

The Utilities of Local Data in STEM Math Pathways: Exploring African American Student Placement, Course Taking, and Engagement at a PBI

Breakout Session #1: 1:10-2:20 PM

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Goal: Transform institutional approaches to student success in STEM Math Pathways



San Diego State











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Six dimensions affecting student transition and progress in STEM Math Pathways





Pair and Share Activity

- Are the indicators present at your campus?
- How transparent is the information about the indicators? In other words, are the expectations and outcomes similarly understood by campus stakeholders who are responsible for them or benefitting from them?













African Americans in STEM and Developmental Math

- African American students are underrepresented in STEM fields
- Blacks make up 6% of employees in STEM fields
- Students of color are disproportionately represented in developmental mathematics
- STEM-interested students who begin in developmental math or less likely to remain a STEM major













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TLC3 Community College Mathematics Chairs National Survey (*n* = 455, 44% response rate)



- Placement
- Courses
- Student Support
- Faculty PD
- Use of Data
- Institutional Priorities

22 PBI, PBI Eligible, or HBCU165 HSIs or Emerging65 AANAPISI Award or Eligible7 Tribal Colleges













Use of Local Data

- Overall 45% had "readily available" access to data
- 49% access but "not readily available."
- 17% disaggregated by race/ethnicity or gender

Top quintile colleges (>20% African American student enrollment, compared to bottom quintile (2% or less)

- More readily available access to data
- More examination of student evaluations
- Less examination of placement data
- No difference in disaggregating data (~ 17%)







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Trend towards more technology in instruction

Instructional Modalities



- Dev Math Modularized or Emporium
- Precalculus Lecture plus Computer-based instruction
- Calculus Lecture plus Computer-based instruction











Institutional Characteristics of TLC3 Sample by Percentage African American Enrollment Quintiles (n = 452)^a

	Quintiles by Percentage African American Student Enrollment				
	1 st (n = 94)	2 nd (n = 88)	3 rd (n = 90)	4 th (n = 87)	5 th (n = 93)
African American enrollment	0 to 2%	2.1 to 5.9%	6 to 9.9%	10-19.5%	≥20%
Graduation rate (African American) ^b	25% (8%)	26% (13%)	22% (10%)	20% (9%)	16% (10%)
Median FTE ^d (max FTE)	1257 (8534)	1859 (11743)	2270 (14722)	3273 (25614)	1848 (18074)
Number full-time (part-time) math faculty ^e	6 (8)	10 (12)	9 (17)	11 (25)	8 (12)
Number states represented	35	28	32	25	25

^aPercentages represent the median. Sources: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Fall Enrollment component final data (2007 - 2016) and provisional data (2017) with the exception of number of full- and part-time faculty which comes from self-reported data from TLC3 national survey respondents.













Selected Placement Policies by Percent African American Enrollment Quintiles

Enrollment	No changes to placement in the past two years	Policy to test out at all DPC2 levels	Policy for higher placement by educator at all DPC2 levels
Top Quintile	40%	37%	26%
4 th Quintile	26%	54%	39%
3 rd Quintile	36%	49%	40%
2 nd Quintile	31%	57%	44%
1 st Quintile	23%	50%	44%











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K-means cluster















CCR, Education Reform, and Illinois Context

- Every Student Succeeds Act (ESSA) 2015 reauthorization of the Elementary and Secondary Education Act
- College and Career Readiness (CCR)
 - reduce the need for remediation, lower educational costs, shorten time to degree, and increase the overall success rate of Illinois college students













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Illinois ACT Average Scores

Race/Ethnicity	Mathematics	
All Students	20.7	
Black/African American	17.2	
American Indian/Alaska Native	17.8	
White	22.3	
Hispanic/Latino	18.8	
Asian	25.2	
Native Hawaiian/Other Pac. Isl.	21.0	
Two or more races	21.1	
Prefer not/No Response	19.7	

<u>% Readiness</u>

Mathematics















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Illinois Community Colleges Remediation Rates – HS Class of 2016

Illinois State Board of Education (2019)

Reading
Mathematics
Communications













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Reflection Break











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PBI Case Study: Haynes College*

- 54% African American student enrollment, located in Illinois
- Data Collected: 6 classroom observations, 5 faculty interviews, 2 student focus groups (11 students), site visit notes
- College focused on supporting their students by...
 - Improving the placement process
 - Offering accelerated developmental math courses
 - Providing student Support for developmental math students

*The pseudonym Haynes College was selected to honor Martha Euphemia Lofton Haynes (1890 – 1980), the first African-American woman to gain a Ph.D. in mathematics in 1943 (Williams, 2001).

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Placement Practices

Recent changes to the placement process

- Use of ACT/SAT scores or ALEKS
- Use of ALEKS allows students to remediate and retake for higher placement
- Mandatory 3-hour online review prior to attempting ALEKS test
- Students can "test out" of initial placement if content mastery is demonstrated









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Selected Quotes on Placement Practices

- "85% of our students were placing into development but the numbers are going down since ALEKS and the implementation of remediation..."- Research Testing Coordinator
- "Pie chart diagnostic given to students provide them with data about where what's needed to shore up skills."- Faculty Member
- "When I first took the placement test, they put me in a [developmental] class (...) When I took the test [in-class assessment], I ended up being removed from that class and placed into college-level."- Student









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STEM Math Pathway Courses

- State context: Course topics and objectives dictated by the Illinois Articulation Initiative (IAI) and Illinois Mathematics Association of Community Colleges (IMACC)
- Most adjustments to courses are made at the lower level (developmental)
 - Influenced by costs, and the number of students who enroll and remain stuck in developmental math coursework

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- Multiple modalities: face to face lecture, web-enhanced, online, and hybrid/blended formats
- "Structured learning component"











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Selected Quotes on Courses

- "I'm changing some of our lower level class [Basic Mathematics, General Mathematics, and Pre-Algebra] into accelerated courses where students don't stay in the developmental sequence too long."- Department Chair
- "We revamped that whole [developmental mathematics] program and made all three of them all two-hour courses... So we've taken it [developmental sequence] from nine to six credit hours."- Faculty Member

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Use of Local Data

- Inconsistencies in availability of data and what data consist of
- Department Outcomes Assessment
- No disaggregated data













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Selected Quotes on Data Use

- "They don't really provide us with much as faculty members. Any kind of data analysis we do in our department, we have to ask for that data specifically or we may not get it."- Former Department Chair
- "We do have access to that [student-level data] whenever we want to see their placement scores, transcripts, history, see where they're coming from.."- Department Chair
- "Sometimes we get percentages, what students are going to succeed, how many have succeeded, and levels of literacy."- Faculty Member
- " I think most of the numbers we get are basically based on that population [African American] because that's our biggest population here. I don't think there needs to be much of a breakdown of those numbers because that's the largest segment we serve here."- Faculty Member

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Student Engagement

- Student Interaction
 - Primarily limited to asking and answering questions, and individual/group work
- Culturally Relevant Teaching
 - CRT was not observed in the classrooms specific to the racial/ethnic groups represented
 - Minimal attempt to build connections with course content through use of examples













Take Aways from the PBI Case Study

- The alignment between how instructors describe their approaches to teaching and how they enacted with them in their classroom did not demonstrate approaches that were explicit culturally responsive
- Beyond attending to teaching approaches, increasing the interactive segments, fostering greater relational practices in mathematics lessons/questions would improve students' opportunities to learn (e.g., more student centered approaches)

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Take Aways from the PBI Case Study

- Some evidence of problem/inquiry-based learning
- In spite of community colleges being referred to as democracy's doors or the last resort to defend an equitable agenda (Bailey & Morest, 2006)
- Classroom environments and college structures even in well intended departments have racial stratifying impact in the access, enrollment, and success in math reflective of "possessive investment in whiteness," the operationalization of white privilege and curricula that reinforce the status quo (Gutiérrez, 2017; Lipsitz, 1998; Martin, 2009).

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The Classroom

Mathematical practices

- 1. Mathematical Work
 - Questions asked and by who
 - Problems solved
 - →level of mathematical challenge of the classroom work
- 2. Student engagement
 - Organization
 - Who is in charge of the mathematics
- 3. Relevance and Metacognition

Relational strategies

- 1. Empowerment
- 2. Culturally relevant teaching
- 3. Performance monitoring
- 4. Classroom Environment
- 5. Welcome-ness

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(Mesa & Thrill, 2018; Wood et al., 2015)









Framing the work

- The knowledge exchanges that occur in the classroom are relational
- The nature of students and faculty interactions shape students' identities as mathematics doers when bounded by a common goal of learning a particular piece of content
- Race matters especially in "the contexts where mathematics learning and the struggle for mathematics literacy" occur
- Mathematics education does not empower everyone equally

(Battey & Leyva, 2016; Gutiérrez, 2002; Martin, 2006, 2009)











Mathematics as a white institutional space

- Whites framed the organizational logic of the discipline
 - Historical construction of the curriculum by white elites
- Numerical dominance of white people and exclusion of people of color in the field (see recent case of Dr. Edray Herber Goins)
- Mathematical knowledge and its production is assumed to be neutral, impartial, and equally accessible by all

(Martin, 2009)









Colorblind Ideological Norms in Mathematics

- Blind spots and perceptions of neutrality
- Math curriculum, teaching, and evaluation are connected to patterns of differential cultural, economic, political and social power
- Equity discussions and equity-related efforts in mathematics education have been largely focused on modifying curricula, classroom environments, and school cultures absent of social and structural realities (Gutierrez, 2013; Martin, 2003, 2008)
- Moving discussions of equity in math beyond access and achievement to address issues of identity and power (Gutiérrez, 2002, 2013, 2017; Martin, 2003, 2008)











Battey & Leyva (2016)

- How does whiteness operate in mathematics?
- Who is privileged and who is oppressed?

Framework for Understanding whiteness in Mathematics Education Institutional – ideological discourse, curriculum, organizational logic Labor – cognitive, emotional, behavioral effort

Identity – mathematics as a racialized form of experience, shaping and conforming to the norms









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New Directions and Considerations

- When it comes to community colleges and in this case mathematics education, is there a glossing over of the deeply embedded structures that produce inequities in definitions of equity?
- How have math reforms, even in lieu of being equity-minded efforts fall prey to perpetuating some groups being left out?
- Need to challenge definitions of equity to grapple with inequitable conditions URMs face in and outside of school, including the mathematical opportunities in these contexts

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