

“Grades and Test Scores Do Not Define Us as Math Learners”: Cultivating Transformative Spaces for Anti-Racist Math Education

Julia Aguirre, Ph.D.
University of Washington
jaguirre@uw.edu

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Equity Webinar Series
Theme: Leveraging the Mathematical Brilliance of Students
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Land Acknowledgement

<https://native-land.ca/>

All of our lives and institutions exists on Indigenous land. We acknowledge the ancestral homelands of those who walked here before us and those who still walk here. I am currently on the lands of the Coast Salish People, specifically the Snoqualmie and Muckleshoot people.

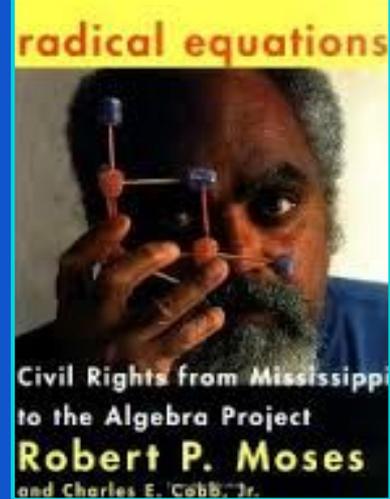
We are grateful to respectfully live and work as guests on these lands. We believe we have a moral responsibility to acknowledge our Indigenous connections, as well as the histories of dispossession, genocide, and forced removal that have allowed for the growth and survival of our institutions and those that surround around us. Let us continue to take active efforts to advocate for and partner with our Indigenous neighbors as we engage our work together as a community of educators, leaders, and learners.

Thank you

- Courage
- Caring
- Creativity
- Support
- Strength
- Advocacy

MATHEMATICS IS A CIVIL RIGHTS ISSUE

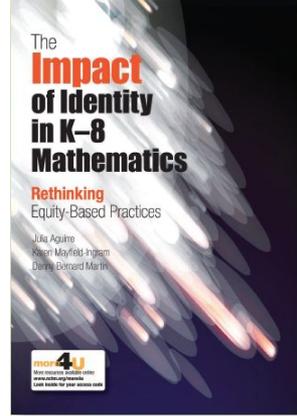
“Mathematics literacy and economic (and political) access are how we are going to give hope to the young generation...the ideas of citizenship now requires not only literacy in reading and writing, but literacy in math and science.”



*Robert Moses (Civil Rights leader, Founder of the Algebra Project)
1935-2021*



Interrogate and Innovate



Equity

Mathematics Education

“All students **in light of their humanity** – personal experiences, backgrounds, histories, languages, physical and emotional well-being—have the right to learn rich mathematics that fosters meaning-making, empowers decision-making, and critiques, challenges and transforms inequities/injustices. Equity demands responsive instruction that promotes equitable access, attainment, and advancement for all students.”

Math Strong Students Are...

<https://www.menti.com/qx3hnq5h8s>

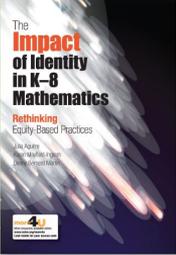
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Mathematics Identity

Aguirre, Mayfield Ingram & Martin (2013)



“Mathematics identity refers to the dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematics contexts and to use mathematics in powerful ways across the context of their lives (p. 14).”

- Self understandings
- Other’s views and ways of positioning
- Negotiation
- Expressed as stories (narrative forms) of lived experiences.
- Is one of many identities (academic, faith, cultural, family etc)

+ All mathematics teachers are identity workers...

Gutierrez (2013)

“By virtue of mathematics being political, all mathematics teaching is political. All mathematics teachers are identity workers whether they consider themselves as such or not. They contribute to the identities students construct as well as constantly reproduce what mathematics is and how people might relate to it (or not).”

The Mo(ve)ment to Prioritize Antiracist Mathematics: Planning for This and Every School Year (2020)

NCTM
Special
Publication
Award

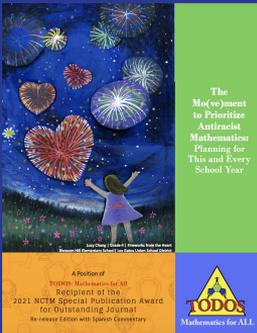
Transformative Spaces

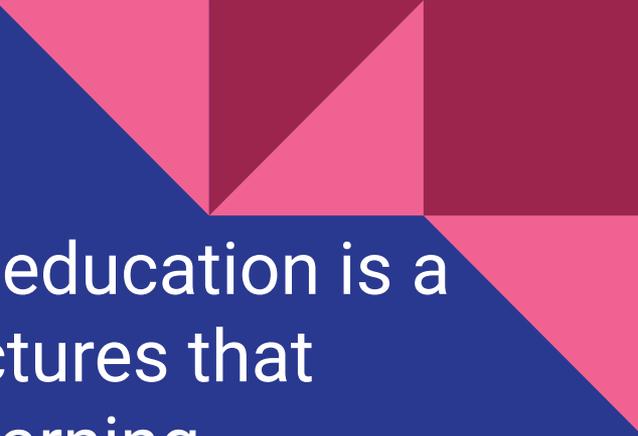
Beliefs &
Structures

Family & Community
Partnerships

Curriculum &
Instruction

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“An antiracist position in mathematics education is a pledge to dismantle systems and structures that maintain racism within teaching and learning mathematics from challenging belief systems that perpetuate microaggressions to disrupting the role mathematics classes play in pushing students out of schooling.”

(TODOS, 2020)

Beliefs and Structures

We need standards/standards-based practices to be meaningful, empowering, and worthy of our students, not the other way around.

Aguirre, Mayfield Ingram & Martin
(2nd edition, Forthcoming)

Interrogate: Worthiness of Standards in relation to Students

- Which standards and standards-based practices are worthy of the students who show up in my classroom?
- How comfortable am I when applying standards to other people's children only to conclude that these children are in need of repair?
- Are these standards and standards-based practices capable of capturing the brilliance of my students?

We must eliminate all forms of tracking

Eradicate the “dark suffering” and “spirit murdering” violence experienced by many children of color in schools and through mathematics.

Gholsen & Wilkes (2017); Love (2019); Martin (2012)
McGee (2020)

KEY ACTIONS!

- Stop using deficit language
 - Focus on learning not labeling
 - Utilize holistic assessment practices
 - Affirm different ways of knowing, doing, and communicating mathematics
 - Make mathematics a joyful journey
 - Keep math gateways open all throughout schooling
-

Psychological imprisonment or Intellectual freedom (Boaler, 2017)

- (2017) Longitudinal study of students from two high schools
- Adults reported their experience as students in math class as:
 - “psychological imprisonment” in a school with fixed ability groups
 - “intellectual freedom” in a school with mixed ability groups.

These mathematical experiences shaped their math identities and practices into adulthood.

In Jo Boaler's youtube video: Asked teachers at a recent conference in Colorado

Q: Where do fixed mindset messages to students come from?

A: Tracking (ability grouping)

Tracking is the structural equivalent of a fixed mindset.

COLUMN | STEM

Is Algebra Really Necessary?

By Michael B. Horn (Columnist) Mar 10, 2020

Forbes

7,272 views

Is Algebra Useful?



John Ewing Contributor

Education

I am a mathematician, currently president of Math for America, writing about math and science education.

EdSource

California revises new math framework to keep backlash at bay

Offering algebra in eighth grade remains a local choice

NEWS

No intermediate algebra? No problem as CSU ditches requirement for non-science, math majors in 2018



By STAFF REPORT | August 2, 2017 at 8:06 pm

12 COMMENTS

If you're one of those students who dreads math — especially algebra — you'll soon get a bit of a break at the California State University system.

The Washington Post
Democracy Dies in Darkness

Education • Perspective

Algebra II just doesn't add up when you figure how little it means to most students

THE WALL STREET JOURNAL.

THE FUTURE OF EVERYTHING | EDUCATION

THE MOVEMENT TO MODERNIZE MATH CLASS

...economics' co-author Steven Levitt and other reformers are pushing for an equitable curriculum that better equips students for a data-driven world

Algebra Debate: Access vs Readiness

- Algebra was originally in the elementary school curriculum prior to the development of the comprehensive high school.
- Through history of the school curriculum, mathematics and “algebra for all” in particular has been a site of contentious debate. We don’t have similar debates about “geometry for all” or “statistics for all.”

“In 1913, David Snedden, the commissioner, stated that the study of algebra was useless for all but very small numbers who would use it as a professional tool. In New York City, algebra was attacked for high failure rates and pressures on pupils. Algebra was charged with injuring the mind, destroying health, and wrecking the lives of children. It was especially dangerous for girls. The Superintendent of the Los Angeles schools maintained that algebra ‘caused many a girl to lose her soul’”

(Krug, 1964, p. 347, as discussed in Spielhagen, 2011).

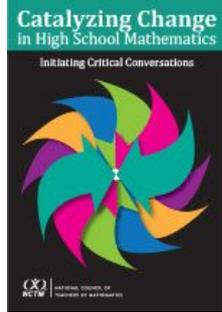
Algebra Debate: Access vs Readiness

- Late 1900s & early 2000 debates continue about access to algebra and readiness for algebra.
- NCTM 2008 position statement fueled this debate by advocating algebra for all, but only when ready
- “lost algebra student” (Loveless, 2008) focused critiques about algebra for all (or algebra by 8th grade) initiatives and policies.
- 2010 Common Core State Standards for Mathematics (High School Appendix, p.80-82) attempted to acknowledge both sides of the debate, and reinforced tracking with two pathway options and little guidance to districts about navigating the consequences of such “pathways”.

What does research say?

- **NO ALGEBRA GENE:** To date, there have been no studies that find specific groups of people are more cognitively ready than other groups to learn algebra
- **YOUNG CHILDREN CAN THINK ALGEBRAICALLY:** Studies have shown elementary age children can and do think algebraically (e.g. Carpenter, Franke & Levi, 2003; Blanton, 2008; Blanton et al, 2019).
- **TRACKING PERSISTS:** Some districts are moving to eliminate tracking again with promising results (Spielhagen, 2011) and more recently San Francisco Unified School District (again). But we have yet to scale up these efforts often beyond 1 school or a set of schools in a district.

Algebra Debate: Access vs Readiness



NCTM (2018) Catalyst for Change in High School Mathematics

Key Recommendation: High school mathematics should discontinue the practice of tracking teachers as well as the practice of tracking students into qualitatively different or dead-end course pathways.

Current reform efforts that focus largely on standards, with some attention to improved instructional practice, are unlikely to address and alleviate equity concerns unless they also address and dismantle the conditions and system structures that stand as barriers to the creation of positive mathematical experiences for students. *Catalyzing Change* outlines three structural barriers to achieving equitable learning outcomes within educators' influence: tracking students into course pathways that do not prepare students for the continued study of mathematics; tracking teachers in ways that deny certain students access to high-quality instruction; and providing inadequate instructional supports before and during high school.

NCSM Position Paper

NCSM, Leadership in Mathematics Education, believes that all students should have access to high-quality instruction and post-secondary educational opportunities. While we acknowledge that many factors hinder such student access, in this position statement we call for the **cessation** of one clear, addressable factor: **the practice of tracking**. As a practice, tracking too often leads to segregation, dead-end pathways, and low quality experiences, and disproportionately has a negative impact on minority and low-socioeconomic students. Additionally, placement into tracks too often lacks transparency and accountability. Overall, tracking does not improve achievement but it does increase educational inequality. **In light of this, NCSM calls instead for detracked, heterogeneous mathematics instruction through early high school, after which students may be well-served by separate curricular pathways that all lead to viable, post-secondary options.**

Branching out (BE-AWARE)

“Instead, students can be offered options based on their own aspirations and interests...With appropriate guidance and information, students implementing their own choices may work harder than students who have been placed.”

“Four years of math should be encouraged, not required, for high school graduation.”





Algebra scenario:
What would you do?

12/15/15 5am

Dear 8th grade Algebra Teacher,

Do you have any recommendations for tutors in local area? Our daughter, Ana, is struggling and we need a 3rd party to help. Are there peer tutors available at the middle school? We are happy to bring her to get help from you, but we also need additional resources. Ideas would be helpful. We are trying to support a growth mindset. But this is a challenge when she continues to get Fs on her tests. Very discouraging for her as you can imagine.

-- Parent

How would you respond?

12/15/15 4pm

Hi Parent,

Thanks for your message. I did ask our math department chair about any tutors she is aware of and she mentioned this website [www._____](#). I don't know of other specific tutors at this point. Certainly there are teachers at Math Lab on Thursdays who are happy to help (and sometimes some high school students come as well, though not always). I spent some time looking at Ana's math history and I noticed that her test scores (for the MSP and SBA) are lower than many of her peers on the compacted path (typically at a Level 4).

3rd Grade – Math Level 2

4th Grade – Math Level 1

5th Grade – Math Level 2 (a Level 4 in reading and science though that year – that's awesome!)

6th Grade – Math Level 2 (grade in math fluctuated between an A and a D+ - ended the year with an A)

7th Grade – Math Level 2 (grade in CC 7/8 fluctuated between a B and C – most frequently a B-, ended the year with a C)

Certainly, I understand that those scores are not measuring all of her knowledge and understanding, but at the same time I notice that she often seems to be struggling to keep up....

Her grades in CC 7/8 also suggest that she only had a partial understanding of many topics from last year, which makes it difficult to build on that understanding this year. As I noted in another message the curriculum is going to get more challenging at this point, because the earlier units were much more of a review from last year and we are now doing a lot of content that is very new to students (such as operations with radicals). After our unit on the Pythagorean theorem we proceed into exponents and exponential models, functions, transformations, and quadratics (we spend a significant amount of time on quadratics in particular). I think it's great that you want to get Ana more support, though I also think it's worth noting that there is another option you may want to consider. Sometimes we have students in algebra who are having trouble keeping up and we have them change to take CC 8 so that they can take algebra next year in high school. Students in CC 7/8 did most (but not all) of the CC 8 curriculum, so there are concepts that they benefit from going through in more depth to be prepared for high school algebra.

I know Ana is a very intelligent, capable student, though as I've mentioned previously, I notice that she often needs more time to process through the concepts that she's learning and she gets distracted easily (so she doesn't always maximize her class time, which causes her to miss out on getting more feedback and support). I am happy to have her as a student, though I just wanted to mention that CC 8 is an option if algebra is feeling too overwhelming. We want students to earn a grade in algebra that they want to apply to their high school transcript (a high grade that will help their GPA) and to feel prepared for geometry. Please feel free to let me know if you have other questions or concerns or would like to speak about this more (in person or via phone). Hopefully having a retake tomorrow on the Looking for Pythagoras quiz and a retake on Friday for the Chapter 5 test will help her grade significantly. Ana has her test and her quiz with her that she can use to review tonight and tomorrow as needed.

Take care, Teacher

Reflect in Chat:

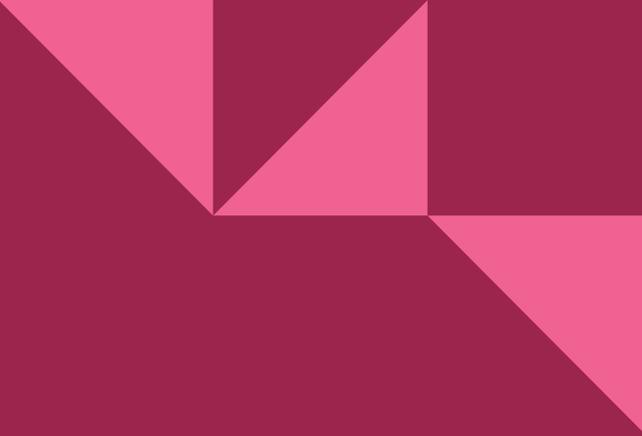
1. What resonates with you in this situation?
2. What role does standards play in this situation?
3. How might this response impact the family?

Quote Reflection

“If we focus only on “learning loss,” we will walk down a familiar road, one paved with repetitive remediation, disengaged students, and reluctant families who are disillusioned with impersonal, inauthentic learning.”

Linda Darling Hammond
(2021)

<https://www.forbes.com/sites/lindadarlinghammond/2021/04/05/accelerating-learning-as-we-build-back-better/?sh=2e9959966722>



Family & Community Partnerships

What we know from research: Family engagement with Mathematics

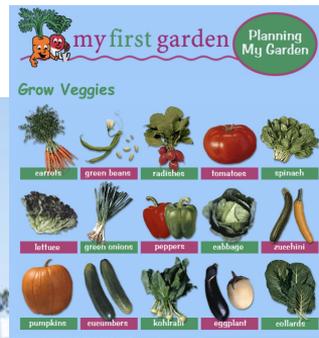
- Positive relationship between family engagement and student achievement.
- Persistent deficit labels about families and communities being barriers to children's education
- Reform mathematics often unfamiliar or inaccessible especially to non-dominant parents
- Non-dominant families (i.e. parents of Color, immigrant families) often left out of critical conversations about mathematics reform efforts

(Aguirre et al, 2013; Christensen, 2004; Civil, 2007; Civil & Bernier, 2006; Civil & Menendez, 2010; Foote, 2009; Gonzalez et al, 2001; Ishimaru, 2020; Ishimaru et al, 2015; Jackson & Ramiliard, 2005;)

What we know from research: Family engagement with Mathematics

- Families are intellectual resources for mathematics teaching and learning
- New teachers can leverage these intellectual resources to support rich, rigorous and relevant mathematics for students.

(Aguirre et al, 2013; Christensen, 2004; Civil, 2007; Civil & Bernier, 2006; Civil & Menendez, 2010; Foote, 2009; Gonzalez et al, 2001; Ishimaru et al, 2015; Jackson & Ramiliard, 2005;)



Garden Contexts

- Home Gardens
- School-community gardens
- Community gardens
- Window Gardens

Math Concepts

- Measurement
- Proportional reasoning
- Number and Operations

Parent/Community Engagement

- Tapped Expertise (Civil & Khan, 2001)
- Missed opportunity

“Many of my families live in apartments, they don’t have gardens” (3rd grade teacher, 2019)

Mathematical Modeling with Cultural and Community Contexts (M2C3)

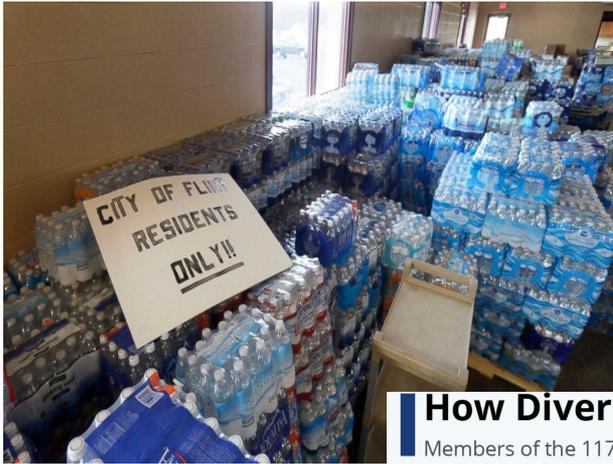
<https://m2c3.qc.cuny.edu/>

Engaging Families in Math Teaching and Learning

Ishimaru, Bang, Barajas-Lopez (2015) p.13

1. Engage families as knowers, doers, decision-makers, and co-designers in the core work of disciplinary teaching and learning across contexts;
2. Recognize and interrogate the complexity of family and community-based mathematics knowledge embedded in cultural practices to expand disciplinary conceptions;
3. Deepen understandings of families and communities' roles in the development of students' academic, disciplinary, racial and cultural identities.

Community & Public Discourse Mathematics



ACCESS - WATER CRISIS

How long will this water last?

How much environmental waste of plastic is generated by this supply?

“Flattening the Curve”

How Diverse is Congress?

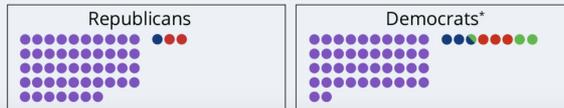
Members of the 117th U.S. Congress by race/ethnicity

- African-American
- Hispanic
- White
- Asian/Pacific Islander
- American Indian

House 439



Senate 100



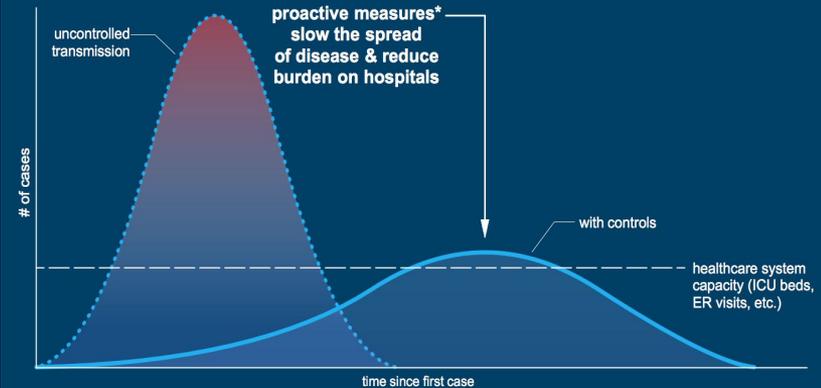
REPRESENTATION

Over or under representation?

What does “most diverse” mean?

What would a representative congress look like?

LOWER AND DELAY THE EPIDEMIC PEAK



*social distancing such as teleworking, limiting large gatherings, reducing travel or more assertive approaches.

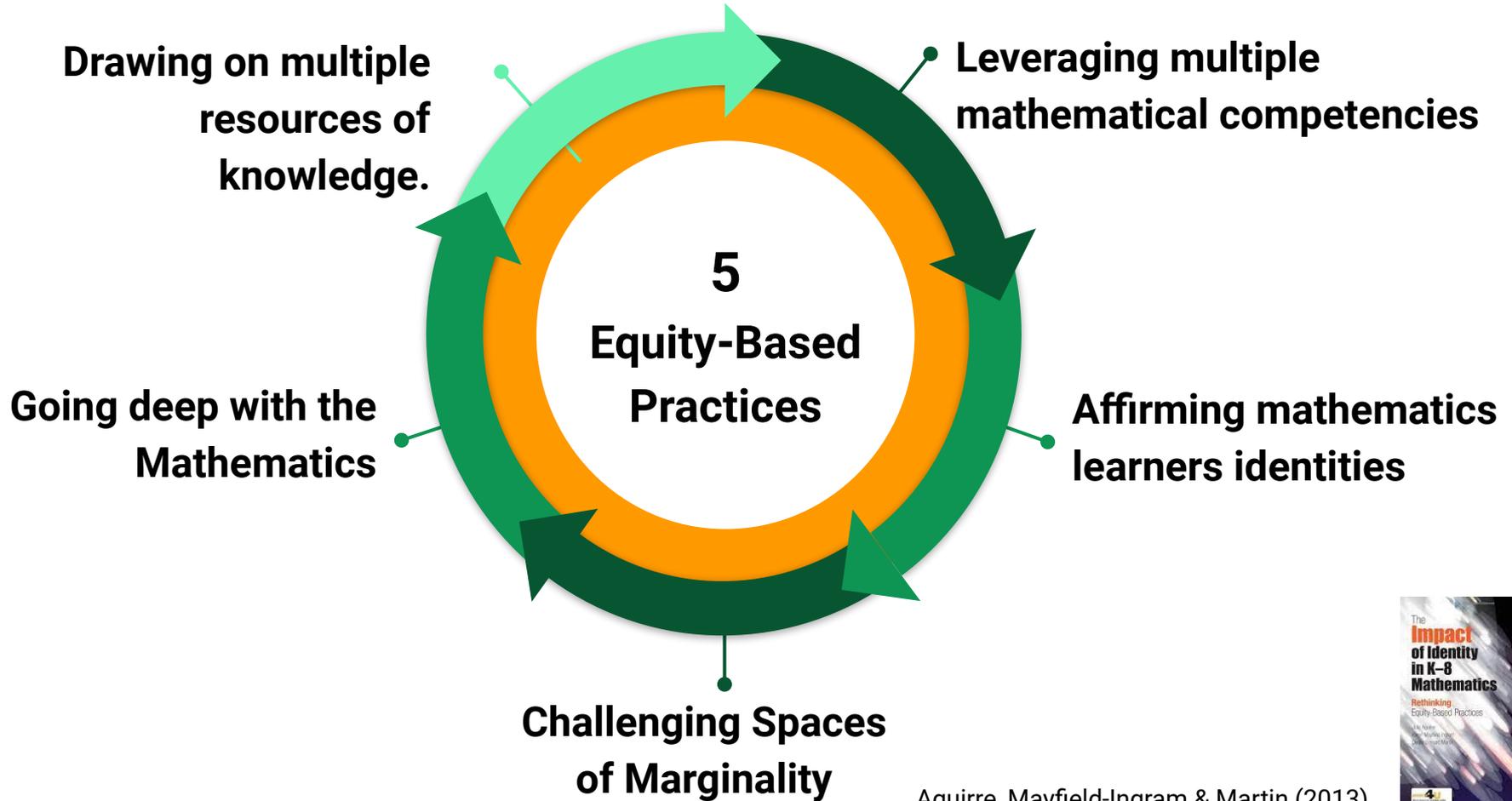
“Culturally responsive teachers have unequivocal faith in the human dignity and intellectual capabilities of their students.”

Geneva Gay (2000)

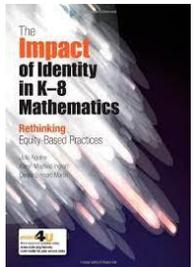
Curriculum & Instruction

“Joy is crucial for social change; joy is crucial for teaching.”

Bettina Love (2019)



Aguirre, Mayfield-Ingram & Martin (2013)



Equity-based Practices

Drawing on multiple resources of knowledge

(e.g. math, culture, language, family, community)

- Tasks involve stories and situations to solve or represent a problem.
- Previous knowledge is a bridge to new learning.
- Taps math knowledge and experiences related to students' culture, community, family and history as resources.
- Recognizes and strengthens multiple language forms (e.g. connections between math language and everyday language).
- Affirms and supports multilingualism.

Equity-based Practices

Going Deep with the Mathematics

- High Cognitive Demand Tasks
- Demonstration of Multiple Strategies and Representations
- Involves analysis and justification

Leveraging Multiple Competencies

- Collaborative learning that utilizes varying math knowledge to solve complex problems.
- Tasks with multiple entry points.
- Assessment, content knowledge, and math practices such as examining patterns, generalizing, abstracting, making comparisons, and specifying conditions.

Equity-based Practices

Affirming Mathematical Learners' Identities

- Promote persistence and reasoning with complex problems solving tasks.
- Validate math knowledge and experiences as math learners.
- Focus feedback on mathematical ideas and strategies (correct or incorrect; productive and unproductive strategies) rather than mistakes/errors only.

Challenge Spaces of Marginality

- Positions students as mathematical resources.
- Distributes math authority as interconnected among students, teacher, and text.
- Encourages student-to-student interactions.

Interrogate & Innovate



Transformative Spaces

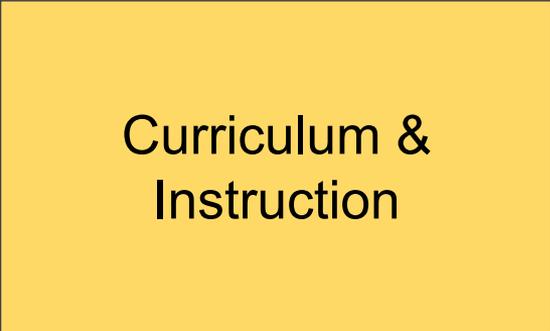
Beliefs &
Structures



Family & Community
Partnerships



Curriculum &
Instruction



Interrogate

Language used to talk about
children's learning

INNOVATE

Stop using deficit
language.

Reframe with a focus
on strengths and
growth areas.

Interrogate

Math Curriculum

INNOVATE

Make your curriculum both a mirror and a lens. It is more than just the textbook you use.

Inquiry-based community-focused justice math projects should be an element of every math unit.

Cultivate that curiosity and connection between math and the world.

Interrogate:

Assessment System

INNOVATE

Build a *holistic* assessment system that goes beyond test scores. A system that includes

1. **multiple measures** (academic, social-emotional, student-voice),
 2. **revision opportunities** to show best work, and
 3. **meaningful feedback** that focuses on strengths and growth areas.
-

Interrogate

Interventions

INNOVATE

Interventions should be strategic and temporary.

If you must maintain interventions due to funding, innovate so that children can advance within the enrichment frame.

For example. If you have interventions that are ability grouped, find ways to STRETCH students with inquiry-focused work. All students are curious.

If you want math strong students you have to give them opportunities to engage rich, rigorous, and relevant work.

Interrogate

The Quality of your
Relationships with Families
and Communities

INNOVATE

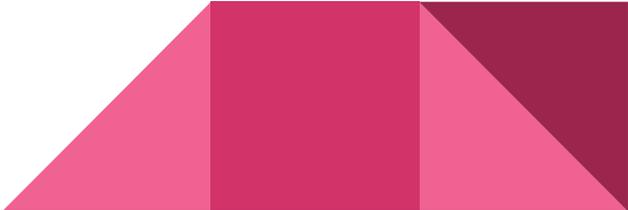
Stop using deficit language to describe families and communities

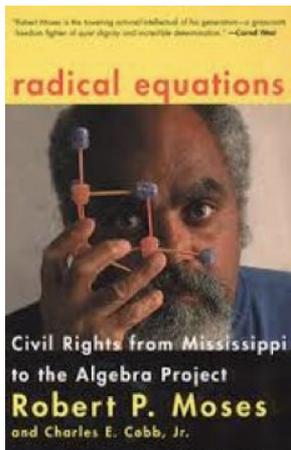
Focus on nurturing authentic partnerships with families and communities, especially those from historically segregated and colonized communities.

Position families and communities as intellectual resources for mathematics lessons

There is no balance
that can be struck
with a racist
system. It must be
dismantled

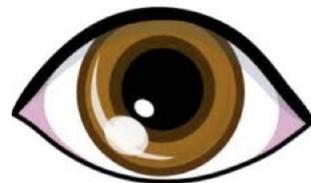
How do I know we've succeeded?

- The racist practice of tracking (including ability grouping) is gone.
 - Demographics of the math classes match the demographics of the school
 - Number of support classes diminish over time
 - Interventions are designed to be strategic and temporary
 - Interventions are enrichment opportunities for all students.
 - Increase in students taking 4 years of mathematics
 - Families are true partners and intellectual resources for math education
 - Children engaged with joy
- 



“We don’t listen to kids enough. Really listen. It is a difficult thing for grown-ups to do—listen and actually pay attention to what young people are saying. In the Algebra Project we are still learning how to do this also. It is the voices of young people I hear every day, more than anything, that gives me hope.”

Robert P. Moses (2001) Civil Rights Leader and Founder of the Algebra Project



Listening To Students

I am/we are change agents

- ★ Making friendship bracelets to welcome refugee families to our community
- ★ Helping families that are unhoused with toy drive
- ★ Donating books to build a diverse library collection for our class and the apartment building next to school
- ★ Creating a community garden to help our community and local food banks
- ★ Beautifying our school by planting flowers
- ★ Writing letters to children in hospitals
- ★ Reducing Cafeteria Waste
- ★ Clean-up trash around the school and local parks
- ★ Recycling plastic bottles into art projects and eco bricks
- ★ Upcycling plastic bags to make a set of jump ropes for the P.E. class or local community center

Innovate...Math Strong

Advice to math teachers from 8th graders

- **Be strict and nice**
- **Be patient**
- **Tell personal stories (open your life to kids), but don't bring your drama**
- **Build relationships (trust) with kids**
- **Make math fun, engaging, relevant**
- **Include math conversations and group work**
- **Connect math to real-life beyond school (keep it real; hands-on; real-world examples)**
- **Less worksheets**
- **Have multiple ways to explain a math concept**
- **Recognize students have different strategies to solve problems. Don't force just one.**
- ★ **Grades and test scores do not define us as math learners**
- **Realize that we are individuals and learn things differently**
- **Students want to learn**
- **Ask questions**
- **Our voices matter; we need to talk through ideas**
- **Don't just point out things we did wrong, focus on things we are doing well too**
- **Make sure it is okay to make mistakes**

I appreciate all the work you do to make teaching and learning mathematics a more joyful, humanizing, and anti-racist experience for everyone

Thank you



Julia Aguirre
jaquirre@uw.edu

@JuliaAguirre23
