Observing Teaching in a Field of Whiteness: An Instrument that Assesses Community College Mathematics Instruction at Minority Serving Institutions

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Background

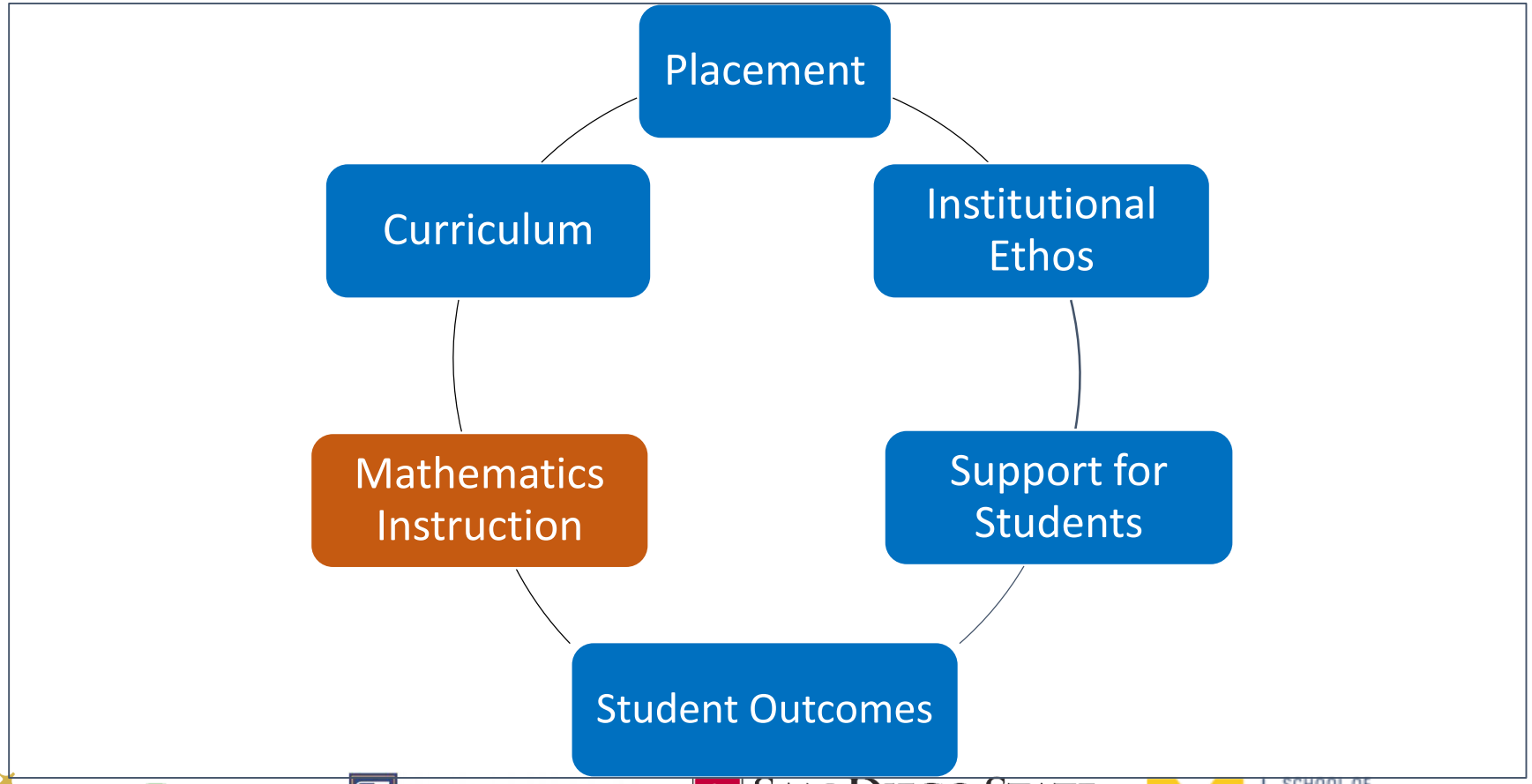
Transitioning Learners to Calculus in Community Colleges Project

What contributes to successful transitions from developmental mathematics through calculus for minority students at minority serving community colleges?

Four institutions with specific minority designation: Asian American Native American Pacific Islander, Hispanic, Predominantly Black, and Tribal.

(NSF-IUSE Awards 1625918, 1625387, 1625946, 1625891)

Hypothesized dimensions related to successful transitions



Research question

To what extent is ambitious and equitable mathematics instruction practiced in minority serving community college classrooms?

Conceptual framing

Instruction: Interactions between an instructor, students, and the content in a particular environment.

Ambitious instruction: Interactions that support student engagement with authentic and challenging mathematics beyond repetition and memorization.

Equitable instruction: Interactions that develop racialized minority students' sense of belonging to the mathematical community, a traditionally White space

(Battey & Leyva, 2016; Battey et al., 2016; Boston, 2012; Cohen, Raudenbush, Ball, 2003, Lampert, 2001; Larsen & Mesa, 2016; Munter, 2017; Wood, Harris, & White, 2015)

Components of our observation instrument for mathematics lessons

- Class map—spatial organization
- Behavior observation templates
  - Mathematical practices→ Ambitious instruction
  - Relational practices → Equitable instruction
- Post-observation reflection

Elements of an observation instrument for mathematics lessons

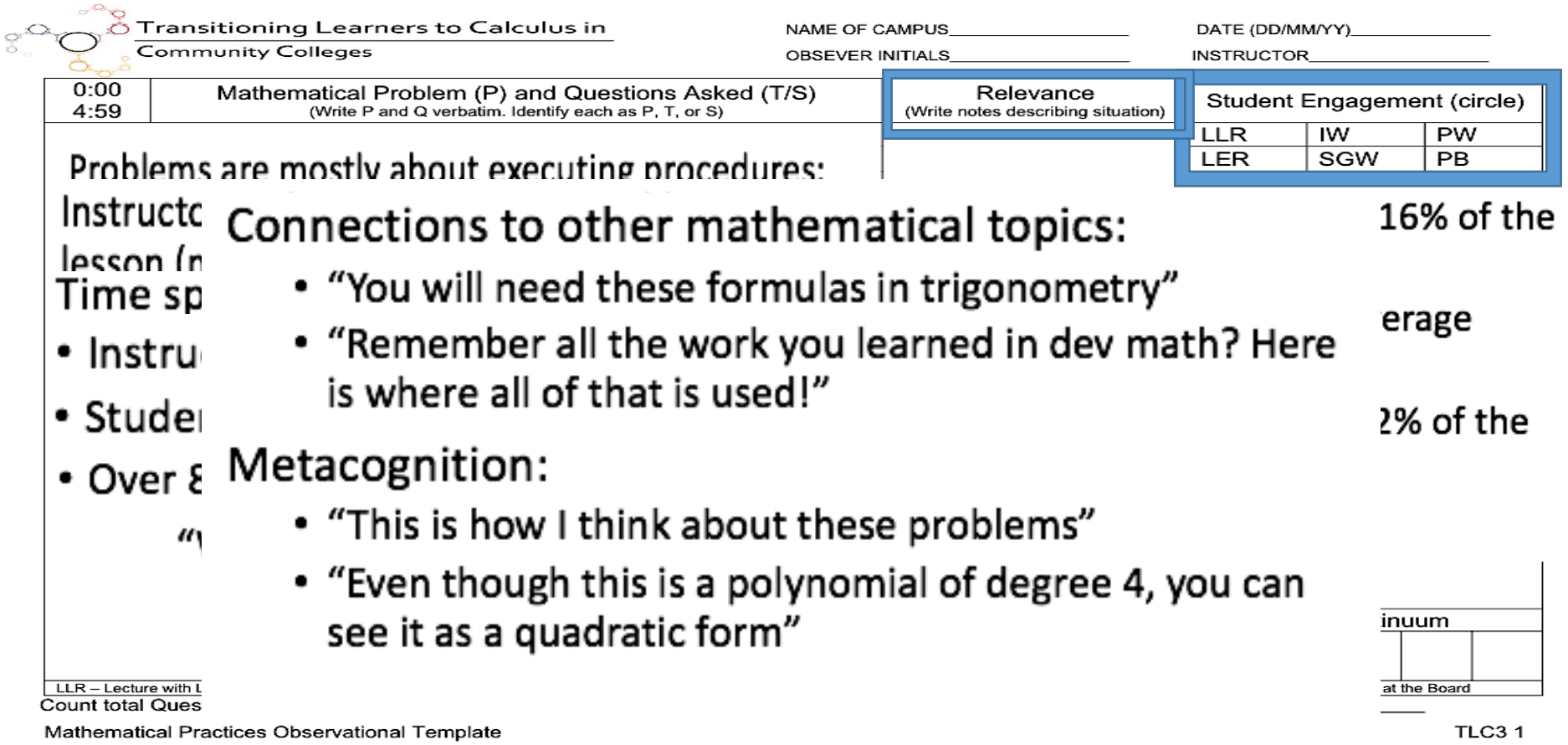
- Class map—spatial organization
- Behavior observation templates
  - Mathematical practices→ Ambitious instruction
  - Relational practices → Equitable instruction
- Post-observation reflection

Instrument characteristics

- Focus on behaviors:
  - What is said or done and by whom
  - Avoid interpretation of behaviors
- It requires two coders, one per template
- Adequate reliability
- The records provide an approximation of **normative practice**

27 observations (developmental, pre-calculus, calculus); 24 instructors ~38 hours
~694 students

Mathematical practices template



Transitioning Learners to Calculus in Community Colleges

NAME OF CAMPUS_____ DATE (DD/MM/YY)_____

OBSEVER INITIALS_____ INSTRUCTOR_____

0:00 4:59	Mathematical Problem (P) and Questions Asked (T/S) (Write P and Q verbatim. Identify each as P, T, or S)	Relevance (Write notes describing situation)	Student Engagement (circle)		
			LLR	IW	PW
			LER	SGW	PB

Problems are mostly about executing procedures:

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Connections to other mathematical topics:

- "You will need these formulas in trigonometry"
- "Remember all the work you learned in dev math? Here is where all of that is used!"

Metacognition:

- "This is how I think about these problems"
- "Even though this is a polynomial of degree 4, you can see it as a quadratic form"

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LLR – Lecture with L

Count total Ques

Mathematical Practices Observational Template

TLC3 1

Relational practices

- What techniques that support and welcome URMs in the mathematics classroom are used?
- To what extent are URMs empowered and encouraged in the classroom?
- How does faculty engage in culturally relevant teaching and/or performance monitoring?
- How does the classroom environment and dynamics support URM student learning and involvement in the classroom?

Relational practices template

Time Interval: 0:00-4:59 min
Welcomeness and Validation
Empowerment
Culturally Relevant Teaching
Performance Monitoring
Classroom Environment and Dynamics
Time Interval:5:00-9:59 min

Relational practices
Welcomeness and Validation

- Instructors utilized students' names within the classroom the majority of the time
- Some instructors fostered environments where students were welcomed and part of the classroom experience
- In some cases, instructors were not particularly engaging or welcoming
  - Stiff body language, matter of fact tone, monotone communication, failure to acknowledge students as they entered the room

Relational practices Empowerment

- Some instructors empowered and encouraged students within the classroom
  - " I am confident you all can do this"
  - "It's okay to make a mistake. It makes you stronger, especially when you can figure out how to fix it"
- Most offers of "praise" were demonstrated through "good work", "you're right" or "yes/yeah"
- No observed instances of students' contributions being recognized or assigned leadership tasks

Relational practices
Culturally Relevant Teaching

- References to culturally relevant examples or topics was noticeably absent. Is it because the institutions are minority serving?
- Limited use of cultural and/or diverse references or tailoring of instruction for a specific demographic
  - Mainly at AANAPISI institutions
- Some instructors referenced the need to provide optional methods of solving mathematics problems

Relational practices
Performance Monitoring

- Most instructors engaged in performance monitoring strategies:
  - Providing individual assistance during individual or group work (kneeling or squatting down at desks)
  - Reminding students of upcoming tests and/or assignments
  - Checking in with students before advancing to new topics in the lesson

Relational practices
Classroom Environment and Dynamics

We observed classes in which …

- Students were heavily engaged
- Instructors encouraged collaboration
- Interactions were informal:
  - Use of professors' first names
  - Students freely called out questions or comments
  - Playful banter or conversations between faculty and students

Some thoughts from the experience so far

- Instrument usability
- Sensitivity to different levels of quality of mathematical practices
- Sensitivity to different levels of quality of relational practices

Next steps

- Tease out if relational practices are targeted at URMs or if they are basic general practices
- Interview faculty to identify their stance towards ambitious and equitable instruction
- Assess each college on the use of these practices
- Assess alignment between the different components of the instrument for releasing the instrument
- Continue testing the instrument for validity and reliability

Acknowledgments

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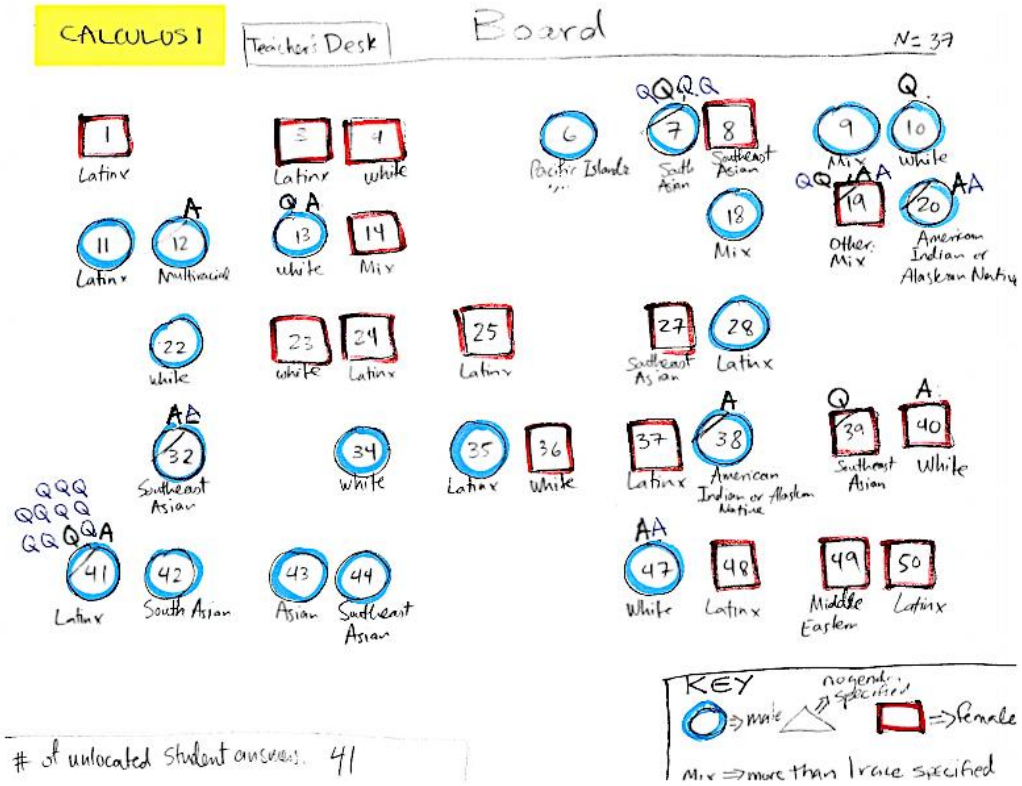
Spatial organization



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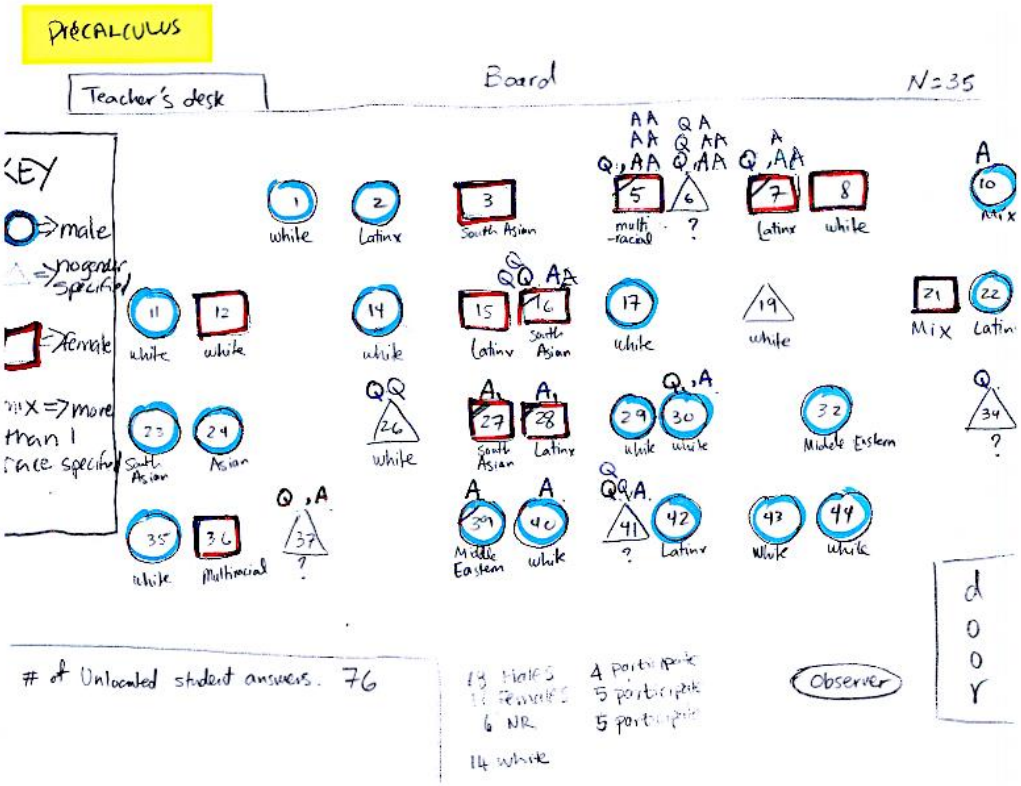

Concluding Thoughts

- Instrument is accessible and easy to use, requiring minimal training for data collection
- Instrument sensitivity to different levels of quality of mathematical and relational strategies