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?
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**RESEARCH FOCUS:**

**STUDY & PD DESIGN:**

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

**Developmentally Appropriate Practice**

**Funds of Knowledge**

**Early Number & Counting**
CAN \[\Rightarrow\] SHOULDN'T
Professional Development for Culturally Relevant Teaching and Learning in Pre-K Mathematics

Can

Should
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Co-PIs: Anita A. Wager ★ M. Elizabeth Graue ★ Thomas P. Carpenter
PAs: Kelly Harrigan ★ Anne Karabon ★ Jiwon Kim ★ Kristin Whyte

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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-1st)

**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.

**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 press)

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 & Whyte, 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:**
1. Dissemination conference (summer 2015)
   - teachers to share action research projects
2. Writer’s workshop to support teachers to publish action research
3. 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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<table>
<thead>
<tr>
<th>MODEL FOR TEACHING &amp; LEARNING MATHEMATICS IN PLAY</th>
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| **PLAN**
| Intended Practice |
| **PREPARE**
| Seed Environments |
| **RESPOND**
| Mathematize Play |

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**RESOURCES FOR RECOGNIZING MULTIPLE MATHEMATICAL RESOURCES**
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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 vs. 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

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