

# Engaging Latina/o Students' Multiple Knowledge Bases in Mathematics Education



Rodrigo Jorge Gutiérrez  
Erin Turner  
Taliesin Sutton  
Maura Varley Gutiérrez  
University of Arizona

*CEMELA is a Center for Learning and Teaching supported by the National Science Foundation, grant number ESI-0424983. Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

# Personal Background

- Latin American/Latino
  - Venezuela, Bolivia, El Salvador
  - Importance of connectedness
- Raised by an activist, as an activist
- Teacher, educator, teacher educator
- Researcher
  - Focus on practice, diversity, and equity
  - Tool for change vs. trickle down research
- Soon to be father 😊

# Traditional Mathematics Learning Environments

- Procedural rather than conceptual instruction
  - Individualized, rote activities with few and narrow points of entry
- Disconnected rules and operations
- Achievement narrowly defined
- Low levels of engagement
- Lack of connections to students' experiences and knowledge bases
- Math as a static discipline discovered by experts
- Even more so with students of color
  - Extreme segregation and tracking

# Paint a Different Picture

- Problem solving and problem posing
- Broadened experiences and definitions of achievement (*What does it mean to do math*)
- Emphasis on accessing and validating various knowledge bases (*Who does math*)
- Increased engagement → learning
- Critique and open up the discipline
  - Student contributions enhance/transform math

# Description of Math Club

- 22 middle school students (mostly Latina/o) in a year-long after school math club
  - Facilitated by university professor, mathematician, graduate students, undergraduates, and a teacher
- Non-traditional mathematics
  - Cryptography (Fall)
  - Surveys: School and Community Safety (Spring)
    - *Use of actual data from students lives*
- Conversations, discussions, and debates that integrated personal and community knowledge

# Characteristics of Setting

- Problem solving as opposed to computational tasks
- Tasks supported collective activity:
  - Rendered range of knowledge bases relevant, benefited from diverse perspectives
  - Designed to be open-ended
  - Allowed for multiple entry points and various forms of participation
- Facilitators explicitly encouraged student-student talk and acknowledged that all ideas were valid and important

# Example: Community Safety

- Students discussing **actual** pilot data that **they** collected in order to improve surveys that **they** created
  - Item: “I feel safe in my community”
    - Zero students disagreed with statement
- When predicting data for larger population (scaling up), none of the students kept Disagree at zero
  - *Intuition* that *someone* would have to select

# Video Clip

# Initial Findings

- Use of personally-relevant data allowed for interaction between math knowledge and other forms of knowledge
  - Led to informed critique of data since a variety of knowledge bases were relevant and important
- More egalitarian discourse
  - Marginalized students assumed more “expert” roles
- Significant discussion and contestation
- Increased conjectures and claim-making

# Implications

- Give students a broadened experience of math
  - More realistic; how math is actually used/done
- Broadened definition of achievement
  - Not rooted in test scores
  - Not normed on white middle class experiences
- Focus on participation and discourse
  - Experiences and knowledge bases of students of color are validated and relevant
- Discipline not only enhanced by diverse perspectives, but transformed by them

# Questions?

- Rodrigo Jorge Gutiérrez
  - [rodrigog@email.arizona.edu](mailto:rodrigog@email.arizona.edu)
- Dr. Erin Turner
  - [eturner@email.arizona.edu](mailto:eturner@email.arizona.edu)
- Dr. Tal Sutton
  - [tsutton@math.arizona.edu](mailto:tsutton@math.arizona.edu)