

EXPLORING THE VOICES OF MARGINALIZED STUDENTS IN A HIGH SCHOOL MATH CLASSROOM

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Originating Question

How do marginalized students react to a teacher's attempts to implement discussion-based mathematical practices?

Marginalized Student Voices

Marginalized groups of people are negatively impacted by the lack of opportunities to exchange ideas and engage in rich discussions (Gutierrez, 2002).

I define "marginalized" as anyone outside of dominant culture: people of color, women, less affluent, ELL, RSP, first generation graduates, non-heterosexual, and others.

I define "student voice" as instances where learners express, argue, and question their ideas, oral or written.

I define "small victories" as moments when students who usually disengage (i.e., off task behaviors such as put his/her head down or yell) contribute to the learning community by answering/asking questions from their desks, present up front, or write something.

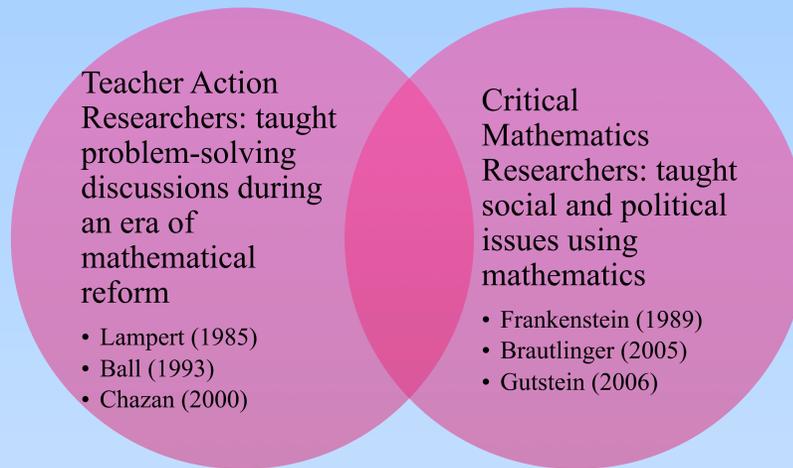
For Discussion to be Effective Students Need to:

- 1) Interact with taken-as-shared mathematical meanings to reason and make sense (Yackel & Cobb, 1996)
- 2) Feel comfortable making mistakes
- 3) Be open to multiple solution strategies
- 4) Publically collaborate, argue and critique

Context

- Two 9-12 Integrated Math 1 classrooms in a racially and economically diverse community. 42% Latino, 29% Black, 16% Asian & 13% White
- District's second year implementing an integrated curriculum (Carnegie Learning)

Related Research in the literature



- **Similarly**, I provide a first-hand narrative of how I perceived student-voice opportunities based on my instructional choices.
- **Differently**, I was critically conscious when interacting with students and facilitating discussions, but I did not prioritize a critical curriculum.

Data Collected

- **Daily** teacher observation journal, whole-class audio recordings, and lesson plans
- **Monthly** student free-write in journals, small-group audio recordings, and digital photos of student work
- **Three times** Likert scale questionnaire
- **When convenient** informal interviews

Students' Positionality

Evidence from Field Notes

- "I need to go back to third grade. I don't know how to multiply. That's why it doesn't make sense when you're talking about writing equations."
- "I just don't apply myself in this class."

- I asked, "how do you respect yourself?" Student #7 said, "I don't! Because I'm black. Nobody respects me so why should I?"
- "...she sent me out because I'm black."

Outcomes

Students shared that they did not perceive themselves to be fluent in mathematics.

Students' racial identities contributed to the ways they chose to participate in the learning community.

Small Victories

Direct Quotes

S6: [While standing up front] Someone got 8 inches. How many other people got 8? [Counts classmates hands] So, one, two. Who else got 8? Just two people?
S: I got ___
S6: Who got 8 though? Two people got 8. So put it right here [shows class how to draw a bar graph on the white board]. Draw this graph one unit smaller 'cause there's two people, not three, this time it's two. Okay, somebody else said they got six and a half... (audio, 3/15/2016).

S25 came up front to share how he counted horizontally and vertically. S1 came up and talked about how he would run down one block then the other. He pointed to the map saying he'd go over there then over there. S25 shared his idea to count horizontally and vertically. He had written $x+y$ on the board with a written explanation. S57 raised his hand and said it's the Pythagorean theorem. He asked if he could come up. He wrote $a^2+b^2=c^2$, then substituted 2 and 3 for a and b, then solved for c by taking the square root of the sum of the squares (field notes, 4/22/2016).

S42: Bernadette is not gonna have as much customers as Mark because with their 5 dollars they can get 5 candy bars from Mark. So Mark has a better deal.
S5: That's what we just said!
S42: You said Bernadette.
S5: I said Bernadette makes more money.
S4: But we're not talking about who makes more money, we're talking about who has the better deal (audio, 1/8/2016).

Interpretation

S6 taught her peers how to create a frequency bar graph representing various stride lengths. She often expressed that school is "not for her" and that she has other things on her mind besides math. On this occasion, she was able to use her social skills to lead the math discussion at the white board.

Earlier, S1 shared that he didn't write anything because he "doesn't like math." He rarely engaged in "on task" behaviors. Here, he started the conversation by sharing his knowledge about local streets. Then, students built off of that knowledge by discussing how to use the Pythagorean theorem to compare distances.

Students who did not usually participate used math to argue their point, *who has the best deal?* They made sense of the situation using linear models. Students' questions and opinions were focused mostly on the context of the problem.

Observations

Students who have traditionally been unsuccessful in mathematics do not identify with being a mathematician (Varelas et al, 2013). It was a "small victory" when they embodied mathematician characteristics by collaborating, questioning, and leading each other in critiquing each other's reasoning processes. While "small victories" occurred on a periodic basis, I continued to encounter a lot of resistance to participating in a mathematics class. It is important to acknowledge moments when students who typically do not engage choose to contribute to the learning community. By playing a valuable role in the math class, marginalized students can begin to identify with meaningful roles that extend to our broader society. By embodying mathematical practices and taking responsibility for their own learning processes, students who traditionally do not perceive themselves to be successful math learners experience what it feels like to have their knowledge valued.

Partial Reference List

- Gutierrez, R. (2002). Enabling the practice of mathematics teachers in context: Toward a new equity research agenda. *Mathematical Thinking and Learning*, 4(2-3), 145-187.
- Varelas, M., Martin, D. B., & Kane, J. M. (2013). Content learning and identity construction: A framework to strengthen African American students' mathematics and science learning in urban elementary schools. *Human Development*, 55(5-6), 319-339.
- Yackel, E., & Cobb, P. (1996). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for research in mathematics education*, 458-477.