# Professional Development for Culturally Relevant Teaching and Learning in Pre-K Mathematics

# Anita A. Wager M. Elizabeth Graue Thomas P. Carpenter





How does a professional development program for culturally relevant teaching and learning in pre-K mathematics support teachers to recognize and use children's multiple mathematical resources (practices in home, school, and play)?

How do teachers use these resources & learning in PD to enhance their practice?

#### STUDY & PD DESIGN:

3 Cohorts of 15-20 4K teachers (2010-2014) 4 graduate courses over two years Culminating action research project



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### Funds of Knowledge

## Developmentally Appropriate Practice

### Early Number & Counting











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#### DATA:

ALL TEACHERS (48):

- Observations & audio of PD sessions
- Observations of classrooms using CLASS
- Interviews
- Assignments and artifacts from PD
- Action research projects

#### CASE STUDY TEACHERS (8):

- Classroom observations
- Student interviews (counting & number)
- Family interviews

#### CHILDREN (≈ 250)

#### • Kindergarten screener

• Progress reports (4k-1<sup>st</sup>)

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### FINDINGS:

MODEL FOR TEACHING & LEARNING MATHEMATICS IN PLAY

To mediate the challenge of maintaining play-based learning opportunities in a world of standards-based accountability, we offer a pedagogical framework that privileges play and responsive teacher/child interactions.

**RESOURCES FOR** RECOGNIZING MULTIPLE MATHEMATICAL RESOURCES

Teachers recognized that knowing the children within the classroom was insufficient for fully supporting their learning -- they needed to better understand the resources that children had within their homes that supported numeracy.

#### TOOL FOR ASSESSING MATHEMATICS IN PLAY

Narrative assessments, such as learning stories, are a powerful tool for connecting with families and for recognizing children's math *learning in play – something* research has suggested can be difficult for teachers to do. Further these assessments support teacher noticing.





(1) Learning to recognize everyday mathematics Document and discuss math in your everyday activities; Ongoing attention to everyday practices (2) Learning to become an ethnographer

Readings; Conduct ethnographic observation at PD site; Compare examples of asset v. deficit based observations; Conduct community observation (3) Recognizing children's resources in the home – home visits Develop questions; Conduct visit; Write reflection (4) Building on children's resources in the classroom Family math night activity; Action research projects

- (1) Observation of and reflection on child's mathematical knowledge, skill, or thinking
- (2) Responding in the moment: describes teacher's interaction with the child to mathematize
- (3) Planning ahead: describes a plan to support child's mathematical learning



#### **IMPLICATIONS FOR RESEARCH &** PRACTICE: Considerations for teaching and learning *mathematics in play-based classrooms:* Model for practice (Wager, 2013) Research on play and math learning (Wager & Parks, in press) • Broadening notions of assessment (Wager, Graue, & Harrigan, in press) • Responding to children's engagement in mathematics (Wager & Kim, in progress) Considerations for professional development: Action research that supports teachers in considering children's multiple mathematical resources (Wager & Delaney, in press) • Exploring teachers' identity as actors in PD (Graue, et al., in press) Considerations for providing equitable practices in play-based classrooms: • Attending to whose home practices are privileged (Wager & Whtye, 2013) How improvisational practice fosters culturally and developmentally responsive teaching (Graue, Whyte, & Delaney, in press) • Examining physical, curricular, and interactional components of early childhood classroom environments (Graue & Whyte, under review)

#### **NEXT STEPS:**

Dissemination conference (summer 2015) - teachers to share action research
projects
Writer's workshop to support teachers to
publish action research
Analyze student outcomes data





# Model for teaching and learning mathematics in play-based classroom Resources for identifying and building on children's multiple mathematical resources Tools for assessing mathematics in play-based classrooms

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