-based coaching: A randomized field trial. *American Educational Research Journal*, 57(6), 2378–2414.

Russell, J. L., Correnti, R., Stein, M. K., Thomas, A., Bill, V., & Speranzo, L. (2020). Mathematics coaching for conceptual understanding: Promising evidence regarding the Tennessee math coaching model. *Educational Evaluation and Policy Analysis*, 42(3), 439–466.

Sandoval, W. (2014). Conjecture mapping: An approach to systematic educational design research Journal of the Learning Sciences, 23(1), 18–36.

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- · Important for scaling-up

ligh-level conjectur learning in the context o

Effective coaching programs engage teachers in learning processes similar to the learning processes that students experience in ambitious classrooms.

Design Features

Tools and Materials (e.g., Teacher Challenges Tool, Noticing and Wondering Tool) Activity Structure: Coaching Cycle (Pre-Lesson Conference, Lesson, Post-Lesson

Discursive Practices: Norms for Engaging in Conferences (invite-rehearse-suggestgeneralize)

Design Conjectures: How will the design features activate the processes of teacher learning?

- Engaging teachers in challenges with ambitious mathematics instruction
- Building coaching on teacher thinking
- · Generalization of practices aligned with ambitious mathematics instruction

Theoretical Conjectures: How will the mediating processes produce teacher learning?

- Meaningful understanding of ambitious mathematics instruction Capacity to plan and enact ambitious mathematics instruction
 - Beliefs about the importance of ambitious mathematics instruction in supporting student learning



Desired Outcome

This work builds on the coaching research undertaken with support from the James S. McDonnell Foundation and earlier work by Margaret Smith on the 5 Practices for Orchestrating Productive Mathematics Discussions.