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

AERA 2017

Model of Responsive Teaching

When teachers’ instructional decisions about what to pursue and how to pursue it are continually adjusted during instruction in response to children’s content-specific thinking.

Professional Noticing of Children’s Mathematical Thinking

Research Question: How can PD support the development of responsive teaching?

- 4 year PD design study
- 105 teachers (& instructional specialists)
  - Grades 3–5
  - Range in years of teaching experience & previous PD on children’s mathematical thinking
  - Drawn from 3 districts with varying instructional contexts
- 3 years of PD (total > 150 hours)
  - Focus on teaching that is responsive to children’s fraction thinking
  - Summer and academic-year workshops (8.5 days per year)
  - School-based activities

Data Sources

- Observation of PD workshops
- Written assessment of teachers’ knowledge of children’s fractional thinking
- Written assessment of teachers’ noticing
- Classroom observations
- Teacher interviews/focus groups
- Pre/post assessment of students’ understanding of fractions

STRATEGIES

- Anticipating children’s mathematical thinking (Staats, Engle, Smith & Hughes, 2008)
- Noticing children’s mathematical thinking (Jacobs, Lamb, & Philipp, 2010)
- Questioning children’s mathematical thinking (Jacob & Empson, 2010)

Children’s Opportunities to Advance Their Thinking

Teacher interviews/focus groups
Classroom observations
Written assessment of teachers’ noticing
Pre/post assessment of students’ understanding of fractions

Project Overview

Research Question: How can PD support the development of responsive teaching?

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PD Design Principles

- Slow down teaching
  - Decompose teaching into core instructional practices that are generative (Grossman et al., 2009)
  - Make the practices visible
  - Give teachers time to explore the practices
- Integrate learning the practices with research-based frameworks of children’s mathematical thinking
  - Knowledge is not an end goal or a prerequisite for engaging in the practices
  - Prioritize practices from the start of PD
- Engage teachers in the practices in multiple contexts (e.g., workshops, classrooms, & peer conversations in schools)
- Engage teachers in the practices in simplified environments and with support
  - Use artifacts of practice (video & student written work) that remove the in-the-moment pressures of teaching
  - Work (with a partner) with an individual child outside of the classroom
- Help teachers gain responsive teaching expertise with one child before extending to small-group & whole-class instruction
- Gradually increase the complexity of the practices (or their contexts), with support, over multiple years

Frameworks of Children’s Mathematical Thinking

- Development of fraction understanding through equal-sharing division
- Identification and flexible use of levels of units
- Equivalence as relationships between unit-fraction quantities
- Relational thinking as implicit use of the fundamental properties of operations and equality