Connecting Mathematics, Children’s Mathematical Thinking, and Community Knowledge through Community Math Explorations

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Overview of Session

- TEACH MATH Project: Goals, Research Settings, and Research Question
- Conjectured Learning Trajectory for Pre-service and Early Career Teachers
- Community Mathematics Exploration Module
- Work Groups: Analyzing CME math lessons
- Concluding Discussion
TEACH MATH Project Goals

- To collaborate across multiple sites to design, refine, and study instructional modules for preK-8 mathematics methods courses that explicitly develop PSTs’ competencies related to mathematics, children’s mathematical thinking and children’s community/cultural/linguistic funds of knowledge.

- To better understand the development of PSTs’ knowledge, beliefs, dispositions and practices related to connecting children’s multiple mathematical funds of knowledge in instruction.
Diverse Range of Teaching Contexts Among Collaborators*

Urban
- J. Aguirre: University of Washington Tacoma
- M. Foote: Queens College, CUNY

Mixture of Urban, Suburban, and Rural
- C. Drake: Iowa State University
- A. Roth McDuffie: Washington State University Tri-Cities

Suburban
- T. Bartell: University of Delaware

Borderlands
- E. Turner: University of Arizona

* Note: Primary collaborators are named for each site, but many others contribute from these sites.
Research Question

What changes do we notice in PSTs’ knowledge, beliefs, dispositions, and practices related to integrating children’s mathematical thinking and their home and community-based funds of knowledge in mathematics instruction?
Theoretical Perspectives

- Teacher learning as situated social practice  
  (Lave & Wenger, 1991)

- PST learning as process of identity development  
  (Wenger, 1998)

- PSTs move along a trajectory toward becoming mathematics teachers  
  Simon (1995); Mason (2008)
PST’s **Learning Trajectory** for engaging children’s multiple mathematical knowledge bases

**Initial Practices**
- Attention
- Awareness
- Eliciting

**Making Connections**
- Emergent

**Incorporating**
- Meaningful
- Incorporating multiple mathematical knowledge bases in instruction

**Children's mathematical thinking**
- Mathematics
- Children's Cultural, Home, and Community-based Knowledge
Learning Modules

- Critical Analysis of Mathematics Classroom Practice
  - Video Case Analysis
  - Analysis of Curriculum Spaces
  - Observation and/or Analysis of Mathematics Lesson

- Mathematics Learning Case Study
  - Mathematics “Getting to Know You” Interview and/or Shadowing of a Student
  - Problem Solving Interview/s

- Community Mathematics Exploration
  - Community Walk/Visit
  - Lesson/Task Planning
Community Mathematics Exploration

- PSTs identify mathematical practices and mathematical funds of knowledge in students’ communities by going on a Community Walk/Visit.

- PSTs build on this information in developing either a standards-based Mathematics Lesson/Task.

- PSTs reflect on these activities through discussion and debriefing. This may include presentations of their lesson plans/tasks, followed by an individual written reflection (completed in class as a quick write or out of class as a homework assignment).
Work Group Session

Look for evidence (narratives and lesson plans) of PST’s knowledge about:

1. Mathematics
2. Children’s mathematical thinking
3. Community/home-based funds of knowledge.

**How would you describe the connections made among these three knowledge bases?**

First Example: Pizza Parlor (3rd grade)
Work Group Session

Various Community Math Exploration Lesson Examples:

- Las Socias Tienda (3rd grade)
- Coastal Drums (Kindergarten)
- Fencing Terminal Park (4th grade)
Work Group Session

- Look for evidence (narratives and lesson plans) of PST’s knowledge about: 1) Mathematics, 2) Children’s mathematical thinking, and 3) Community/Home-based funds of knowledge.

- How would you describe the connections made among these three knowledge bases?

- Given the community walk context the PSTs examined, what other possible connections might have been made?

- Why might this be an important experience for PSTs in a k-8 math methods class?

- Summarize your discussion on poster paper and prepare to share with group.
Promises and Challenges of CME

- Provides opportunities for PSTs to engage in *initial practices* toward making *meaningful connections* mathematics beyond the classroom.

- Develops an integrated knowledge base for the teaching practice of lesson planning.

- Supports awareness of mathematical-community connections in multiple ways:
  - going beyond math and money
  - more nuanced and complex views of both mathematics and communities as resources for teaching and children’s learning.
Final Reflection: New ways to see math and the community

“I actively looked for numbers in places that I normally would not. It was easy to spot numbers in the café or the corner store: prices and money. But in addition, it was fun to think about the angles of the crooked fencing near the school, or the garbage-to-receptacle ratios in People’s Park…”
Final Reflection: New ways to see math and the community

“In my past, I have spent a lot of time highlighting the gentrification of the [Neighborhood] to City officials, and espousing the positive qualities of the neighborhood and its residents. However, this time, with the “math” and “kid” lenses also in focus, I saw new places for justice. The corner store, with its miles of candy and its spoiled meat from [Big Store Chain], struck me, in particular. It seems to be a place preying upon kids, under the guise of convenience. I’m sure an interesting math lesson exists there.”
Thank you

Questions?

For more information
TEACH MATH Website:
http://mathconnect.hs.iastate.edu