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An Investigation of Successful Mathematics Instruction in an Urban High School *Five Urban Schools*

**Percentage of 4<sup>th</sup> Graders Scoring at the Basic Level of Proficiency or Above on the NAEP Assessment (by Race)**

Source: <http://nces.ed.gov/nationsreportcard/pdf/main2005/2006453.pdf>

**Percentage of 4<sup>th</sup> Graders Scoring at the Basic Level of Proficiency or Above on the NAEP Assessment (by SES)**

Source: <http://nces.ed.gov/nationsreportcard/pdf/main2005/2006453.pdf>

**Why Do These Gaps Exist?**  
Possible explanations....

- ~~Inherent differences in mathematical ability?~~ **NO!**
- Complex social forces (poverty, racism, language learning issues, uneven distribution of social capital) too powerful to overcome?

**Are Social Forces too Powerful to Overcome?**

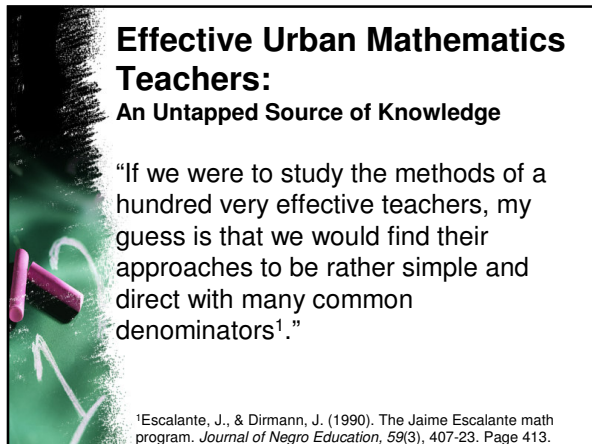
“Well-documented examples demonstrate that all children, including those who have been traditionally underserved, can learn mathematics when they have access to high-quality instructional programs that support their learning. These examples should become the norm rather than the exception in school mathematics education.”

(National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Reston, VA: Author. Page 14)

**Why Do These Gaps Exist?**  
My assumptions....

- The education system as a whole has failed to meet the particular needs of historically underserved student populations.
- Consistently successful urban mathematics teachers provide an “existence proof!” that a) historically underserved students can and should be expected to achieve at high levels; and b) such teachers provide models of practice regarding how educators can effectively meet student needs.

Wolf, S.A., et al. (2000). “That dog won’t hunt!” Exemplary school change efforts within the Kentucky reform. *American Educational Research Journal*, 37(2), 349-93.

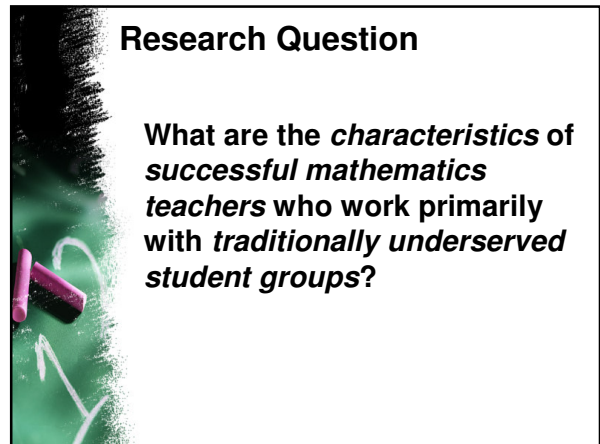


## Effective Urban Mathematics Teachers:

### An Untapped Source of Knowledge

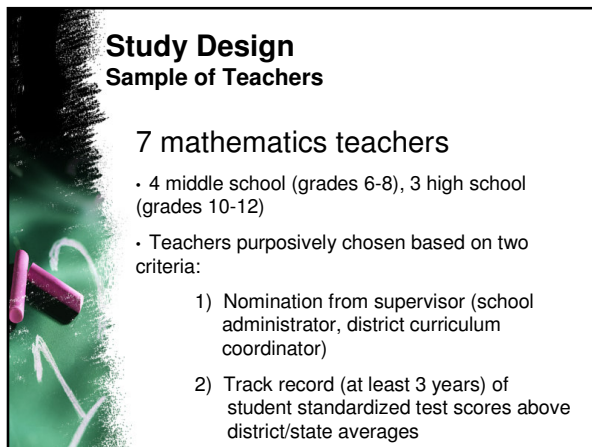
“If we were to study the methods of a hundred very effective teachers, my guess is that we would find their approaches to be rather simple and direct with many common denominators<sup>1</sup>.”

<sup>1</sup>Escalante, J., & Dirmann, J. (1990). The Jaime Escalante math program. *Journal of Negro Education*, 59(3), 407-23. Page 413.



## Research Question

What are the *characteristics of successful mathematics teachers who work primarily with traditionally underserved student groups?*

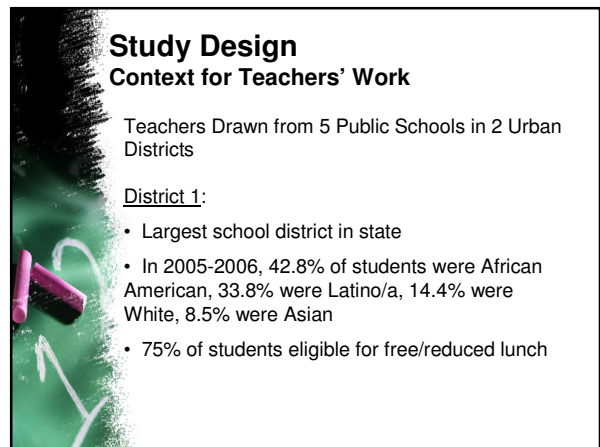


## Study Design

### Sample of Teachers

7 mathematics teachers

- 4 middle school (grades 6-8), 3 high school (grades 10-12)
- Teachers purposively chosen based on two criteria:
  - 1) Nomination from supervisor (school administrator, district curriculum coordinator)
  - 2) Track record (at least 3 years) of student standardized test scores above district/state averages



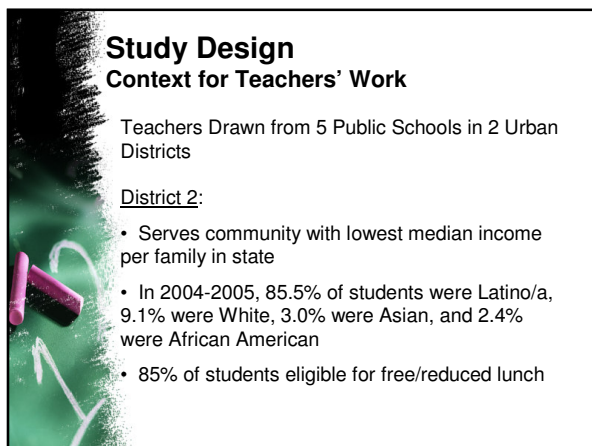
## Study Design

### Context for Teachers' Work

Teachers Drawn from 5 Public Schools in 2 Urban Districts

District 1:

- Largest school district in state
- In 2005-2006, 42.8% of students were African American, 33.8% were Latino/a, 14.4% were White, 8.5% were Asian
- 75% of students eligible for free/reduced lunch



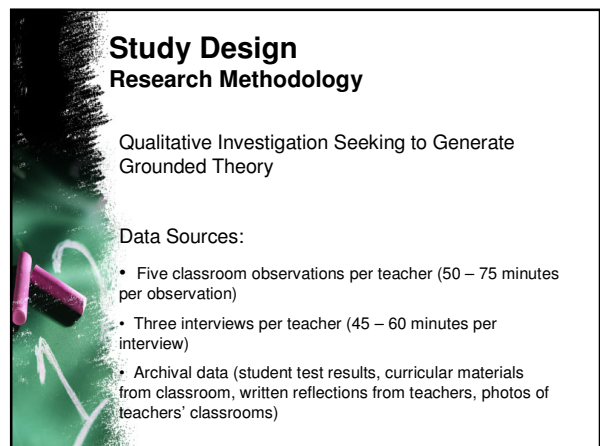
## Study Design

### Context for Teachers' Work

Teachers Drawn from 5 Public Schools in 2 Urban Districts

District 2:

- Serves community with lowest median income per family in state
- In 2004-2005, 85.5% of students were Latino/a, 9.1% were White, 3.0% were Asian, and 2.4% were African American
- 85% of students eligible for free/reduced lunch



## Study Design

### Research Methodology

Qualitative Investigation Seeking to Generate Grounded Theory

Data Sources:

- Five classroom observations per teacher (50 – 75 minutes per observation)
- Three interviews per teacher (45 – 60 minutes per interview)
- Archival data (student test results, curricular materials from classroom, written reflections from teachers, photos of teachers' classrooms)



### Emphasis on Mathematical Vocabulary

Images from the classrooms of middle school teachers Frederick, Etienne, and Zimmerman

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### Safe Environment For Meaningful Communication

"I really want the kids to feel comfortable. I want them to feel comfortable taking risks, and I want them to feel comfortable making mistakes. So, we have an environment where I'm not afraid to make a fool of myself, they're not afraid to get up and do the jazz box in front of the class, then no one's gonna feel nervous to go up on the board and do a problem. Because, three other kids have already done the jazz box in front of the class...how could it be worse than that? It's an atmosphere where sometimes people do stupid things, sometimes people make mistakes, and that's OK. I find that if I...sort of make a fool of myself, they're not afraid to make a fool of themselves." -Ms. Thompson, high school teacher

### Safe Environment For Meaningful Communication

"I think the safety issue, as we've gone through this year, I feel like that determines more and more all of the other behaviors and all of the other learning that I see. I'm pushing it really hard now because I feel like there are a lot of different, for whatever reason, different things that came up that made students feel like...I mean, it's natural, anyone is afraid to be wrong. I felt there were some things, just dynamics, in two of my classes where students just didn't want to share an idea just because they were afraid. They wanted to sit back and wait for somebody else who either has confidence, or is always right....[I want students to express ideas in class] because a lot of times when students explain something, how they start explaining something makes way more sense to their peers than how I would explain it. Because, they think differently than I do. I'm coming from this big picture [perspective] when I'm talking to them, whereas they're just using the space of whatever knowledge they happen to have. I find that whenever the kids start getting better at expressing themselves, that's when I find a lot of other kids starting to click and saying 'Oh, that's also what I thought.' When they hear it from each other, they seem to get it." -Mrs. Etienne, middle school teacher

### Safe Environment For Meaningful Communication

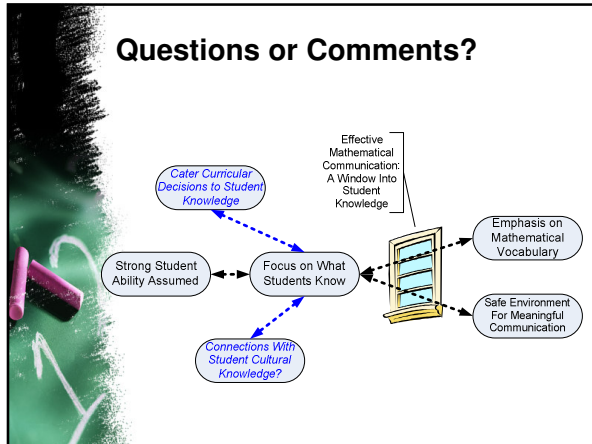
Providing Explicit Guidelines for Productive Communication (Mrs. Etienne, middle school teacher)

### Tentative Additional Findings

Effective Mathematical Communication: A Window Into Student Knowledge

- Cater Curricular Decisions to Student Knowledge  
 - Strong Student Ability Assumed  
 - Focus on What Students Know  
 - Connections With Student Cultural Knowledge?

- Emphasis on Mathematical Vocabulary  
 - Safe Environment For Meaningful Communication



## Questions for the Audience

1. Does this model resonate with your own perspectives on effective instruction?
2. Is this model unique to mathematics?
3. Is this model unique to traditionally underserved students? *"A common question asked by practitioners is, 'Isn't what you described just 'good teaching'?' And, while I do not deny that it is good teaching, I pose a counter question: why does so little of it seem to occur in classrooms populated by African-American students?"*

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465-491. (P. 484)

## Mike Egan

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- 1.State your name.
  - 2.Tell us a couple of things about yourself (where you work, your position, how your work is affected by or strives to address issues related to the "Achievement Gap."
  - 3.Tell us why you chose to attend this session.
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