When 2+2 Is So Much More Than Four:

Integrating Social Justice into Advanced Mathematics Classes

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When 2 + 2 Is So Much More Than Four:

1. Introductions
2. The “ME” Work
3. The “WE” Work
4. The “MATH” Work
5. The MATH Works”
6. Closing
7. Resources
Introductions

01 Norms
   Guidelines for our Session

02 Purpose of Social Justice through the Lens of Math

03 Our Stories
   We all need to be willing to be vulnerable.
Norms

- Importance
- Creation
- Visibility
- Evolving
A social justice priority in mathematics education is to openly challenge deficit thinking and the institutional tools and practices that perpetuate static views about children and their mathematics competencies.
Question

Is mathematics “neutral”, or is it connected with social justice?
If teachers truly integrate students’ real-worlds in classrooms, mathematics cannot be neutral to the true reality experienced by students (Fasheh, 1997).

Students are inclined to engage ill-defined problems since they related to conflicts they are likely to encounter in their lives (Gutstein, 2006).
My goal is helping students see themselves as “doers” of mathematics.

“Equity is ultimately about the distribution of power – power in the classroom, power in future schooling, power in one’s everyday life, and power in a global society” (Gutiérrez, 2009)

*Just Equations* - Pamela Burdman
Student Impacts

“When math is embedded in important issues — from racial disparities in school expulsions to the rate of global warming — every child has a contribution to make and a stake in the answers. This is “real-world” math, not calculations about which train gets to the station first,” (Pamela Burdman)

Math is for everyone!
The “ME” Work

01 THINK - INK - PAIR - SHARE
Why? Attempts? What holds you back?

02 Biases

03 Dispositions
Our Journeys
Common Understanding:

1. What is Social Justice?
2. Classroom Integration?
3. Share Responses - Padlet
Reflect on the Lesson(s)

1. How does my lesson enable students to closely explore and analyze math concept(s), procedure(s), and reasoning strategies?
2. How does my lesson make student thinking/understanding visible and deep?
3. How does my lesson create opportunities to discuss mathematics in meaningful and rigorous ways (e.g. debate math ideas/solution strategies, use math terminology, develop explanations, communicate reasoning, and/or make generalizations)?
4. How does my lesson distribute math knowledge authority, value student math contributions and address status differences among my students?
5. How does my lesson help students connect mathematics with relevant/authentic situations in their lives?
6. How does my lesson support students’ use of mathematics to understand, critique, and change an important equity or social justice issue in their lives?
Reflect on the Lesson(s)

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1. How does my lesson help students connect mathematics with relevant/authentic situations in their lives?

1. How does my lesson support students’ use of mathematics to understand, critique, and change an important equity or social justice issue in their lives?
Challenges of Teaching Social Justice Thru a Math Lens
Think - Ink - Pair - Share

THINK - INK
1) Why do you want to do the work of Social Justice
2) What have you tried
3) What holds you back?
4) No, really...What holds you back?

PAIR - SHARE
1) Introduce Yourself
2) Share, Push Your Comfort Zone
IGNITE!
Dispositions

Think about a typical day - think of the choices you make, and then codify where they came from.
The “WE” Work

01 Getting to Know the Students
Math - Ographies & I am From Poems

02 Formative Assessments
Beyond an Interest Inventory...

1. Frankenstein’s Mathematician
2. Math-ography Project
3. I Am From Poem - Calculus
Frankenstein’s Mathematician

As a way to introduce yourself, you are going to build your own “Mathematician” that represents you as an individual; one with a brilliant mathematical mind! The process is simple:
1) Choose at least 5 people of notoriety whom you admire and edify to be more like. At least 3 of these people need to be of a STEM field.

2) For each person, decide -
   a) What part of your “Frankensteinian Mathematician” this person will embody. This can be a physical body part or a more abstract part of the identity.
   b) Explain what you know about this individual (this should be a few sentences and include biographical information)
   c) Justify this connection between part a and the individual (this may be with a quote from this person or connecting that biographical information to the ‘part’ from part a)

3) Once you have assembled your “Mathematician” however you wish with all the aforementioned information identified, you will turn it in. This final product must be tangible - ie something you can physically turn in.
You are going to write your own autobiography as it relates to mathematics for me.

Thinking over the last 12 years of schooling (not including this year) -

- Tell me about your past schooling experiences as it relates to mathematics
- Tell me about the times that you felt you learned mathematics the best
- Tell me about the times you struggled
- Tell me about the times you had great teachers/poor teachers
- Tell me about what has shaped you into the math student you are today
- Tell me about how you have seen others in your life use mathematics
- Tell me about how others have influenced you in mathematics (good or bad)

Thinking about this year

- Tell me why you took this class
- Tell me what you hope to get out of it
- Tell me what worries you the most – and how you are (or will) overcome those anxieties

Thinking about now and the future –

- Tell me about what you want to accomplish in high school
- Tell me what you plan on doing in the next year/in college and how this class can prepare you for that
- Tell me where you see yourself 10 years from now and how mathematics plays a role in that stage of your life.
I am from 1) (specific ordinary item) Poems from 2) (product name) and 3) (something you loved as a child) I am from the 4) (home description... adjective, adjective, sensory detail). I am from the 5) (plant, flower, natural item),
The “MATH” Work

01 Unheard Stories
Hidden Heroes

02 Level Up
New Lesson “Templates”
Unsung Heros *(Hidden Figures)*

1. Gladys West (another individual in Hidden Figures)
2. Autumn Kent
3. Sarah Goode
Looking at my room I think “it would be nice to have multipurpose furniture.”

Apparel, this idea has been around forever and in 1885 a woman got a patent for inventing the folding cabinet bed!

Her name was Sarah E. Goode.

I should get rid of stuff...

Bed folds in!

You can use as desk

She looks a bit grouchy.

Cabinets for storage!

From the days photography took forever, it was just best not to smile.

UNLAEZY

A DAILY COMIC BY SAVANNAH ZAMBRANO
New Lesson Template: Student Interests

Step 1: Determine How to Identify Student Interests

Step 2: Develop Lessons Based Off Those Topics

(instead of trying to force real world ideas to connect with the lesson you already have.)

1. College Vs Trade School Vs Immediate Work
2. Affordability of Products (Maximize Revenue & Affordability)
3. Gender & Racial Wage Gap
4. Voting: Regional Impacts
5. Transportation: Car/No Car, New/Used, Finance/Cash
1. Mental Health Rates
2. Death Penalty & Ethnicity
3. Homeland Defence (Budgets & Military Recruiting)
4. Public Health: Epidemiology, Asthma, Cost of Health Insurance
5. Homogeneous or Heterogeneous Grouping of Students
6. Effects of Neighborhoods Dominated by Singular Demographics
The “MATH Works” Work

01  Tasks & Projects
What has worked?

02  Tasks & Projects Attempted
Good Ideas - Improve Implementation
Ditch the Trash Project

So often, when companies package their products, they use far more material than is necessary. We have been using calculus to optimize different shapes and solids in class this week. You are going to apply those skills in order to improve the packaging of a real-life product of your choice.

Your Goal: Find a product that you can reduce the amount of waste for

What you will produce:

1) A letter to the manufacturer of the product you want to reduce the waste of which includes:
   - Relevance of the letter: Why do we care about reducing waste?
   - Existing conditions around the packaging
     - How you would change the packaging
   - How this would benefit society

2) The calculations that accompany the letter (as an appendix – you can refer to them in the letter)

3) A prototype of the new packaging design: a physical object or digital model to scale.
Lessons I’ve Tried:
What do YOUR students want to learn about?

1. Mathematicians Project
2. Object of Revolution
3. Food Access - Food Deserts
4. Building Access
5. Body Image Politics (BMI, Weight & More)
6. Infographics
John Urshel - NFL

Baltimore Ravens *(5th Round Draft 2014)*

Bachelor’s & Masters Mathematics *(Penn State)*

Doctor *(MIT Mathematics)*

Stats Columnist *(Player’s Tribute)*
A living wage is a wage that is high enough to maintain a normal standard of living. A minimum wage is the lowest an employer can pay an employee for their work. A housing wage is an estimate of the hourly wage a full-time worker must earn to afford a modest rental home without spending more than 30% of their income on housing costs.
Closing

01 Contacts

02 Research & Resources

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Resources

RESEARCH:

- What is Social Justice in Education
- Mathematics Education Through the Lens of Social Justice: Acknowledgment, Actions, and Accountability
- Teaching Math Through a Social Justice Lens
- Learning to Teach Mathematics for Social Justice: Negotiating Social Justice and Mathematical Goals
- Rethinking Mathematics - Second Edition

EXAMPLES:

- Curriculum Resources - Math and Social Justice: A Collaborative MTBoS Site
- Social Justice in the Math Classroom
- Social Justice Math – Solving World Problems
- 5 Ways to Incorporate Social Justice into the Classroom