NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CELEBRATING 100 YEARS

Promote Equitable Teaching Practices AND Focus on Content & Connections: Don't Settle For Only One!

Farshid Safi **@FarshidSafi**

School of Teacher Education

University of Central Florida

#NCTM100

June 18, 2020 7 PM EST

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CELEBRATING 100 YEARS

Culture
People
History
Art
Traditions
Architecture
Beauty
Mathematics

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Community	Initiatives	Language (Persian)
@FarshidSafi	#NCTM100	فرشید صفی

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CELEBRATING 100 YEARS

My Journey & Privileges of Teaching

@FarshidSafi #NCTM100 فرشید صفی

My Journey


A CASE STUDY EXPLORING THE RELATIONSHIP
BETWEEN MODEL-ELICITING ACTIVITIES AND
PROSPECTIVE SECONDARY TEACHERS'

MY commitment

My story is NOT unique!

I happen to have a great deal of privilege through teaching and a platform to *share* and *vocalize* some long standing concerns and critical issues!

Personal Acknowledgement:

I have a lot to learn and will remain committed to *listening*, *reflecting* and *growing* personally and professionally!

Serving Our Students & Communities

Farshid Safi
@FarshidSafi

As we are all busy trying to provide content to students, let's remember that what many students need MOST from us -specially now- are the connections & relationships! Not one or the other, but both! 🍎🙌🏼📚💗 @UCFTeacherEd #educhat #MTBoS #iteachSTUDENTSmath #iteachmath @UCFCCIE

12:13 PM · Mar 26, 2020 · Twitter Web App

Farshid Safi
@FarshidSafi

Thank you @nctm @TrenaWilkerson @robertqberry "As a mathematics education community, we must not tolerate acts of racism, hate, bias, or violence." #NCTM #MTBoS #education We MUST "challenge systems of oppression that privilege some while disadvantaging others" #BlackLivesMatter✊🏾

themselves, their students, and colleagues.

As NCTM's Catalyzing Change series advocates, we need to engage in critical conversations that urge educators to create structures where each and every student can be fully engaged in our democratic society. We owe this not only to our students but also to the society we wish to inhabit both now and in the future.

> One either allows racial inequities to persevere, as a racist, or confronts racial inequities, as an antiracist. There is no in-between safe space of "not racist." The claim of "not racist" neutrality is a mask for racism. (Ibram X. Kendi, author of *How to Be an Antiracist*, p. 9)

Trena L. Wilkerson
NCTM President
@trenawilkerson

Robert Q. Berry III
NCTM Past President
@robertqberry

11:00 PM · Jun 1, 2020 · Twitter Web App

OUR commitment

WE need to commit *personally* and *professionally*!

Empathy → Awareness → Activism

- For our students
- For our colleagues
- For our communities

Session Goals

- Build on human connections and our collective experiences
- Explore the significance of our students & issues related to identity
- Connect equitable teaching practices AND mathematical content & connections

Educators From All Around

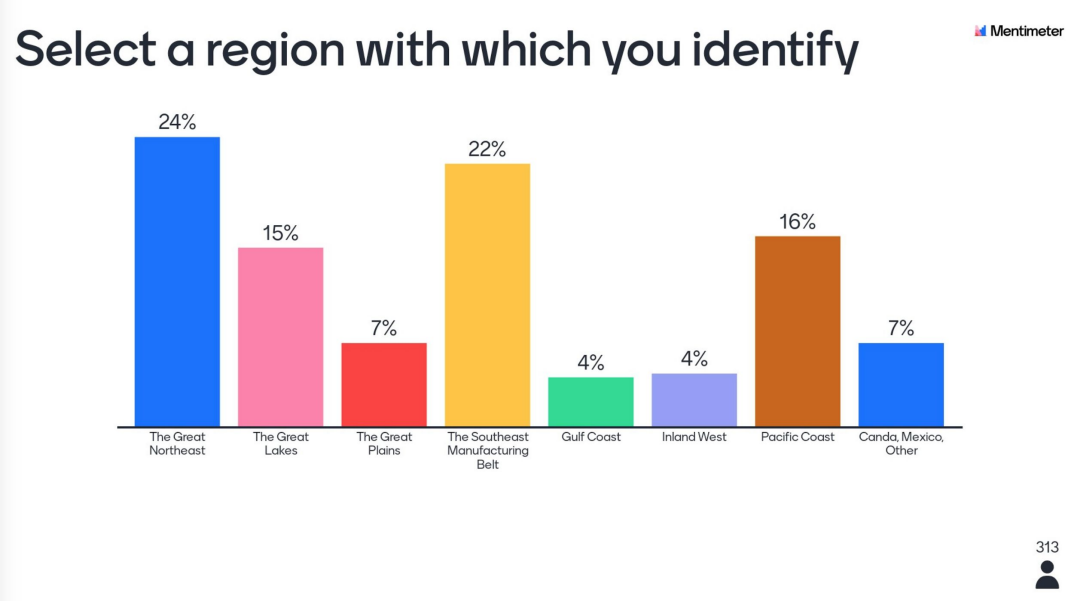
Go to **www.menti.com** and use the code **11 74 91**

Mentimeter

Select a region with which you identify

Go to www.menti.com Use **Code 11 74 91**

Educators From All Around



Educators From All Around

Implications related to:

- Identity
- Representation
- “Other”ing
- History
- Power
- Policies
- …

Go to www.menti.com and use the code 11 74 91

Mentimeter

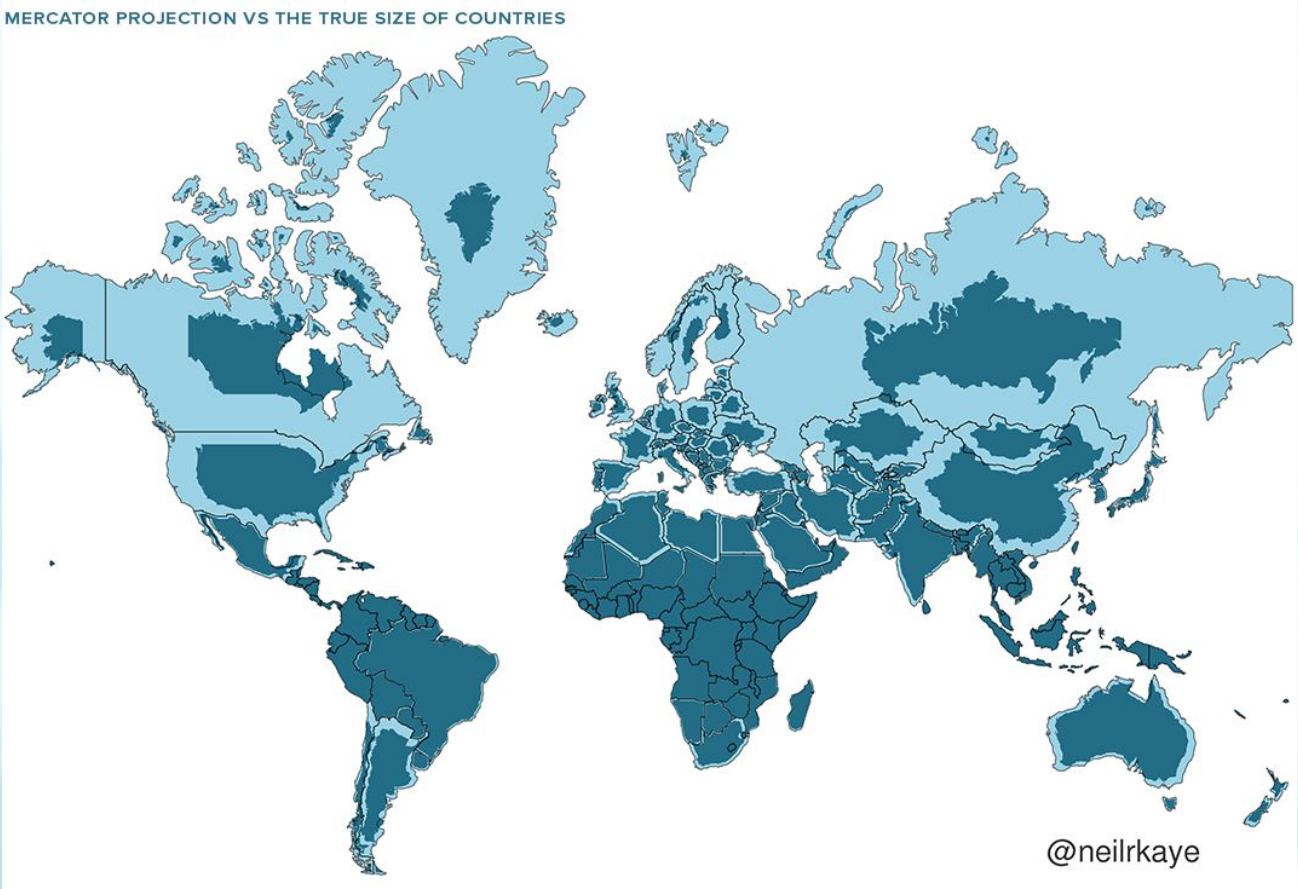
Select a region with which you identify

Options ?

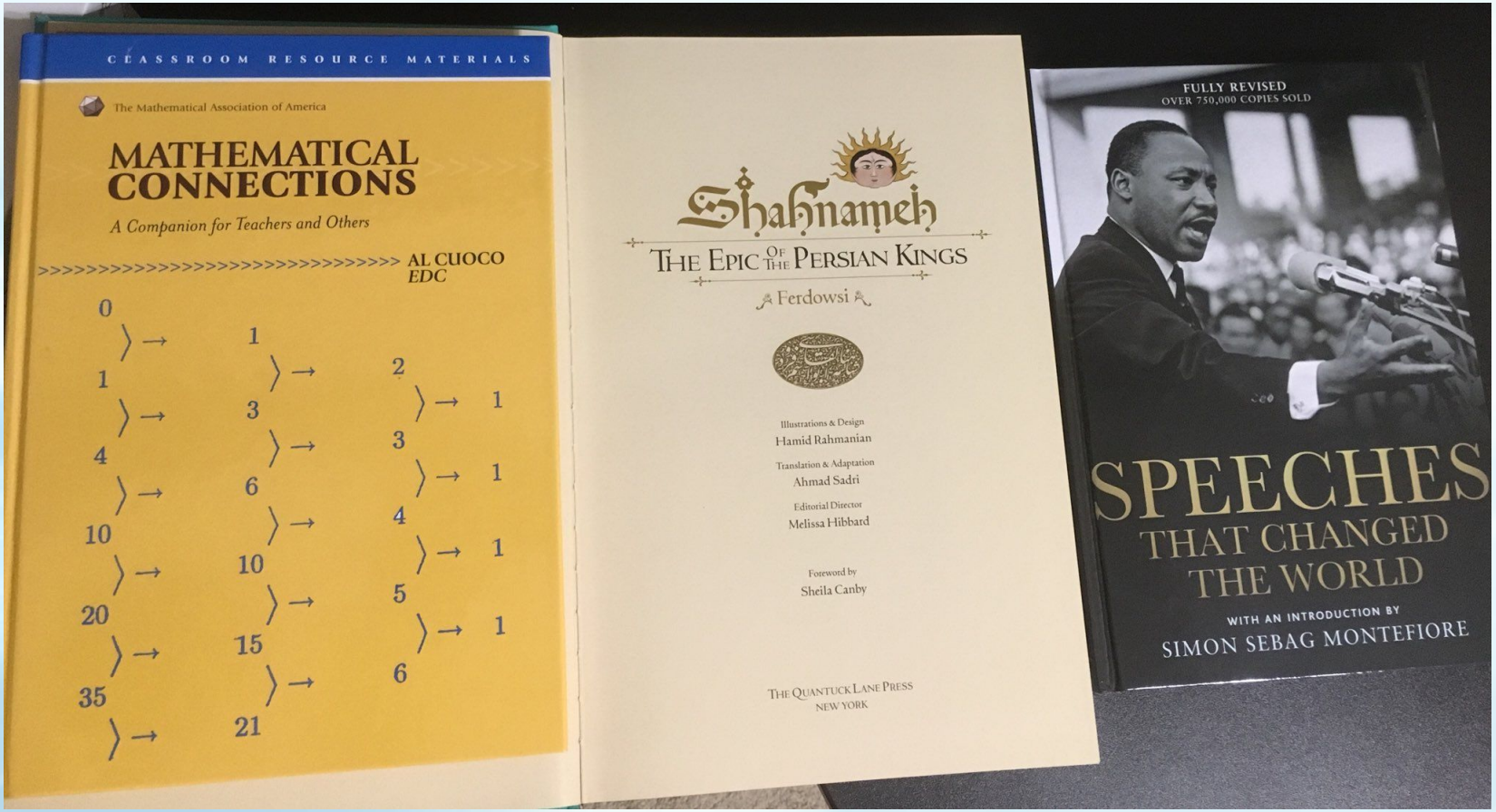
- The Great Northeast
- The Great Lakes
- The Great Plains
- The Southeast Manufacturing Belt
- Gulf Coast
- Inland West
- Pacific Coast
- Canda, Mexico, Other

Representation, Identity & History

Mathematical Connections and Implications



Complexity of Identity



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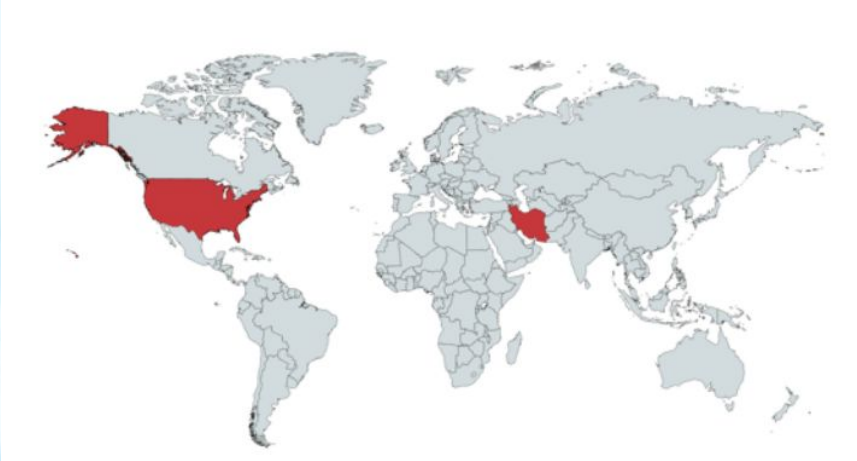

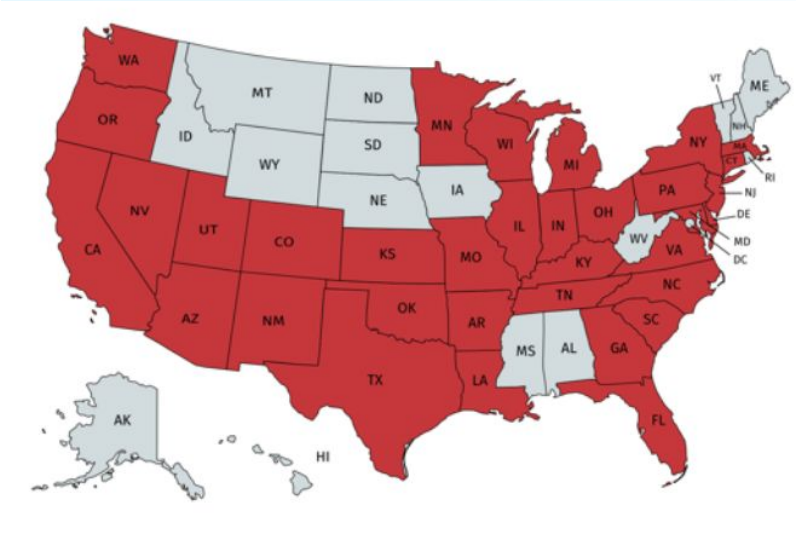

Complexity of Identity

Negin Farsad Retweeted

TED Talks @TEDTalks · 1d

"Islam doesn't explain me, Iranian poetry doesn't explain me, and apple pie doesn't explain me. And yet I understand all of those things." — comedian and @TEDFellow, @NeginFarsad

I'm an Iranian-American Muslim. Here's how that works
ideas.ted.com

Professional Commitment

Commitment to continue to educate ourselves and listen to the experts...Not just mathematically and pedagogically but also in ways to *rehumanize* mathematics education *for/with our students*!

Sociopolitical Turn

"The rush to move onto the next mathematical concept (or response to intervention procedure) almost ensures we will not ask *why* this concept? *Who* benefits from students learning this concept? What is *missing* from the mathematics classroom because I am required to cover this concept? How are students' *identities* implicated in this focus?

Indeed, we are at a moment in history where we have ready excuses not to attend to issues of identity and power in mathematics education - after all, what does power have to do with a rational, universal field like mathematics?" (Gutiérrez, R., 2013, p. 37)

VOLUME 44 | NUMBER 1 | JANUARY 2013

Journal for Research in Mathematics Education

EQUITY SPECIAL ISSUE

EDITORIAL

ARTICLES

NCTM NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Gutiérrez, R. (2013).
The sociopolitical turn in mathematics education.
Journal for Research in Mathematics Education,
Equity Special Issue 44(1), 37-68.

Sociopolitical Turn

"The sociopolitical turn signals the shift in theoretical perspectives that see knowledge, power, and identity as interwoven and arising from (and constituted within) social discourses. Adopting such a stance means uncovering the taken-for-granted rules and ways of operating that privilege some individuals and exclude others.

Those who have taken the sociopolitical turn seek not just to better *understand* mathematics education in all of its social forms but to *transform* mathematics education in ways that privilege more socially just practices."

(Gutiérrez, R., 2013, p. 40)

VOLUME 44 | NUMBER 1 | JANUARY 2013

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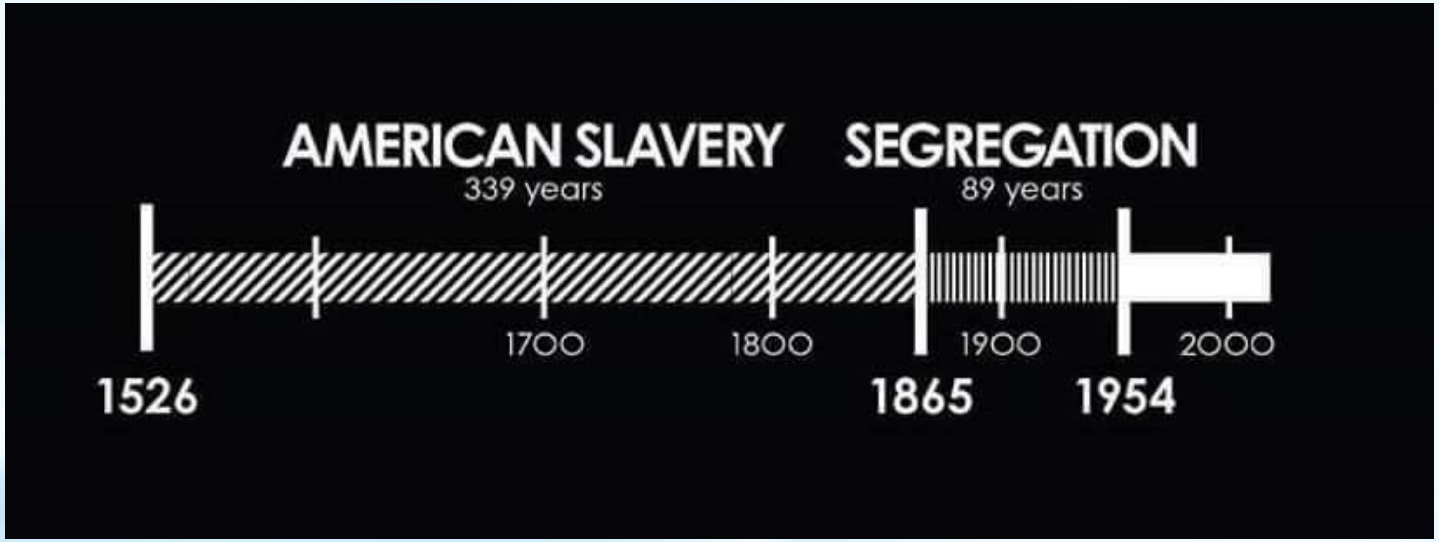
Context Matters



Human Connections
AND
Mathematical Content & Connections

Factors Influencing Identity

Go to **www.menti.com** and use the code **11 74 91**

Mentimeter

List factors that may influence identity

Go to www.menti.com Use **Code 11 74 91**

Factors Affecting Student Learning

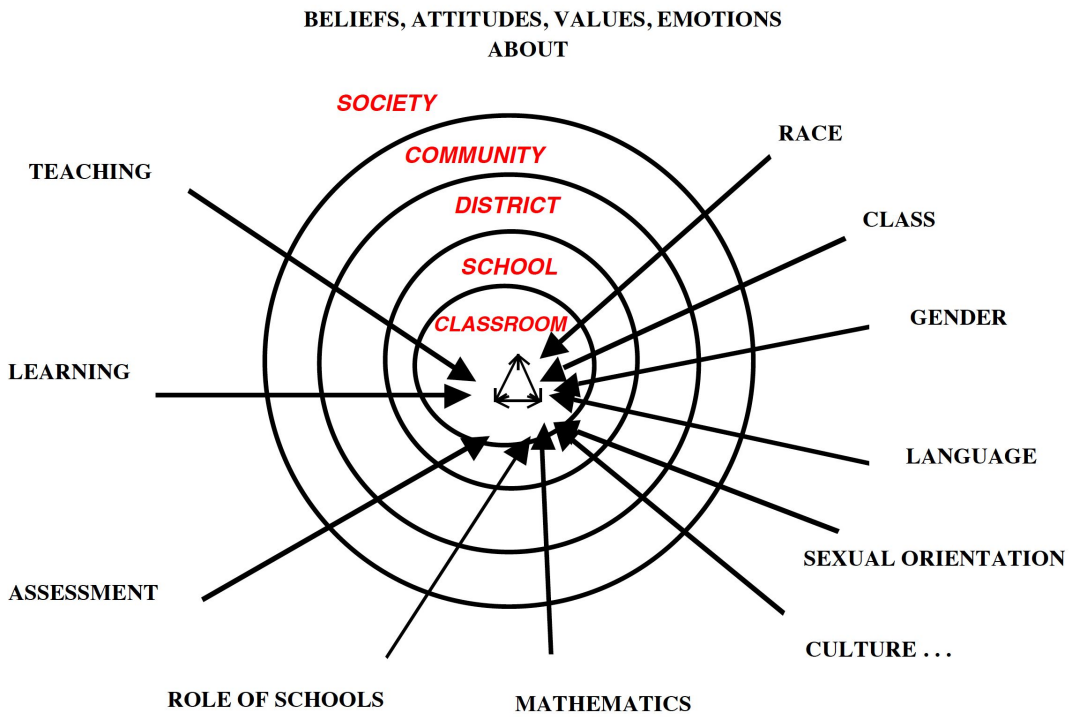
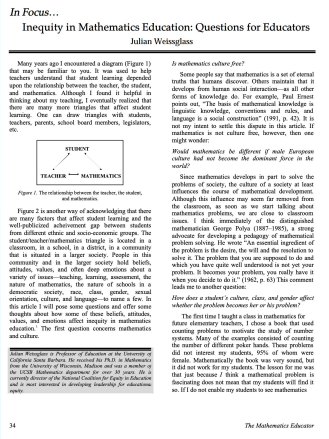


Figure 2. The many factors that affect student learning.



In Focus…

Inequity in Mathematics Education: Questions for Educators

Julian Weissglass

Many years ago I encountered a diagram (Figure 1) that may be familiar to you. It was used to help teachers understand that student learning depended upon the relationship between the teacher, the student, and mathematics. Although I found it helpful in thinking about my teaching, I eventually realized that there are many more triangles that affect student learning. One can draw triangles with students, teachers, parents, school board members, legislators, etc.

Figure 1. The relationship between the teacher, the student, and mathematics.

Figure 2 is another way of acknowledging that there are many factors that affect student learning and the well-publicized achievement gap between students from different ethnic and socio-economic groups. The student/teacher/mathematics triangle is located in a classroom, in a school, in a district, in a community that is situated in a larger society. People in this community and in the larger society hold beliefs, attitudes, values, and often deep emotions about a variety of issues—teaching, learning, assessment, the nature of mathematics, the nature of schools in a democratic society, race, class, gender, sexual orientation, culture, and language—to name a few. In this article I will pose some questions and offer some thoughts about how some of these beliefs, attitudes, values, and emotions affect inequity in mathematics education.[1] The first question concerns mathematics and culture.

Julian Weissglass is Professor of Education at the University of California Santa Barbara. He received his Ph.D. in Mathematics from the University of Wisconsin, Madison and was a member of the UCSB Mathematics department for 30 years. He is currently director of the Joint Coalition for Equity in Education, and is most interested in developing leadership for educational equity.

Is mathematics culture free?

Some people say that mathematics is a set of eternal truths that humans discover. Others maintain that it develops from human social interactions—as all other forms of knowledge do. For example, Paul Ernest points out, "The basis of mathematical knowledge is linguistic knowledge, conventions and rules, and language is a social construction" (1991, p. 42). It is not my intent to settle this dispute in this article. If mathematics is not culture free, however, then one might wonder:

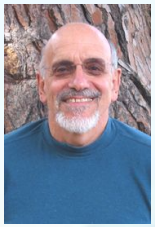
Would mathematics be different if male European culture had not become the dominant force in the world?

Since mathematics develops in part to solve the problems of society, the culture of a society at least influences the course of mathematical development. Although this influence may seem far removed from the classroom, as soon as we start talking about mathematics problems, we are close to classroom issues. I think immediately of the distinguished mathematician George Polya (1887–1985), a strong advocate for developing a pedagogy of mathematical problem solving. He wrote "An essential ingredient of the problem is the desire, the will and the resolution to solve it. The problem that you are supposed to do and which you have quite well understood is not yet your problem. It becomes your problem, you really have it when you decide to do it." (1962, p. 65) This comment leads me to another question:

How does a student's culture, class, and gender affect whether the problem becomes her or his problem?

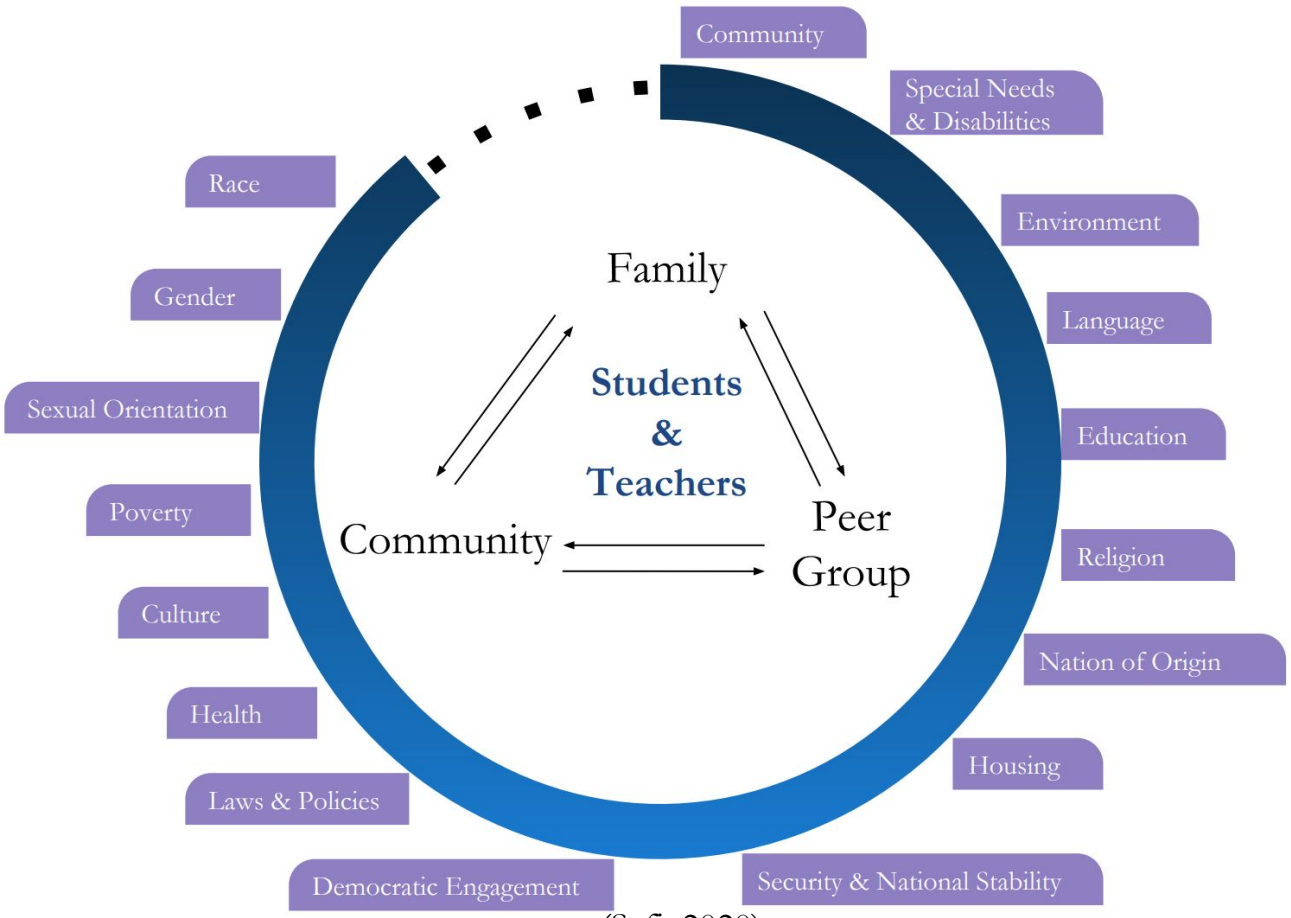
The first time I taught a class in mathematics for future elementary teachers, I chose a book that used counting problems to motivate the study of number systems. Many of the examples consisted of counting the number of different poker hands. These problems did not interest my students, 95% of whom were female. Mathematically the book was very sound, but it did not work for my students. The lesson for me was that just because *I* think a mathematical problem is fascinating does not mean that my students will find it so. If I do not enable my students to see mathematics

34 *The Mathematics Educator*



Weissglass, J. (2001). In focus... inequity in mathematics education: Questions for educators. The Mathematics Educator, 12(2).

Identity & *Some* Related Factors



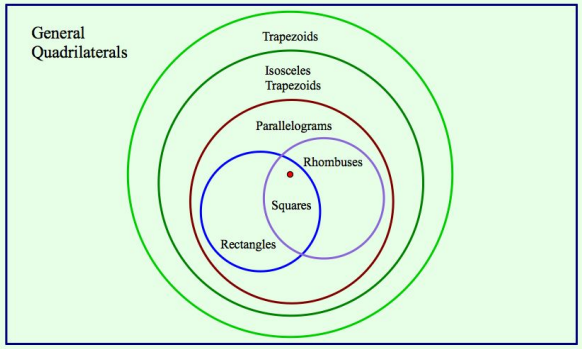
(Safi, 2020)

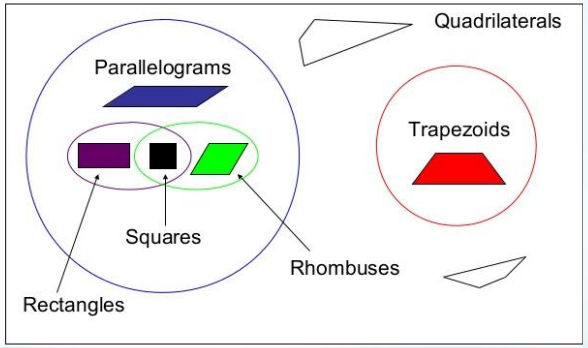
Classifications of Shapes

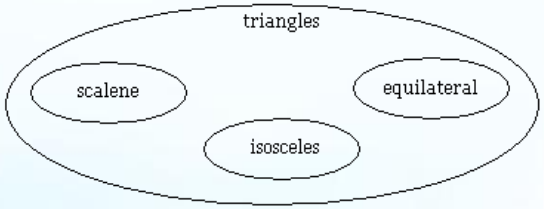
Emphasize

- Definitions
- Classifications
- Representations
- Characteristics
- Intersections

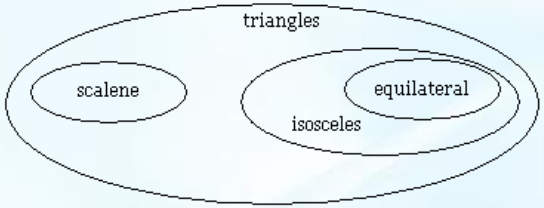
All Matter!







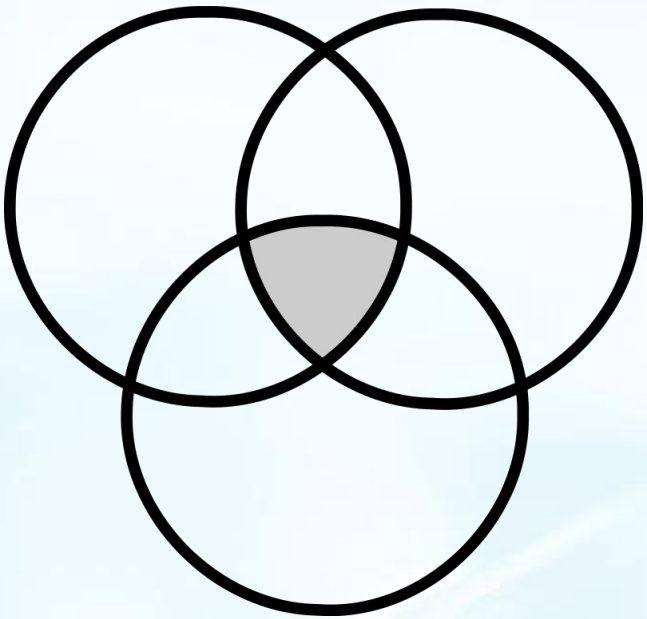
Exclusive



Inclusive

Identity & Intersections

What about *marginalization* and *oppression* taking place at multiple intersections?



- Race
- Language
- Nation of Origin
- Religion
- ...

- Gender
- Sexual Orientation
- Health
- Natural Disasters
- Poverty

Identity & Intersections

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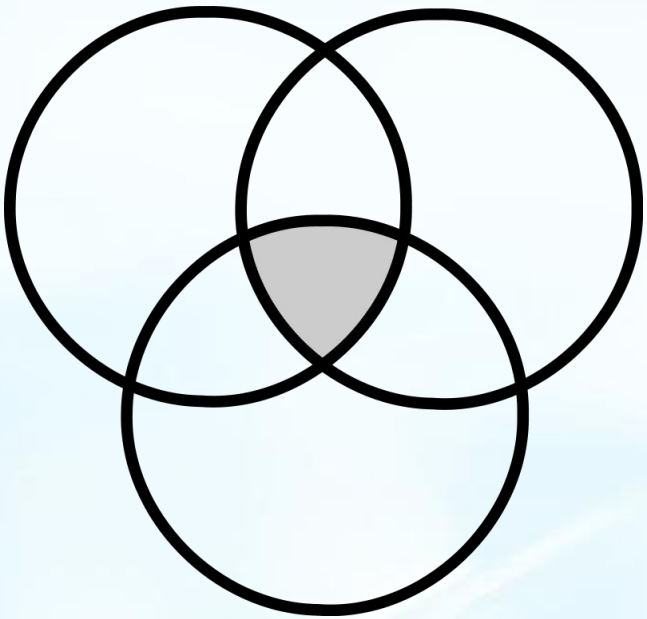

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- Language
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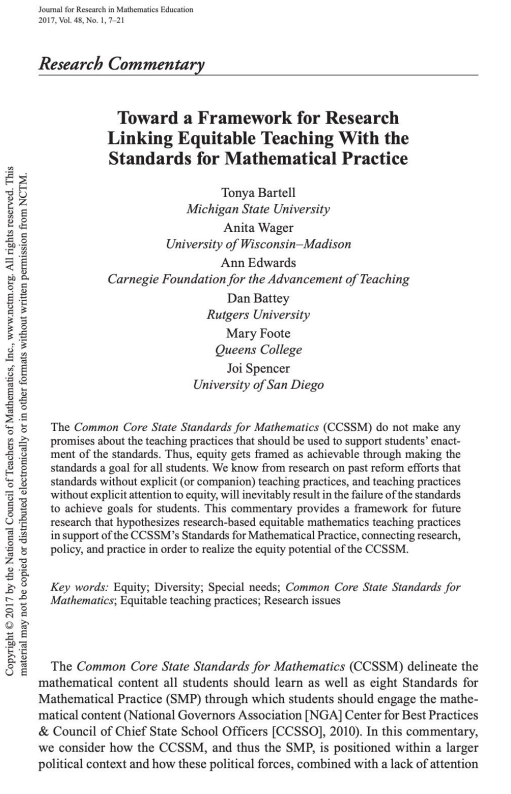
- Natural Disasters
- Poverty

My story is NOT unique!

Equitable Mathematics Teaching Practices

Equitable Mathematics Teaching Practices (Bartell, et. al, 2017)
1. Draw on students' funds of knowledge
2. Establish classroom norms for participation
3. Position students as capable
4. Monitor how students position each other
5. Attend explicitly to race and culture
6. Recognize multiple forms of discourse and language as a resource
7. Press for academic success
8. Attend to students' mathematical thinking
9. Support development of a sociopolitical disposition



Journal for Research in Mathematics Education
2017, Vol. 48, No. 1, 7–21

Research Commentary

Toward a Framework for Research Linking Equitable Teaching With the Standards for Mathematical Practice

Tonya Bartell
Michigan State University
Anita Wager
University of Wisconsin–Madison
Ann Edwards
Carnegie Foundation for the Advancement of Teaching
Dan Battey
Rutgers University
Mary Foote
Queens College
Joi Spencer
University of San Diego

The *Common Core State Standards for Mathematics* (CCSSM) do not make any promises about the teaching practices that should be used to support students' enactment of the standards. Thus, equity gets framed as achievable through making the standards a goal for all students. We know from research on past reform efforts that standards without explicit (or companion) teaching practices, and teaching practices without explicit attention to equity, will inevitably result in the failure of the standards to achieve goals for students. This commentary provides a framework for future research that hypothesizes research-based equitable mathematics teaching practices in support of the CCSSM's Standards for Mathematical Practice, connecting research, policy, and practice in order to realize the equity potential of the CCSSM.

Key words: Equity; Diversity; Special needs; *Common Core State Standards for Mathematics*; Equitable teaching practices; Research issues

The *Common Core State Standards for Mathematics* (CCSSM) delineate the mathematical content all students should learn as well as eight Standards for Mathematical Practice (SMP) through which students should engage the mathematical content (National Governors Association [NGA] Center for Best Practices & Council of Chief State School Officers [CCSSO], 2010). In this commentary, we consider how the CCSSM, and thus the SMP, is positioned within a larger political context and how these political forces, combined with a lack of attention

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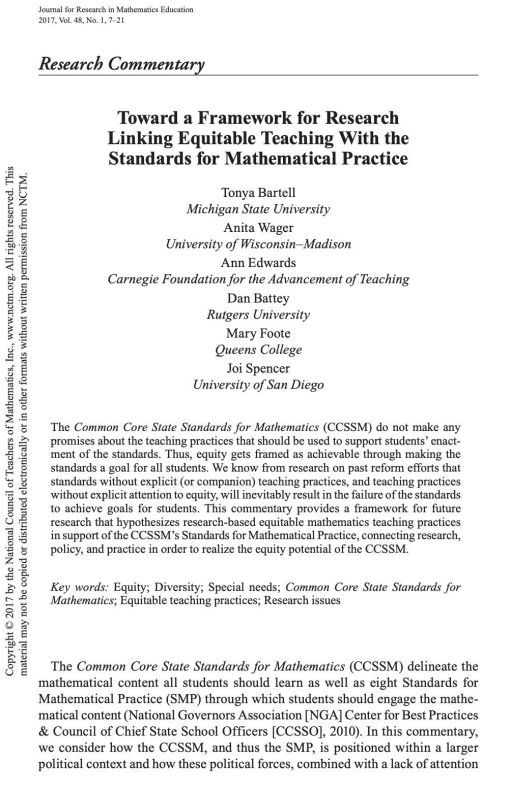

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Equitable Mathematics Teaching Practices

Table 1
Equitable Mathematics Teaching Practices

Equitable practice	Examples of the practice
1. Draw on students' funds of knowledge	• Build on community and cultural knowledge and practices (Civil, 2007) • Recognize students' cultural and linguistic resources (Gay, 2002; Ladson-Billings, 1995) • Have robust knowledge of students, validate shared ideas and experiences, and connect instruction to students' experiences and interests (Aguirre et al., 2013; Bartell, 2011; Hedges, Cullen, & Jordan, 2011; Wager, 2012)
2. Establish classroom norms for participation	• Recognize that student voice has implications for power and authority and builds agency (Cobb & Hodge, 2007; Turner, Dominguez, Maldonado, & Empson, 2013) • Set up and guide discussions so that students from nondominant backgrounds develop strong mathematical identities (Hodge, 2006) • Connect pedagogical practices to student participation (Boaler & Greeno, 2000; Wager, 2014) • Question whose participation norms are valorized (Planas & Gorgorió, 2004)
3. Position students as capable	• Construct social structures that enable students to "develop strategies that help maintain certain positions and reduce others" (Planas & Civil, 2010, p. 145) • Challenge and counteract societal stereotypes and inequities to which students and communities are subjected (Bartell, 2011; Gay, 2002; Ladson-Billings, 1995) • Attend to how the curriculum may influence perceptions of students (Atweh, Bleicher, & Cooper, 1998) • Share power in the classroom by allowing students to provide meaningful input in making decisions about classroom practices, curriculum, and assessment (Cornelius & Herrenkohl, 2004; Sheets, 2005)
4. Monitor how students position each other	• Assign competence to support students' repositioning of one another (Cohen, Lotan, Scarloss, & Arellano, 1999; Featherstone et al., 2011) • Attend to reification of existing status structures so as to reposition some students with their peers (Forman & Ansell, 2002) • Position students to use one another as mathematical resources (Dunleavy, 2015)
5. Attend explicitly to race and culture	• Make connections to students' mathematical, racial, and cultural identities (Battey, 2013; Martin, 2007) • Recognize that certain groups have been positioned as anti-intellectual (Martin, 2009; Steele, 2003)

Table 1 (continued)
Equitable Mathematics Teaching Practices

Equitable practice	Examples of the practice
6. Recognize multiple forms of discourse and language as a resource	• Facilitate respect among students by cultivating culturally responsive relationships among students and validating possible differences in their language practices (Moschkovich, 2013) • Coconstruct resources with students in moment-to-moment interactions around mathematics (Dominguez, 2014) • Consider linguistic choices and acknowledge home language as a valid language of mathematics (Meaney, 2005; Setati, 2005) • Bridge language practices through affirming students' home languages, modeling code switching, and fostering interactional patterns familiar to students (Brenner, 1998; Howard, 2001; Lee, 1995)
7. Press for academic success	• Assess student learning, build on student strengths, explicitly communicate expectations for students, and communicate the teachers' responsibility in student success (Morrison, Robbins, & Rose, 2008) • Have high academic expectations while maintaining students' cultural and psychological well-being rather than accept deficit views about students' intellectual potential (Fine, 1986; Fordham, 1988)
8. Attend to students' mathematical thinking	• Recognize, understand, and build from children's understanding of mathematics (Carpenter, Fennema, Franke, Levi, & Empson, 1999) • Respond to developmental needs so as not to expect a student to do mathematics they are not developmentally ready for (Jackson, 2009)
9. Support development of a sociopolitical disposition	• Incorporate critical texts, discuss controversial topics, serve the community, and allow social issues to drive instruction (Hickling-Hudson & Ahlquist, 2003; Hyland, 2005; Tate, 1995) • Provide opportunities to explore sociopolitical topics using mathematics (Frankenstein, 2012; Gates & Jorgensen, 2009) • Engage students in conversation about real-world problems and how mathematics can be used to examine them (Gutstein, 2006; Skovsmose, 1994)

Bartell, T., Wager, A., Edwards, A., Battey, D., Foote, M., & Spencer, J. (2017). Toward a Framework for Research Linking Equitable Teaching With the Standards for Mathematical Practice, Journal for Research in Mathematics Education JRME, 48(1), 7-21.

History Should Be a Guide

Oppression, *Colonialism*, & *Militarization* are not new….
and they are not unique to the United States of America.

Let history be our guide, our teacher and our ally in uniting our efforts to bring about change!

Finding Solutions to Inequalities

Properties of Inequality

$$If\ a > b,\ then\ a + c > b + c$$

$$If\ a > b,\ then\ a - c > b - c$$

$$\begin{aligned} If \quad & x - 3 > 5 \\ then \quad & x - 3 + 3 > 5 + 3 \\ & x > 8 \end{aligned}$$

Finding Solutions to Inequalities

Properties of Inequality

$$If\ a > b,\ then\ a + c > b + c$$

$$If\ a > b,\ then\ a - c > b - c$$

$$\begin{aligned} If \quad & x - 3 > 5 \\ then \quad & x - 3 + 3 > 5 + 3 \\ & x > 8 \end{aligned}$$

Properties of *Systemic* Inequality*

$$If\ a > b,\ then\ a + c^n >>>> b - c^n$$

Importance of Dissonance

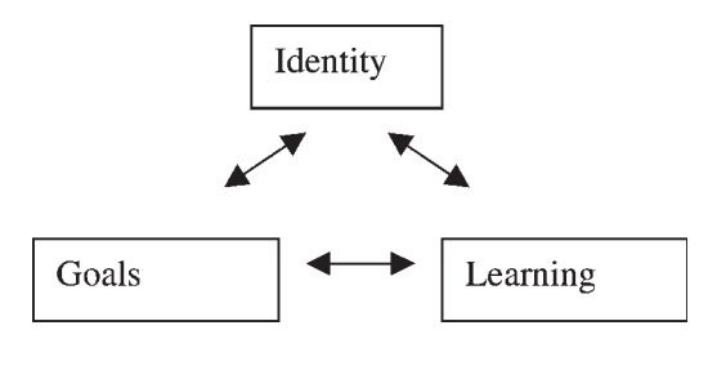
Often times as teachers we would like our students to examine the content from a new perspective - *Cognitive Dissonance* for our students!

How about some *Professional Dissonance* for us as teachers and educators?

Identity, Goals & Learning

"It may be useful for future research to explore how sequences of schooling practices for African American and other minority students form a developmental trajectory and how the practices afford new kinds of engagement, imagination, and alignment."

(Nasir, 2002, pg. 243)



Na'ilah Suad Nasir (2002)
Identity, Goals, and Learning: Mathematics in Cultural Practice, Mathematical Thinking and Learning, 4:2-3, 213-247

Diversity & Inclusion

"Diversity and inclusion has not caught us off guard.
It's been ongoing for years.
If we can quickly respond to COVID, why have we failed to respond *at all* to diversity and inclusion?"

(Childs, June 2020)

Kristopher J. Childs (June 13, 2020)
Beyond the Statement: An Educational Leaders Guide to Organizational Diversity and Inclusion Commitments

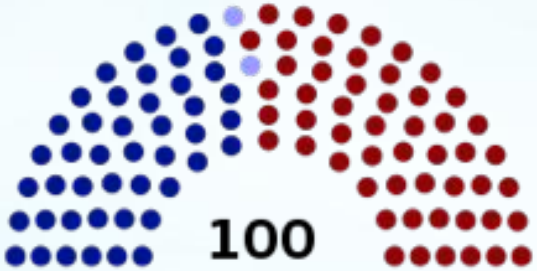
Definition

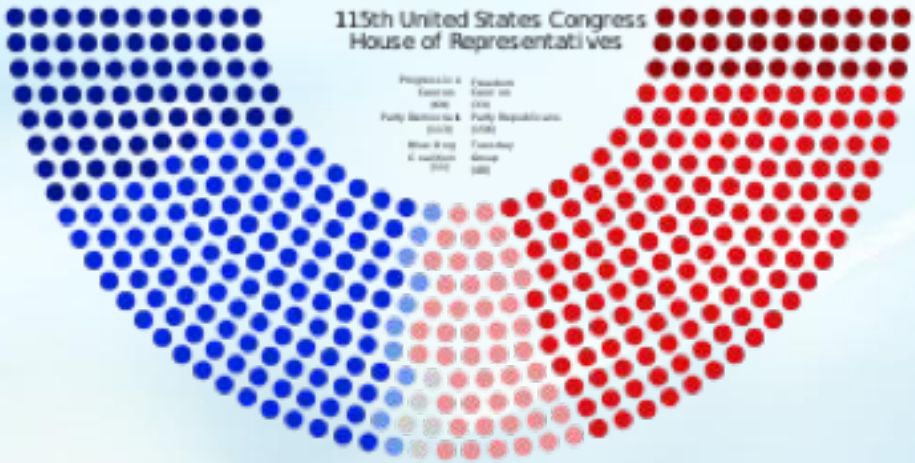
In the Chat section,

In your own words, provide a definition for the concept of "majority".

Majority in Context

Majority in Context





Implications for Equitable Teaching

We need to look *within* ourselves,

Listen, Listen More Deeply,..., Process, Reflect

so that we can look *outward* and *look out* for/with

- our students,
- our colleagues,
- our communities

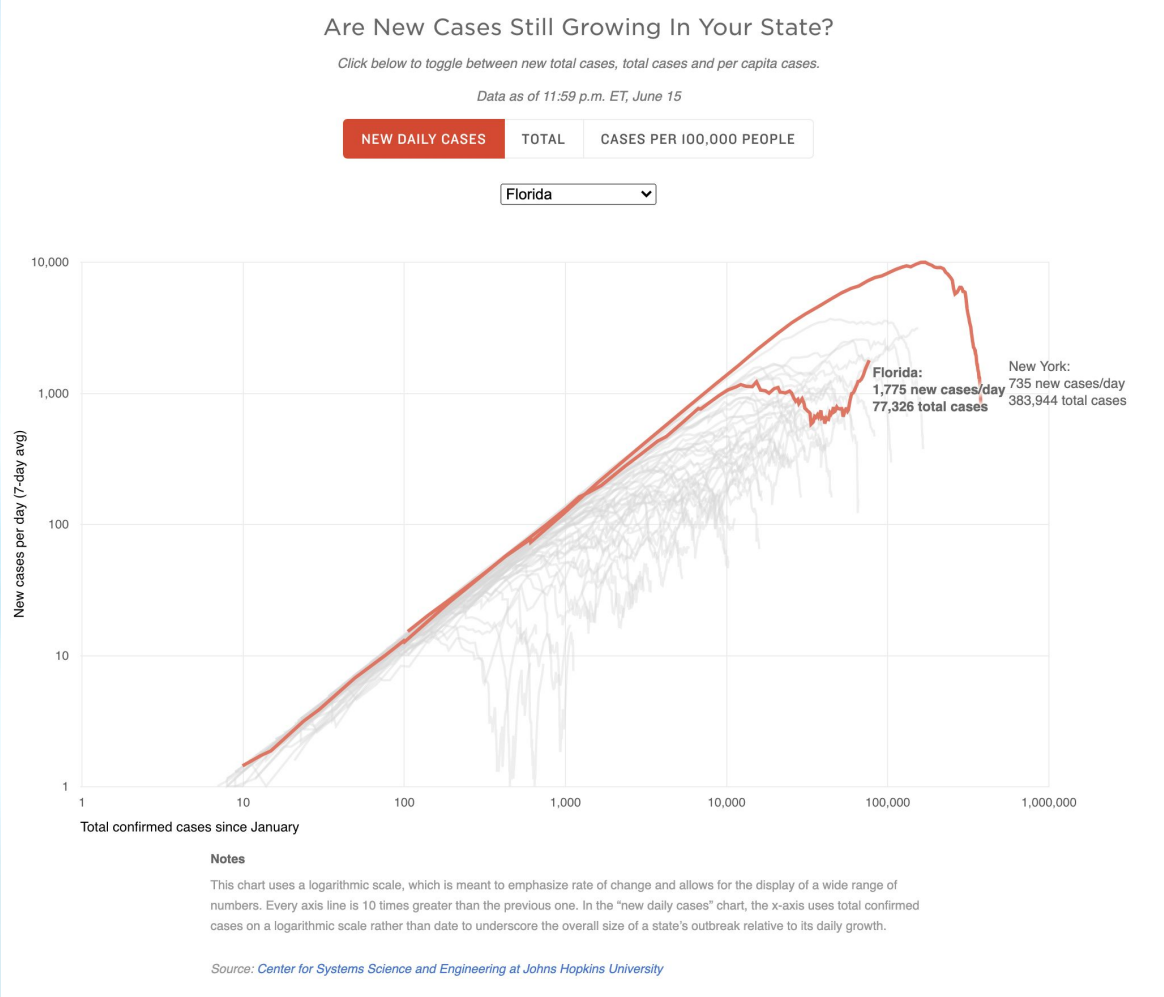
Content & Connections

Content

- Graphs
- Logs
- Scale
- Unit Rate
- Rate(s) of Change
- Concavity
- Local vs. Absolute Extrema

Connections

- Public Health
- Effect on Communities
- Disproportionate Impact on POC
- Economic Implications
- Planning for Schools
- Care
- Elderly
- Access to Resources
- ...



Human Connections & Math Content

Connections

- Public Health
- Effect on Communities
- Disproportionate Impact on POC
- Economic Implications
- Planning for Schools
- Care
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Content

- Graphs
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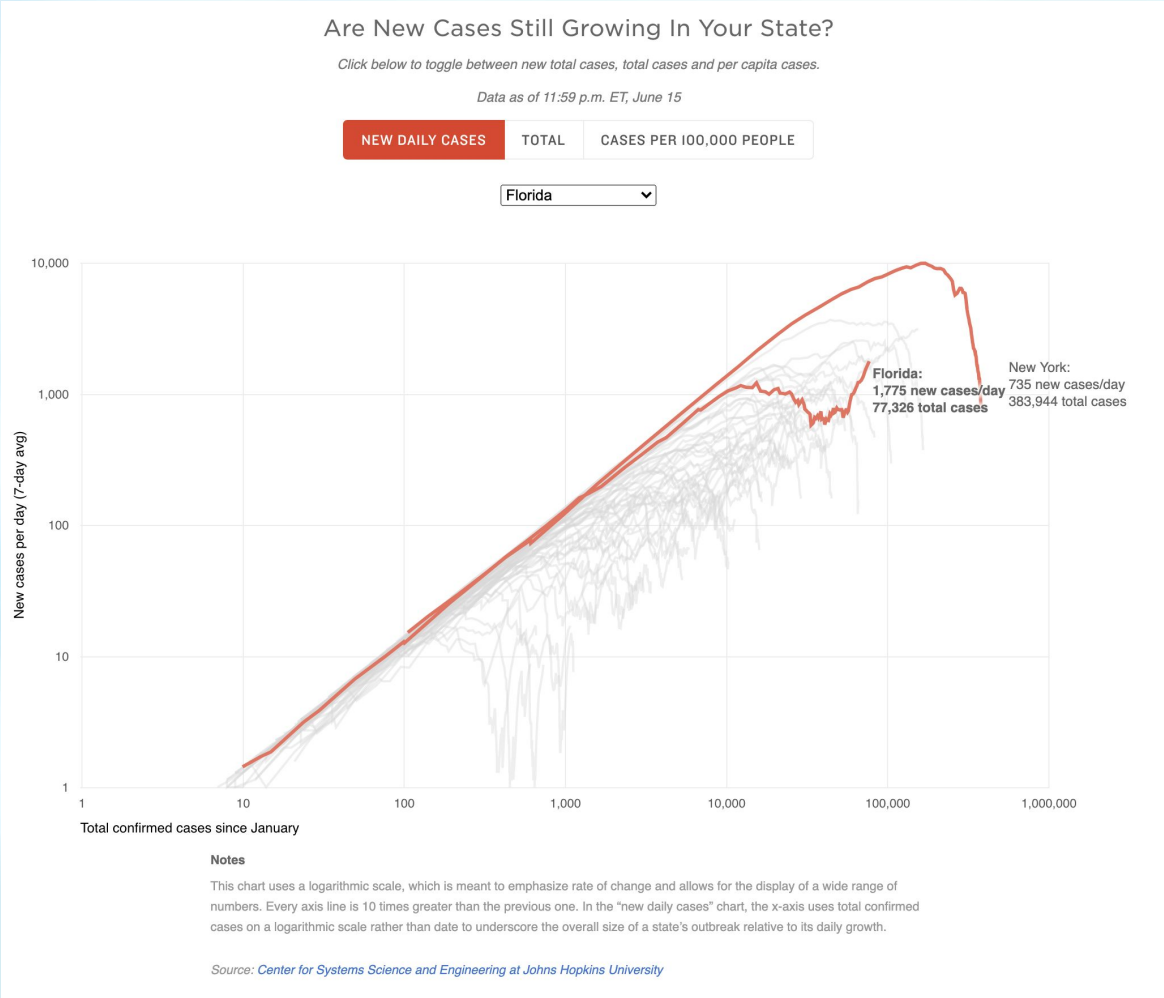

Concepts in Context

The official Florida site says there are more than 1.3 million "total people tested" in Florida, of which about 73,500 were positive, resulting in an **"overall percent positive" rate of 5.4%**.

...

She says that on the state's dashboard, any person who tests positive will be counted as a positive test only once, no matter how many times they test positive. But a person who tests negative will be counted over and over again each time they test negative for the coronavirus.

Jones says that because **many residents, such as health care workers, require repeated testing, the state's dashboard is artificially deflating the true positivity rate**.

"They're adding their total test figures instead of their total people, which makes their percent positive extremely low," she says.

Fired Florida Data Scientist Launches A Coronavirus Dashboard Of Her Own

June 14, 2020 · 9:36 AM ET

LAUREL WAMSLEY

Rebekah Jones says she was fired after she refused to manipulate coronavirus data at the Florida Health Department. Now she has launched her own COVID-19 data portal for the state.

Screenshot by NPR/ Florida's Community Coronavirus Dashboard

https://**www.npr.org/2020/06/14**/876584284/fired-florida-data-scientist-launches-a-coronavirus-dashboard-of-her-own?utm_campaign=storyshare&utm_source=twitter.com&utm_medium=social

Fractions/Decimals/Percents

CCSS.MATH.CONTENT.4.NF.A.2

Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

CCSS.MATH.CONTENT.7.RP.A.3

Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

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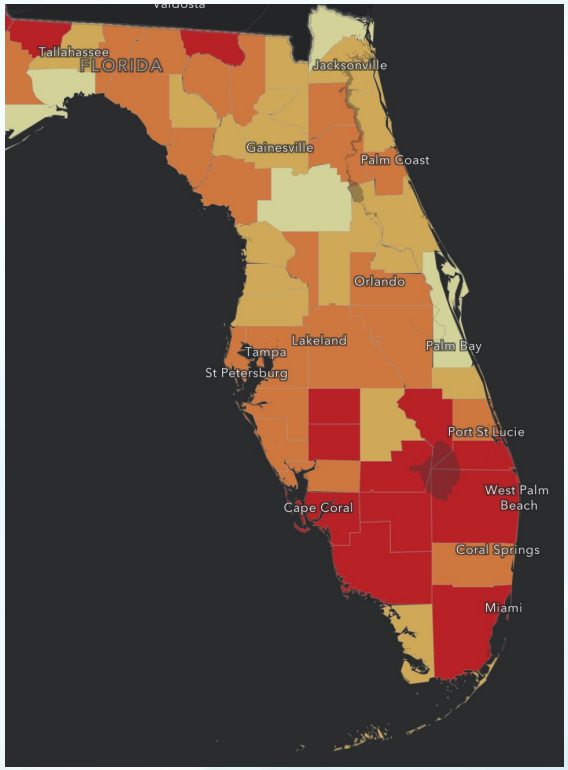
Fractions/Decimals/Percents

People Tested
901,330

Negative
824,166

Positive
75,568



TESTING DATA FOR ORANGE

Does **percent positive of all** *people* **tested** meet criteria for Phase I? **YES**

Does percent positive by DOH's *new and misleading* **calculation** meet criteria for Phase I? **YES**

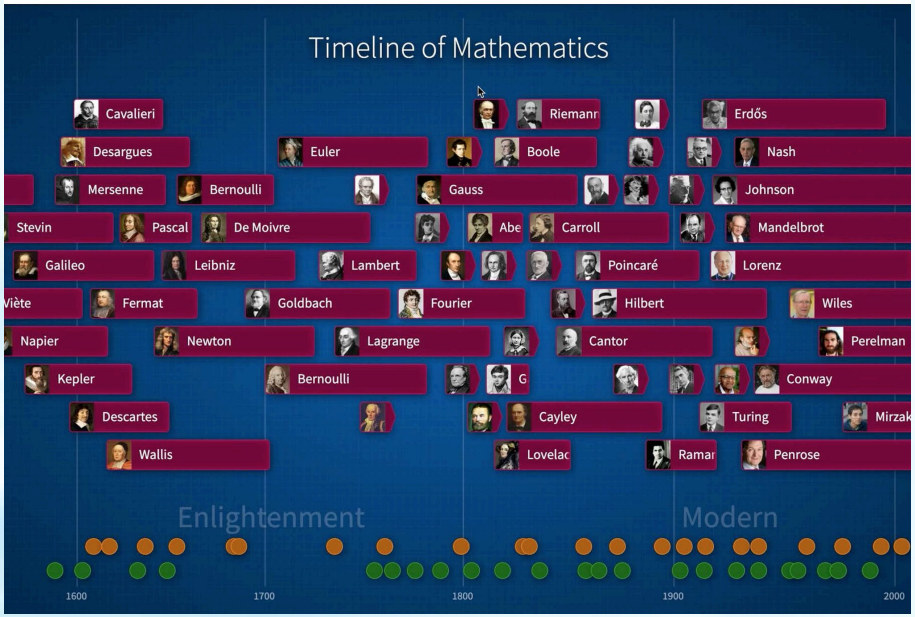
Testing Data Details:

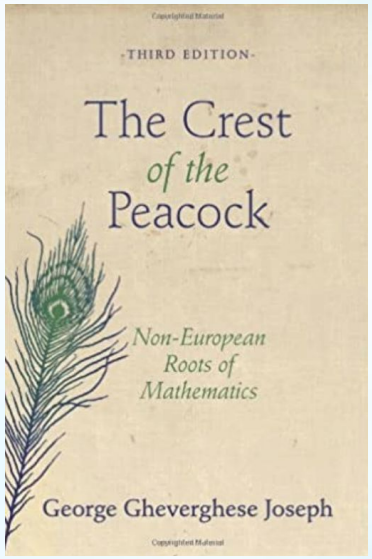
Total People Tested: 62,461

Total People Positive: 3,130

Total Tests (*including duplicates and re-tests*): 94,627
Percent of all tests that are duplicates/retests: 34.0%

Who is Represented? Marginalized?





Our world & our communities can not afford to continue to exclude, marginalize, and devalue the brilliance of our students, our future teachers & leaders and their identities!

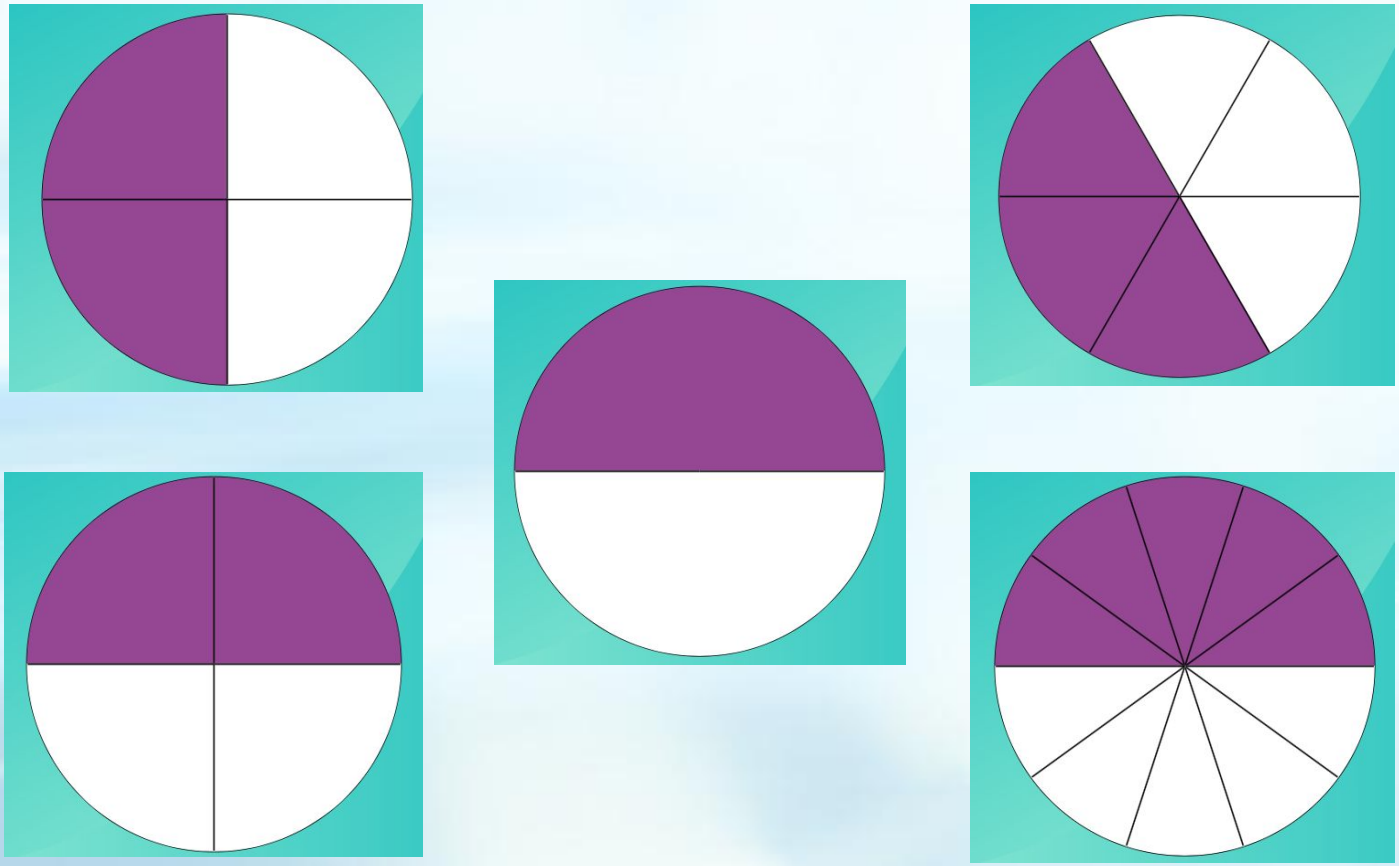
Equal, Equivalent, or Neither?

Several factors play a role in our reasoning about equal vs. equivalent including:

- Composition & Decomposition
  - Numbers
  - Fractions
  - Geometric Shapes
- Partitioning
- Orientation
- Measurement

Equal, Equivalent, or Neither?

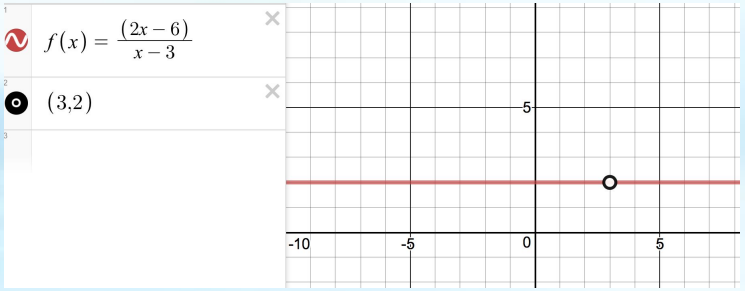
Equal, Equivalent, or Neither?



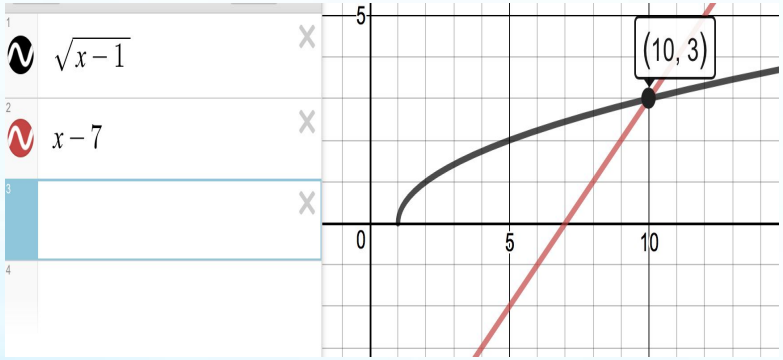
Equal, Equivalent, or Neither?

Equal, Equivalent, or Neither?

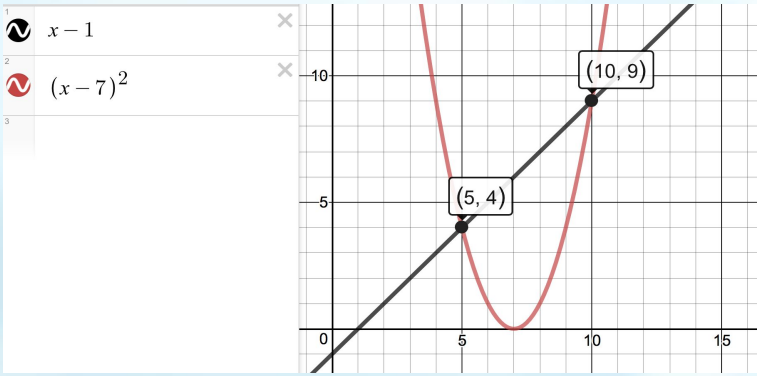
$$y = \frac{2x-6}{x-3}, \qquad y = 2$$



$$\sqrt{x-1} = x - 7$$



$$x - 1 = (x-7)^2$$

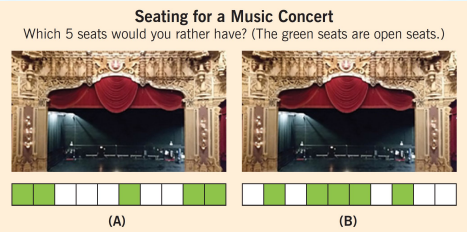


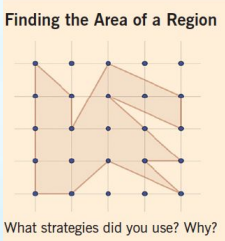
Engaging Students in Mathematical Reasoning

Mathematics presents a playground for us to explore, analyze and reflect on the possible consequences of our actions & inactions!

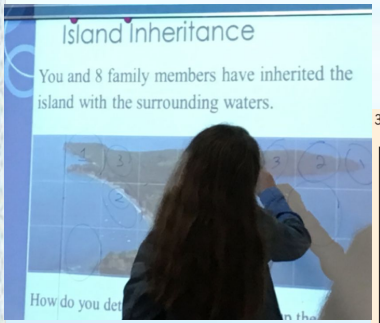
NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CELEBRATING 100 YEARS

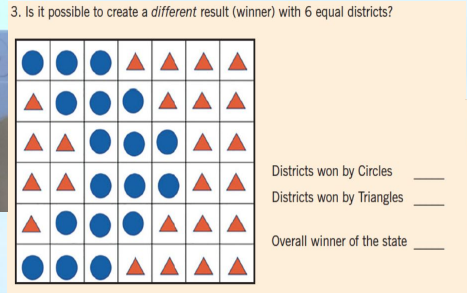
Gerrymandering: When Equivalent Is Not Equal!

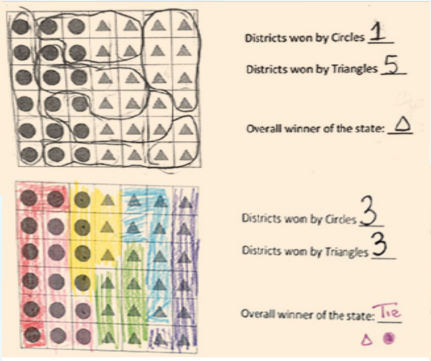


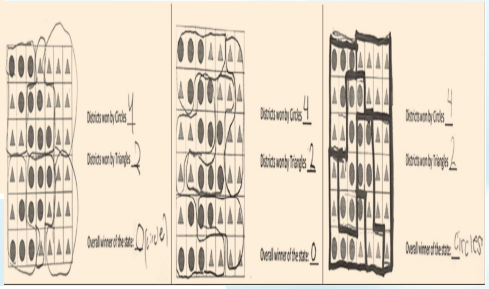


Farshid Safi, Sarah B. Bush, & Siddhi Desai. (2018)
Gerrymandering: When Equivalent Is Not Equal!
Mathematics Teaching in the Middle School, 24(2), 82-89.





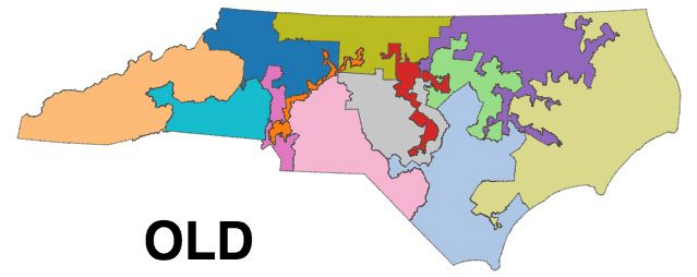




@FarshidSafi #NCTM100 فرشيد صفى

Gerrymandering: When Equivalent Is Not Equal!

- What are the potential mathematical and societal impacts of reconfiguring districts so that a particular group is more likely to win the state election?
- Why is it important to understand the mathematics in grouping, regrouping, and decomposing and recomposing geographical regions?
- When we think about the Gerrymandering Task, how can understanding the context empower or potentially lead to a disenfranchisement of groups throughout society?



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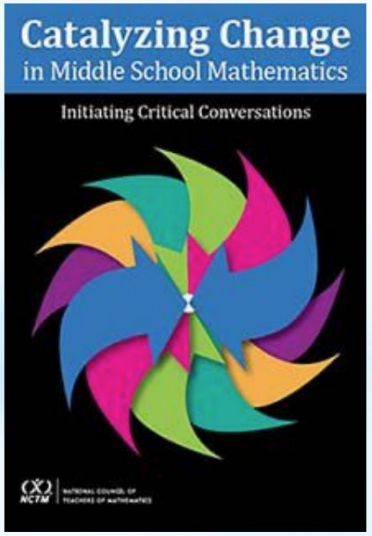
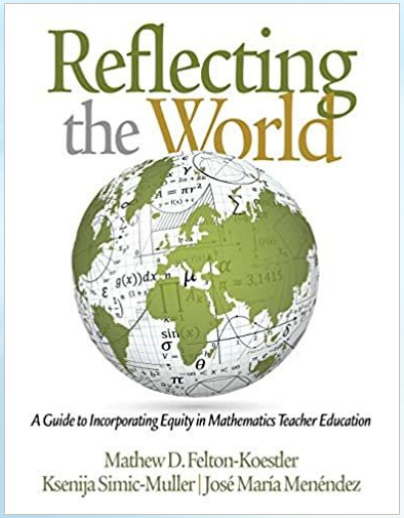
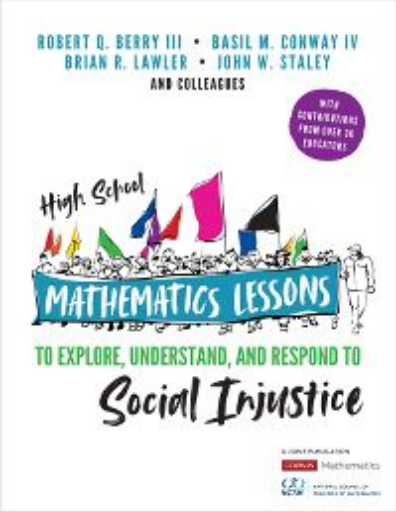
Catalyzing Change
in High School Mathematics
Initiating Critical Conversations


Catalyzing Change
in Middle School Mathematics
Initiating Critical Conversations


Catalyzing Change
in Early Childhood and Elementary Mathematics
Initiating Critical Conversations


Reflecting
the World
A Guide to Incorporating Equity in Mathematics Teacher Education
Mathew D. Felton-Koestler
Ksenija Simic-Muller | José María Menéndez


ROBERT Q. BERRY III • BASIL M. CONWAY IV
BRIAN R. LAWLER • JOHN W. STALEY
AND COLLEAGUES
High School
MATHEMATICS LESSONS
TO EXPLORE, UNDERSTAND, AND RESPOND TO
Social Injustice

Logical Statements

We talk about importance of logic in learning mathematics

Voters → Politicians & Policies

Politicians & Policies → Voters

KeyConcept Related Conditionals

Words	Symbols	Examples
A conditional statement is a statement that can be written in the form *if p, then q.*	$p \rightarrow q$	If $m\angle A$ is 35, then $\angle A$ is an acute angle.
The **converse** is formed by exchanging the hypothesis and conclusion of the conditional.	$q \rightarrow p$	If $\angle A$ is an acute angle, then $m\angle A$ is 35.
The **inverse** is formed by negating both the hypothesis and conclusion of the conditional.	$\sim p \rightarrow \sim q$	If $m\angle A$ is *not* 35, then $\angle A$ is *not* an acute angle.
The **contrapositive** is formed by negating both the hypothesis and the conclusion of the converse of the conditional.	$\sim q \rightarrow \sim p$	If $\angle A$ is *not* an acute angle, then $m\angle A$ is *not* 35.

KeyConcept Logically Equivalent Statements

- A conditional and its contrapositve are logically equivalent.
- The converse and inverse of a conditional are logically equivalent.

Personal & Professional Commitment

Keeping **"in our minds and in our hearts"** ….

Good start but not good enough to address and fundamentally dismantle the systemic and institutionalized aspects that impact our students, colleagues, and communities!

Keeping **"in our actions"** to start with ourselves, our students, our network of colleagues including family/friends and addressing long standing aspects of marginalization within our own communities!

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
CELEBRATING 100 YEARS

Promote Equitable Teaching Practices AND Focus on Content & Connections: Don't Settle For Only One!

To Continue Our Conversation:

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College of Community Innovation and Education

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