MATHEMATICS EDUCATION & **PULLS TOWARD (IN)JUSTICE**

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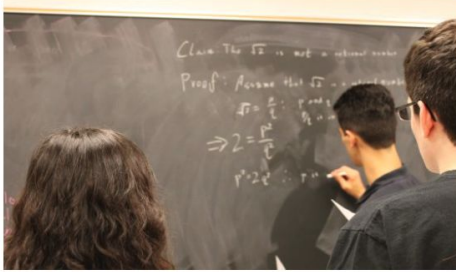*University of Wisconsin-Madison*

University of Michigan Mathematics • November 22, 2021
Inaugural Lecture on Justice in Mathematics Education

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1. INTRODUCE YOURSELF!

- What's your name?
- Where are you from?
- Where are you now?
- What professional position(s) do you currently hold? In what kind of department?

Learning Community on Inclusive Teaching

The Learning Community for Inclusive Teaching (LCIT) came together in Winter 2018 with a grant from CRLT, led by Math Department lecturers Gavin LaRose and Nina White. Since its inception, it has met ~1 / month over lunch (including during the summer) to read and discuss resources that pertain to making our mathematics teaching more inclusive. These common readings range from short blog posts, academic articles, and whole books. While some focus specifically on the math classroom, others focus more generally on race, gender, or other social identities. Please email whitenj@umich.edu to get involved. During the school-year, meetings are also posted to the seminar bulletin. **U(M) Math Learning Community on Inclusive Teaching Materials** and information about the University of Michigan Mathematics Department's Learning Community on Inclusive Teaching are posted **here**.

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2. JOIN THE DISCUSSION!

- Share questions and comments that arise for you during the talk
- Respond to others' questions and comments

"The proper aim of egalitarian justice is …
to create a community in which people stand in
relations of equality to others."

Elizabeth Anderson
Professor of Philosophy and Women's Studies
University of Michigan

What does it mean to be "good at math"?

3. JOIN THE DISCUSSION!

Think of a math classroom you've been in.

Who in that classroom is easy to see as "good at math"? What do they do?

"Math is power. Math carries status."

-Dr. Cathery Yeh

"[People think] understanding math … is a direct indicator of your level of intelligence."

-Uzma, an undergrad math student
quoted by Battey et al. (in press)

THE NATURE OF INTELLIGENCE

- Intelligence is a social and cultural construct

- What counts as intelligent is relative to the environment

- When we are not yet able to see a given student as smart, the problem is the learning environment, NOT the learner

- Black students are brilliant. Female students are brilliant. "Low" and "remedial" students are brilliant.

"It wasn't one student that somehow made it happen for everybody else, everybody contributed … and offered something special about themselves to that community, and that made that community stronger and better than what any one of them individually would have been. … The community is part of that opportunity to learn."

–Oscar, college calculus instructor
(Louie, Adiredja, & Jessup, 2021)

"She has a very big personality … Regardless of whether it's right or wrong, she just puts [ideas] out there. … She'd go up to the board and she'd start writing things … and sometimes, you know, she'd write incorrect things … and that was something that really stood out about her. For me that was interesting."

–Oscar, college calculus instructor
(Louie, Adiredja, & Jessup, 2021)

"… For me that was interesting because I feel like that experimentation, that ability to just kind of put things out there and sort through them, is a really kind of powerful skill to have … when you're exploring things, and trying to make sense of the concepts and how to actually use them."

–Oscar, college calculus instructor
(Louie, Adiredja, & Jessup, 2021)

The **hierarchical** ability frame	The **multidimensional** ability frame
Mathematical ability is distributed along a linear continuum. Some people have a lot; others have very little.	Everyone has both intellectual strengths and areas for growth that are relevant to mathematics learning.
• Explicitly valorizing speed and correctness • Assigning tasks that rely heavily on recall and formulaic computation • Positioning some students as helpers and others as in need of help	• Naming skills that are not always seen as mathematical as important • Assigning tasks that require a wide variety of mathematical strengths • Positioning every student as having resources for their peers' learning

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(Louie, 2017)

FRAMING ABILITY AS MULTI-DIMENSIONAL

"One, did you recognize patterns? Two, did you show patterns using multiple representations such as tables, or graphs, or rules? Did you use technology to help you solve the problem? I saw a couple graphing calculators out. That's a great way to be smart in math. ... Did you predict something that you cannot see? Can we see the hundredth pattern? ... Did you make sure that everyone could understand and explain the problem? Did you ask questions? And did you organize in a clear way so that other people could understand your work. ... Pick as many as you want, because that's smart in math."

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(Louie, 2018)

REDEFINING "GOOD AT MATH"

"Soriah, I am so proud of you … because man, it was really smart that you knew you were wrong."

"Miguel. Your group needs you for this problem, because you are kind of my master translator from English—will you look at this for a sec? Last week when we were doing the word problems and everybody else freaked out? It clicked for you … Can you translate that from English to math?"

(Louie, 2018)

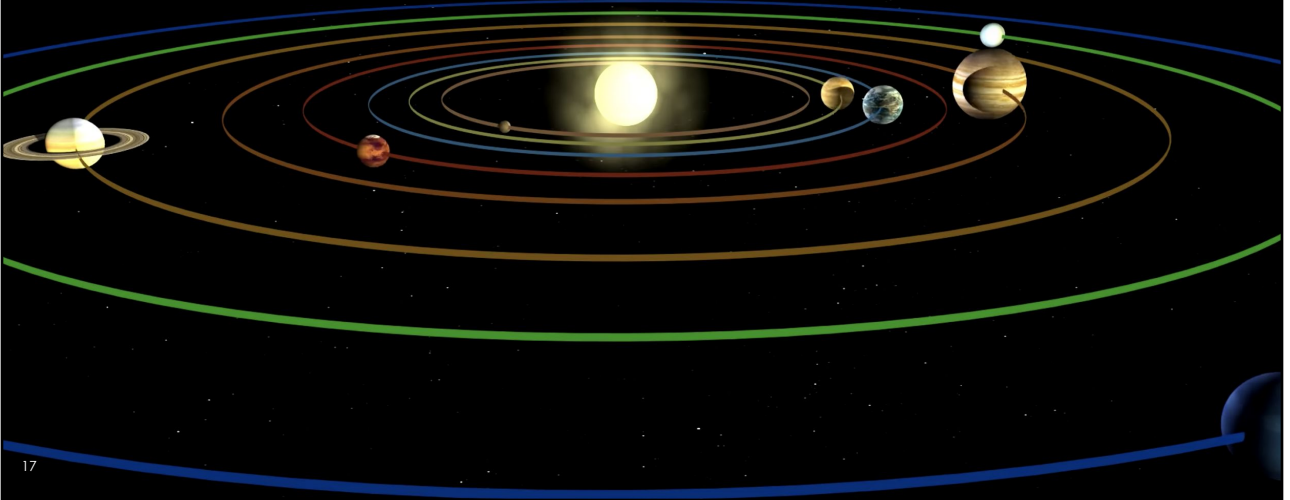Describe people who are good at math. What are they like? What do they do in math class?

• It's funny when I think of people who are good at math because then I realize it can be anybody. I learned this from my classmates.

		both people who do good at math
• Quiet	• loud	
• Shy	• social	
• nice	• rough	
• Studious	• distracted	

THE GRAVITATIONAL PULL OF HIERARCHIES

THE GRAVITATIONAL PULL OF HIERARCHIES

"I'm constantly up against this traditional view of what smart looks like. And I think I still have it in my head. … Sometimes it feels really soft, the way that I'm looking at how they're smart. Or it feels almost fake, or like, I'm trying too hard … I sometimes feel like I'm out of reality, by wanting to believe that they're so smart in different ways."

(Louie, 2018)

Ideally, provision should be made for five groups of children: the very superior, the superior, the average, the inferior, and the very inferior. We may refer to these as classes for the "gifted," "bright," "average," "slow," and "special" pupils.

—Lewis Terman, 1922, for the National Education Association

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Size of the Brain in Cubic Inches.		
RACES.	I.C. Mean.	I.C. Mean.
Modern White Races;		
Teutonic Group	92	92
Pelasgic	84	
Celtic	87	88
Semitic	89	
Ancient Pelasgic	88	
Malays	85	83½
Chinese	82	
Negroes (African)	83	
Indostanees	80	
Fellahs (Modern Egyptians)	80	
Egyptians (Ancient)	80	
American Group;		
Toltecan Family	77	79
Barbarous Tribes	84	
Hottentots	75	75
Australians	75	

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Nott et al., *Types of Mankind,* 1854

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Size of the Brain in Cubic Inches.

RACES.	I.C. Mean.	I.C. Mean.
Modern White Races;		
Teutonic Group.....................	92	92
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Semitic................................	89	
Ancient Pelasgic	88	
Malays	85	} 83½
Chinese	82	
Negroes (African)	83	
Indostanees..........................	80	
Fellahs (Modern Egyptians)......	80	
Egyptians (Ancient).................	80	
American Group;		
Toltecan Family...................	77	} 79
Barbarous Tribes.................	84	
Hottentots.............................	75	} 75
Australians	75	

Slide 22 — 2019 SAT Suite Annual Report Michigan

2019 SAT Suite Annual Report
Michigan

Total	Test Takers		Mean Score		
	Number	Percent	Total	ERW	Math
Total	113,724		1003	507	496
Took Essay[1]	109,832	97%	1007	509	498

Race / Ethnicity	Test Takers		Mean Score		
	Number	Percent	Total	ERW	Math
American Indian/Alaska Native	1,676	1%	859	436	423
Asian	4,529	4%	1159	563	596
Black/African American	15,180	13%	864	442	422
Hispanic/Latino	10,497	9%	936	476	460
Native Hawaiian/Other Pacific Islander	153	0%	887	453	434
White	73,174	64%	1040	525	515
Two or More Races	5,184	5%	1005	511	494
No Response	3,331	3%	894	455	439

A little bit of math

What is ¼ of 80?

How many different ways can you think of to solve this problem?

What mathematical concepts would a child need to understand to be able to make sense of the strategies you thought of?

THE PULL OF HIERARCHIES IN ACTION: I

What is ¼ of 80?

- Mr. Ingram's classroom
- Students have not yet been taught explicit strategies for finding fractions of numbers
- The class doesn't often work with large numbers

(Louie, 2020)

THE PULL OF HIERARCHIES IN ACTION: I

What is ¼ of 80?

"Even Kayla, who is a very, very low student, you know that she—I think, yeah I pressed her and said, so 8 divided by 4 is 20? No no no no, 80, 'cause I could add a 0, and divide it by 4, is 20."

(Louie, 2020)

THE PULL OF HIERARCHIES IN ACTION: II

FRASER: Every day, I'm with them the entire time.

KOETS: Do they always sit together like that,

FRASER: Yes,

KOETS: or do they ever mix them up—

FRASER: It makes it easier for me? Because I know I have to work with them. So instead of just having them—I know just go straight to this table.

(Louie, 2020)

THE PULL OF HIERARCHIES IN ACTION: II

" … I know just go straight to this table, because the other ones I have, I have where it's at least two highs, medium, and like somewhat of a low? But the lowest of the low is at that table."

- Opportunities to build their own understanding?
- Opportunities to experience agency and authority?

(Louie, 2020)

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How does the gravitational pull of hierarchies exert itself in university mathematics?

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AN EARLIER OSCAR

"Does somebody remember the midpoint formula? Can somebody do the algebra steps correctly? … Can they just whip out an answer, you know? … When you're explaining things, does this person get it? Or does this person not get it? Those are the types of things that I probably would've, somehow, in my mind used as an indicator [of who was a strong student]."

(Louie, Adiredja, & Jessup, 2020)

AN EARLIER OSCAR

"I would've seen [the discussions] as wasting time, or—I wouldn't have seen the value of letting people be themselves. … And I think it would've just completely, shut [Paulina] down."

(Louie, Adiredja, & Jessup, 2020; see also Ernest, Reinholz, & Shah, 2019)

THE PULL OF HIERARCHIES IN ACTION: III

- Telling a student they're stuck on an "easy problem"

- Advising a student to drop down to a lower-level course or not take further courses

- Thanking some students for their contributions to class while dismissing others' contributions

(Battey, Amman, Leyva, Hyland, & McMichael, forthcoming)

How can we build toward escape velocity?

SEEING NEW POSSIBILITIES

"I witnessed my students feeling smart, enthusiastic, and challenged, embracing mathematical strengths that I had not known they possessed. I saw ways that privilege had been playing out in our everyday interactions, making certain strengths obvious and others invisible. And I began to find my capacity to create more humanizing math learning experiences."

(Skinner, Louie, & Baldinger, 2019)

SEEING NEW POSSIBILITIES

"As a middle-class White person who was successful in school, my unconscious tendency had been to view James [a White boy] as a model of how children should operate and achieve in math. Other ways of participating and succeeding were invisible to me. This limited perspective affected my teaching in concrete ways. For example, without really thinking about it, I provided Nasira [a Black girl] and Luna [a Latina] with feedback that was less open-ended and more directive than the feedback I typically gave James. In doing so, I gave them less room to explore, to create, and to shine."

(Skinner, Louie, & Baldinger, 2019)

STRATEGIES TO TRY

1. Trust students with challenging, multidimensional tasks.

2. Randomly assign students to partners or groups (and check your assumptions about who is successful).

3. Have explicit, inclusive conversations with students, parents, and colleagues that broaden what it means to be smart in math.

4. Work to notice power and privilege as they play out in classroom interactions.

5. **Seek out critical friends and engage together in creative insubordination.**

(Skinner, Louie, & Baldinger, 2019; Gutiérrez, 2016)

BUILDING TO ESCAPE VELOCITY

Amanda
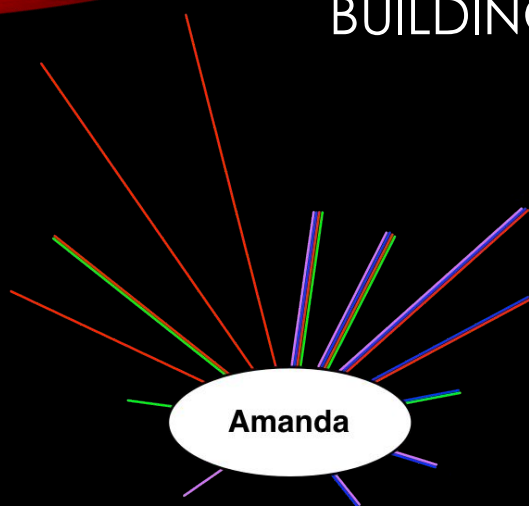
Orienting resources for envisioning equitable math education
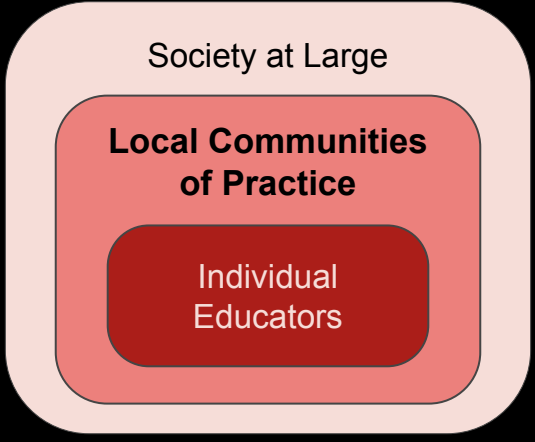
Technical resources for enacting it

Relational resources providing a sense of belonging to a supportive professional community

Positional resources to affirm her competence and worth

(Louie, 2017b)

Society at Large

Local Communities of Practice

Individual Educators

LET'S TALK!
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