



Supporting Mathematical Meaning Making through Technology: Provoking Questions and Guiding Discourse with Urban Youth

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AGENDA

- Introduction, Mathematics is NOT Neutral, and Goals
- Meet the Students
- Identity, Discourse, Connections
- Using Video to Provoke Questions and Guide Discourse
- Video Examples
- Beyond Awareness – Planning and Share Out
- Summary and Closing

Reflection

- Take a minute and envision your idea of the perfect mathematics class. What are the most essential components of an equitable mathematics class serving historically marginalized children (middle grades)?
 - What might you see or hear?
 - What would be the teacher's role?
 - What would be the students' role?
 - How might the teacher feel?
 - How might the students feel?

Our Ideal Classroom

➤ YES, PLEASE!

- Problem Solving
- Student Driven Discussions
- Asking Questions
- Leveraging technology
- Collaboration
- Building on one another's' comments and ideas
- Everyone has something to contribute
- Open to new ideas
- Meaningful teacher-student relationships

➤ NO WAY!!

- You must only focus on the “Bubble Kids” to improve the school grade
- “Only speak English here, this is America.”
- “These kids” just don’t want to learn. They’re not motivated!
- If they only had the right parental support.
- They can’t even bring a pencil so how are you supposed to do anything else.?!

Mathematics is NOT Neutral

“**Mathematics curriculum functions as a racialized social system** investing more in Whites than Blacks, Hispanics, and American Indians. Mathematics coursework is associated with higher earnings, better jobs, and social esteem based on who is mathematically able. Much like . . . **color-blind policies** of housing and taxes, the mathematics curriculum espouses neutrality while racial stratification continues in terms of mathematics coursework and potential earnings. One mechanism that might be producing these racial differences is mathematics use as an **unfixed gatekeeper** while also reifying who is innately mathematical” (Battey, 2013, p. 350).

Introduction

- Drawing from our experiences in diverse (35% Black, 35% Latino/a, 30% White), multilingual classrooms, this session explores ways to incorporate technology into middle grades mathematics classes to redefine how urban youth might engage, participate, and develop conceptual understandings.
- In particular, we will suggest how video can be used to transcend the boundaries of classroom walls and allow urban youth to make connections between mathematical ideas and their lived experiences. This use of technology will help students utilize familiar contexts to make math more relevant.

Goals

Outcomes of this instructional approach include:

1. Creating an environment where urban students are an integral part of the learning process.
2. Developing urban students' identities as mathematicians.
3. Overcoming students' fear of mathematics.

Meet the Students

- **REGINA** walks into math class and immediately tells the teacher she *HATES* math and does not want to be there. She frustratingly explains how every year she never seems to get it and often daydreams in math class because the teachers always talk on and on and on. She says there are so many things to learn and she can never remember all the rules.
- **ESTEFANIA** is an English language learner and a determined student, but admits mathematics has always been her most difficult subject. She quietly shares with the teacher how she has never felt like she is good at math and has always received lower grades. She is eager to learn new things, but is extremely intimidated by math.
- **ERENDIDA** loves to talk and explains how she is often in trouble for talking in class. She tells the teacher how she thinks he will become annoyed with her quickly for all the talking. She is extremely creative, but reveals she has always received low grades, especially in math.

Identities

Identity

- The stories that people tell about themselves and what they view as important to them: their understanding of their place in the world and their core beliefs.
- Our identities represent negotiations between who we claim to be and how others identify and label us.

Mathematics Teacher Identity

- An identity that consists of knowledge and lived experiences, interweaving to inform teaching views, dispositions, and practices to help children learn mathematics.

Four Steps Toward Productive Math Talk

1. Helping Individuals Clarify and Share Their Own Thoughts
2. Helping Students Orient to the Thinking of Others
3. Helping Students Deepen Their Own Reasoning
4. Helping Students Engage with the Reasoning Others

Connections

Mathematical Connections

- Helping students make mathematical connections between different students' responses and between students' responses and the key ideas (Stein et al., 2008, p. 330-331)

Connections to Lived Experiences

- Making math real and relatable
- Meaning making

Using Video

- Access to Mathematics
- Cultural Relevance (including pop culture)
- Lesson Hooks, Building Engagement
- Introductory / Explanatory
- Problem Focus and Conversation Starters

Dating, Ratios, & Proportions

- Identity?
- Discourse?
- Connections?

Going Further with Video

Student produced videos

- Mathematizing children's stories
- Community Mathematization Project

Project Summary Videos

- Building Positive Class Community
- Fostering Positive Mathematics Identities

Resources

Dan Meyer's Three Act Math Problems

- <https://docs.google.com/spreadsheets/ccc?key=0AjlqyKM9d7ZYdEhtR3BJMmdBWnM2YWxWYVM1UWoWTEE#gid=0>
- Favorites: Domino Skyscraper, Bath vs. Shower, 25 Billion Apps
- <http://blog.mrmeyer.com/2011/the-three-acts-of-a-mathematical-story/>

Mr. Gatza's Math Videos Youtube Channel

- <http://www.youtube.com/playlist?list=PLBE2DE7D08387F6AE>
- Favorites: Rise Up Run Out, Mean Median Mode, Scale Factor
- Ask or email me if you are interested in other videos

Meet the Students – Revisited

- **REGINA** has grown a new appreciation for math and was excited to realize that “math truly is every where!” after watching the dating and proportions video. She explains how she will definitely test this out at lunch with her friends. Furthermore, she realizes that she, too, can be a “doer” of mathematics.
- **ESTEFANIA** has gained tremendous confidence in her mathematical abilities and even served as a group leader on many projects. Using her bilingualism, she was able to communicate and collaborate with others in two different languages. She often commented that it was nice that she was able to – and even encouraged to – speak in both Spanish and English. Both her and her parents were extremely proud of her math grades.
- **ERENDIDA** realized that her love for talking can be a powerful tool in crafted mathematical arguments. She also served as a group leader often and would help facilitate discussions. While she still admitted that mathematics was NOT her favorite subject, she did say she enjoyed this approach to mathematics and that she was able to build on her strengths to do mathematics.

Teacher-Student Relationships/Interactions

- **What does it take for a teacher to use this type of approach to mathematics?**
 - Time, technological proficiency, aligning with youth, empathizing with those who identify least with mathematics, fearlessness or willingness to make yourself vulnerable as a teacher
- **Reduce the seriousness, rigidity, and view of mathematics as a “fixed” body of knowledge.**
 - What is mathematics?
 - Math as relatable rather than unattainable
 - Math Person vs. Not a Math Person

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