
Paper Summary

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Prioritizing Practice in Professional Development: Anticipating, Noticing, and Questioning Children's Mathematical Thinking

In Event: *Exploring Varied Approaches to Supporting Responsive Teaching in Science and Mathematics*

Sun, April 30, 12:25 to 1:55pm, Henry B. Gonzalez Convention Center, Meeting Room Level, Room 221 D

Abstract

This poster reports on a professional development design study in which grades 3–5 teachers participated in 3 years of professional development (PD) focused on research-based knowledge of children's fraction thinking and how teachers can use this knowledge to be responsive to the thinking of children in their classrooms (Author, 2011). We conceptualize responsive teaching as a type of teaching in which instructional decisions about what to pursue and how to pursue it are continually adjusted during instruction in response to children's content-specific thinking, instead of being determined in advance. The complexity of responsive teaching makes it challenging to design PD that supports teachers in gaining this expertise.

In our PD, we prioritized teachers' engagement with instructional practices that involve children's mathematical thinking and represent critical components of responsive teaching. Specifically, we focused on three practices: (a) anticipating children's thinking (Stein, Engle, Smith, & Hughes, 2008), (b) noticing children's thinking (Author, 2010), and (c) questioning children to support and extend their thinking during instruction (Author, 2016). We view these practices as knowledge intensive because teachers must use knowledge of children's mathematical thinking to engage in them. However, we did not present the acquisition of knowledge of children's thinking as an end in itself or as a prerequisite for engaging in the practices. Instead, we engaged teachers in these practices from the beginning of the PD to help them gain expertise in the practices and make sense of research-based knowledge of children's thinking.

Our approach builds on the seminal work of Grossman and colleagues (2009) showcasing the need for learners to have strategically structured opportunities to engage in the core practices of a profession. We illustrate our approach with a case study of a sequence of PD activities that prioritized the practices of anticipating, noticing, and questioning children's thinking to introduce teachers to the use of equations designed to help children explore fraction relationships. For example, rather than being asked to solve $9 \times \frac{1}{4}$, a fifth grader was asked to solve $\square \times \frac{1}{4} = 2 \frac{1}{4}$. The form of this equation encouraged the use of fraction relationships (vs. the simple application of a procedure). The child started with the foundational relationship of $4 \times \frac{1}{4} = 1$, doubled it

to get 8 fourths, and then added 1 more fourth to answer 9. This case describes how teachers engaged in a variety of activities targeting the core practices around equation work both during summer workshops and in their classrooms throughout the year. Data were drawn from two iterations of PD and include facilitator plans, video recordings of teachers engaged in PD activities, and audio recordings of focus group discussions in which teachers reflected on their learning in these activities. Although no ideal single sequence exists, our design principles guided what we foregrounded and how we sequenced activities. Our goal is to show the potential for teacher learning when the knowledge-intensive practices of anticipating, noticing, and questioning children's mathematical thinking drive PD.

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