

TENSIONS OF KNOWLEDGE AND AUTHORITY: CHALLENGES OF TEACHING SJM

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This study seeks to demonstrate how knowledge and authority are linked for preservice mathematic teachers and how this link may pose a challenge for teaching mathematics for social justice. A CDA of multiple preservice class discussions is presented.

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There is a great need for social justice mathematics (SJM) in U.S. schools. Students of color frequently feel disconnected in mathematics classrooms (Gutiérrez, 2012b). Despite the efforts of Frankenstein (1983), Gutstein (2006) and others, SJM has not gained wide acceptance (Gutstein, 2006). Bartell (2013) notes that mathematics teachers prepared to teach SJM often fail in the moment. De Freitas (2008) has suggested that mathematics teacher identities are tied to mathematics and Walshaw (2013) notes that teachers are caught by dominant discourses of mathematics. These represent mathematics as apolitical, acultural and neutral (Ernest, 1991; Walkerdine, 1988). These characteristics contrast sharply with the openly political aims of SJM. Further, these characteristics form the basis of White authority (Frye, 1992), thereby creating an overlap of authority between mathematics and Whiteness (Author, 2015). For mathematics teachers to address social justice requires that they come into conflict with this authority.

One means for teachers to connect to authority is by emphasizing mathematical competency. Since many teachers, White in particular, have limited knowledge of social justice issues they can feel a lack of authority in this area. Further, the mathematical competency of U.S. mathematics teachers is under fire (Wolfmeyer, 2012), potentially leading mathematics teachers to be defensive. This may link mathematical knowledge and authority, leaving little room for SJM. This study seeks to understand the relationship between knowledge and authority for secondary mathematics teachers. To this end I aim to answer the following questions:

- 1) How do we discursively link mathematical knowledge and teacher authority?
- 2) How can we disrupt this link to create space for social justice in mathematics education?

Theoretical Framing

Wagner and Herbel-Eisenmann (2014) found that authority issues were prevalent in mathematics classes. These issues may arise because of the perceived authority of mathematics (Amit & Fried, 2005). Skovsmose and Valero (2001) describe a kind of “omniscient authority” embedded in mathematical discourse. Authority relations are primarily between teachers, students, and mathematics. Authority is a key aspect of equity (Gutiérrez, 2012a). A potential problem arises when teachers use a knowledge-authority link to justify authoritative mathematics teaching. I focus primarily on this teacher-student authority relationship linked to knowledge. This link is important because the dominant mathematical discourses may dissuade teachers from questioning their authority and from creating equitable relationships. Amit and Fried (2005) note that when teachers are too authoritative it reduces student authority. One means of understanding authority is through the lens of agency (Sengupta-Irving, 2016). Authority can attempt to limit who (and how) can exercise agency. This may create a dynamic where students are mostly

passive (Boaler & Greeno, 2000). While this passivity can be an exercise of agency (or resistance), it does not contribute to the mathematical development of the student or classmates.

Authority and Social Justice in Mathematics

Reforms in mathematics promote a redistribution of authority (Amit & Fried, 2005); this is not sufficient to equitable relationships. Because authority is in the discourses of classes (Skovsmose & Valero, 2001), it does not disappear with the adoption of more “student-centered” pedagogy. Gutiérrez (2009) notes that teachers cannot pretend to lack authority; instead teachers need to explicitly discuss authority (Gutiérrez, 2015), so that its use can be negotiated. In terms of equity, Gutiérrez (2012a) outlines four dimensions: access, achievement, identity and power. The power and identity dimensions intersect with authority in terms of which mathematical practices are valued, whose voices are heard, and in using mathematics to critique structures.

Discourse

Discourses can establish authority. I look at the discourses of mathematics, mathematics education, SJM and teacher and student roles. Discourses both enable and constrain (Fairclough, 2001). Appropriate discourses allow me to be recognized as a mathematics teacher through how I speak, interact, dress, and use mathematics materials. Discourses constrain by limiting what speech and behaviors are acceptable for a mathematics teacher. This enabling/constraining illustrate the operation of power in discourses. As a result the use of discourses is a negotiation of power. This negotiation occurs most directly between the teacher and students. These negotiations are implicit and dependent on a shared idea of teacher or student roles.

The discourses that carry the greatest power are dominant. A discourse becomes dominant by excluding other ways of thinking by establishing a static understanding of truth. Current dominant discourses about mathematics portray it as apolitical, neutral, acultural and objective (Ernest, 1991; Walkerdine, 1988). SJM argues, in part, that mathematics is political, cultural, and subjective. Since the dominant discourses of mathematics specifically disallow this perspective it may be difficult for teachers to understand the why and how of SJM. Walshaw (2013) notes that teachers and students are caught in these discourses. Thus, I expect to find that mathematics teachers generally will struggle to understand SJM, because of the of these dominant discourses.

Discourse and Whiteness. The pressure to conform to dominant discourses and their limits help maintain power structures. In the U.S. dominant discourses are discourses of Whiteness. Whiteness Theory helps uncover how discourses maintain white privilege. Whiteness Theory operates on the assumption that the lives of all people in the U.S., in particular, are racially structured (Frankenberg, 1993; Frye, 1992). Since mathematics achievement follows racial lines (Stinson, 2004), race is a significant factor in defining traditional measures of mathematical success. Further, Skovsmose and Valero (2001) explain that mathematics is used to sort students. Battey (2013) specifically applies Whiteness Theory to the material benefits of this sorting. Here I will analyze discursive connections between knowledge and teacher authority.

Methodology

Participants

Like my students, I am caught in the dominant discourses of mathematics education. As a young, white teacher I taught all of the mathematics classes for emergent multilingual students at a rural, public high school. I witnessed the roles of race and class in the lives of my students. There were clear divisions along race and class lines. As a teacher I felt pressure to support school policies; I also wanted to support my students who were not served by those policies.

Teacher Candidates. The teacher candidates included four White males (Pseudonyms: Jeff, Karl, Gavin, and myself), two White females (Stella and Lisa), one Latina (Esperanza), and one

Japanese-American female (Jane). They were working towards a Master's degree in mathematics with certification funded by Mathematics for America (MfA). During the Fall semester I supervised their student-teaching, attended monthly meetings, and a retreat. During the Spring semester I taught their action research class as I continued their supervision. Several of the preservice teachers expressed an interest in SJM and four attended a conference on SJM. I considered each of them to be capable and committed, who struggled with SJM.

Critical Discourse Analysis

Drawing from critical theory, critical discourse analysis (CDA) explains how language is linked to society (Chilton, 2011). Fairclough (2001) draws on Foucault to explore how consent is gained through dominant discourses. Fairclough uses discourse to explain the relationship between social norms and power. Here I will analyze discourses we used to explain the links between mathematics and authority. Critical discourse analysis draws on post-structural understandings of discourse and the circulation of power (Rogers et al., 2005). In particular, as speakers use discourses we construct objects and subject positions. But even these objects and subject positions are multiple and changing; they are negotiated and re-created. I have also framed these discourses within Whiteness Theory to analyze how they maintain white privilege and how we begin to re-work some of these discourses in order to understand SJM.

Data Collection

All data for this study were drawn from a teacher research (with a SJM focus) course for preservice teachers. Each class was recorded and transcribed, resulting in over 25 hours of recorded data. The teacher candidates' written work, as well as my reflection journal were additional sources. I chose sections in the data where there was evidence of, or potential for, SJM for further analysis. I performed line-by-line analysis of each of these transcripts using Gee's (2005) building tasks paying particular attention to authority. From these analyses I identified themes and re-analyzed for key ideas I missed, to fill in details, and to identify deviations.

Results

Linking Knowledge to Authority: A Traditional Frame of Knowledge and Authority

The transcript that follows illustrates the link between knowledge and authority, how that link is normalized, and is representative of other discussions. This discussion focused on the discourses that shape mathematics education. Prior to the transcript we discussed teacher and student roles. These discourses structure teacher-student relationships.

Jeff: It's inevitable I mean if I am more knowledgeable than my students you can't change that, that automatically gives me some more power that they don't have, you can't change it so that's not necessarily a bad thing. Sometimes there's this connotation that we want to remove all power differences.

Teacher: Right

Jeff: I think that that's erroneous.

Teacher: And I think to pretend that you don't have that authority is false and the students are going to recognize it right away and they're not going to respond to it.

Jeff: Well and if they don't respect the fact, if they don't think you have the knowledge you can't teach them in any way

Here Jeff draws on a discourse that links authority to knowledge. Within this discourse greater knowledge necessarily creates greater authority. In drawing on this discourse Jeff positions teachers as naturally having more authority than students since teachers have "more knowledge". Presumably he is talking specifically about mathematical knowledge. This knowledge differential is unchangeable ("inevitable", "you can't change it"). These statements

naturalize the relative positions of teacher and student and the teacher's authority as authority over students, which is "automatic". Finally, he evaluates these positions as "not necessarily a bad thing". My comment does nothing to disrupt this link and, in fact, accepts it as natural. Jeff's final comment points to the necessity of this authority as necessary for teaching. Among the assumptions of this discourse is that authority is static (i.e., natural to a teacher), teacher authority and student authority are in an inverse relationship, and that the authority-knowledge link applies only to sanctioned knowledge—especially mathematics.

Lack of Knowledge as Justification

Alternatively, the following transcript shows how this link can be used as justification to not engage SJM. Prior to this, the teacher candidates had read an article by Gutstein (2012) on implementation of SJM. In response, we discussed various topics including the importance of addressing racism. During this discussion Esperanza drew on her experiences as an immigrant student of color to argue that teachers need to discuss these issues. In the transcript Jeff shifts the discussion by asking Esperanza more about her experiences.

Jeff: Because one of my fears is I don't see when I'm doing it wrong for them so but if I said look I want to have a discussion about immigrant reform . . . and I know that I'm not an immigrant so I'm not going to see all of the issues the way that you will and so if I do something you know prelude that says I'm going to probably screw some of this up but it's not because I'm trying to would that have made a difference for you

Esperanza: Letting me know yea and I think it would be great to not take on and shut because I know my U.S. history teacher he thought he knew everything he just knew the newspaper like you're not looking at the families that are being deported you're just bringing the issues the media brings out to the table and not other perspectives and so if you really want to do touchy subjects like that I feel like you have to make sure you know both sides of the coin you know what I mean like

Teacher: Yeah and I think like you said acknowledge the limits of your knowledge

Esperanza: Exactly let them know

Jeff: I don't know, at some point then I might just decide not to have it because the problem is that if there is something that the teacher brings to the class and if nothing else it's some sophistication in how debates can go and realizing that kids just like to argue and so what are they going to do they're going to bring the news to class and their parents views and if you aren't knowledgeable you can't manage that discussion very well right I mean if I personally am not knowledgeable about it it can get out of hand very quickly.

As Jeff directs his question to Esperanza he frames it around his own fear which is, "I don't see when I'm doing it wrong". In Esperanza's response she emphasizes that a teacher should "know both sides" of an issue. This would require a teacher to learn about issues before discussing them in class and positions the teacher as taking responsibility. It is at this point that the direction of Jeff's argument becomes clear. In response he says, "I might just decide not to have [the discussion]". Thus, he draws on a dominant discourse that uses ignorance as a reason not to engage rather than a responsibility to learn. He links this to the idea of "sophistication" that a teacher should bring to the class. This sophistication requires more knowledge than what the students have (who "just like to argue") in order to give the teacher the authority to control "how debates can go", since "if you aren't knowledgeable you can't manage that discussion". The concern is that the discussion "can get out of hand", which may undermine teacher authority. In this way, white ignorance (of racism) creates a fear of losing authority. This fear prevents a willingness to learn to have the difficult discussions that could benefit students. It is a

fear of not being a “good” teacher, when a good teacher is understood as knowledgeable and in control. While Esperanza provided an opportunity for a different perspective, the dominant discourse of Whiteness, and a lack of white responsibility to understand racism was reasserted. Again these are the dominant discourses that are available to us.

Problematic Relationships in Social Justice Mathematics

In another moment of this same class Karl brought up a question of how to bring up difficult topics, such as HIV/AIDS, and have students engage appropriately. In our responses to this question we describe the concerns we have about teaching this kind of SJM lesson.

Teacher: So let’s talk about this so somebody there brought up the idea that if you're teaching this lesson on the west side [lower income, more students of color] that it could be possibly discouraging to students. How would you address that?

Gavin: Well just that life sucks and that's how it is.

Multiple: ((laughter))

Jeff: Isn't it all in the context of being able to create change if you can do that it doesn't have to be inherently negative being reminded of reality and if that’s all you're doing is saying yeah tell me something I don't know

Teacher: Isn't well ok I want to hear you out is there any benefit to doing that? . . .

Jeff: Well maybe I mean to let them know that you're aware

Teacher: To remind them mhmmm why might that be beneficial?

Jeff: Because they may feel that you aren't and they can't approach you and talk . . .

From the beginning I position the teacher as the authority, bringing difficult topics to the class (“how would you address”). While this was Karl’s question, I do not challenge this assumption. This leads us to continue in a way that assumes the authority of the teacher. I ask the teacher candidates to recall a SJM lesson that Esperanza, Stella, Lisa, and Jane had written. Their lesson highlighted an unequal distribution of parks based on geography and population density.

After Gavin’s joke, Jeff mentions the importance of “being able to create change”. The passive construction here leaves it unclear who is creating change. However, if it is parallel to the structurally similar “being reminded of reality” where it is clear that the students are “being reminded,” the implied agent is the teacher. This passive role for the student maintains teacher authority, even if that teacher intends to “create change”. Picking up on Jeff’s point I ask if there is benefit to just pointing out inequity. Jeff mentions a benefit of overcoming some of the teacher’s authority to make them more approachable. This point suggests that students are careful in their relationships, positioning them as agents as they negotiate the school system.

This improved relationship could benefit students, as they will be more likely to have someone they can work with and who will listen to them. In this discussion there are implicit references to knowledge of inequality; this will become more explicit as the discussion continues. As Lisa responds (below) to my questions she seems to suggest that bringing up difficult, social justice topics is beneficial because it can increase teacher authority.

Teacher: And why would they care if you as their teacher are aware?

Jeff: Because you have authority that you're trying to hand out to them.

Teacher: K. other thoughts on that?

Lisa: Yeah. Because you're trying to teach them stuff if they think you have no idea what's going on and they don't get you at all they're not going to participate in your classroom

Jeff: So you can't create relationships you mean

Lisa: Yeah. So I think that's something that I never really thought of that much making them aware that you're aware of it

Teacher: Is there benefit in just making students aware of social issues like this . . . ?

Lisa: I think that you have to talk about the actual thing before you can start to talk about why that thing is occurring and I don't think that that is a given that all students know reasons that could potentially explain why things are unfair.

Lisa highlights the importance of what students think of their teacher. If their opinion of the teacher is low (in terms of knowledge) then “they’re not going to . . . participate in your classroom”. This is a very similar statement to one Jeff made in week 4, “if they [students] don't think you have the knowledge you can't teach them in any way.” Also “your classroom” suggests teacher ownership. Both Jeff and Lisa link teacher knowledge, with students’ willingness to listen. A lack of teacher knowledge may result in students exercising agency disagreeably.

If we discuss teaching mathematics in a traditional sense (as Jeff was) then the knowledge/authority link is restricted to mathematics. However, if we discuss SJM (as Lisa is) then that knowledge is expanded to include sociopolitical knowledge. This is a potentially disruptive view suggesting that being a mathematics teacher requires sociopolitical knowledge. However, increased knowledge is still linked to increased authority. There is no discussion of benefit to the students from this kind of teaching. It seems that our primary concern is how bringing up difficult topics in the classroom will affect the teacher. As I rephrase the question I maintain this focus on the teacher as agent who is “making students aware.” This may reflect my own whiteness where I was largely unaware and may also universalize this white perspective. Lisa also notes that we should not assume that “all students know”. We position ourselves as responsible for SJM and focus on the teacher as authority.

Balancing Teacher and Student Authority

In a later class, Karl shared an example of a SJM lesson in his class. A majority of his students were low-income students of color and bussed to the high school.

Karl: We calculated the area based on those grids that you put over the maps and then talked used that as a segue into you found the area it looks like you guys used a rectangle here this one you guys said was a half what's really going on so like that was kind of the math reason for doing it but the discussion was pretty good it started out kind of poorly they would say let's just have it how it is now I don't care what parks are like and that was about the first five minutes of the discussion was about how people don't really care about parks

Here Karl explains the lesson that illustrates the ways local parks are distributed inequitably. His focus is on what the students did, positioning them as agents. Notice how he includes himself with his students (“we calculated”) and then the frequent use of “you” to refer to his students and their work. He positions students and their work as central, while he remains on the periphery. When the lesson “started out kind of poorly” he attributes this to his own inexperience. He emphasizes the students’ perspective and identifies with it by using first person (“let’s just”, “I don’t”). Their perspective went against what he was trying, but he valued their thinking. Students are portrayed as exercising agency in valid ways, even when they disagree with the teacher.

After listening to his students, Karl still thought the lesson was valuable and that his students would benefit. As a result, he persuaded them to give the lesson a chance.

Karl: And I had like a little bit of a discussion like this I know we're talking about parks right now but take this a little more seriously for a little while this isn't really about parks and I think you guys will figure out what's going on here They brought up were things that I never thought about in terms of this park issue and one thing being cost or a couple things being cost of upkeep for a park I didn't really think of that as a possible

reason for maybe how they're distributed like maybe one park has more graffiti than another park and more cost is gone into upkeeping it. One student brought up the distinction between a community park and a city park and I didn't know the difference really and she was kind of thinking she was like schools are kind of supported and I don't know much about taxes and she was kind of asking me about taxes and I was like I don't know your idea could be right or it could be wrong. . . . which I thought was an interesting question that I didn't expect from a 17-year-old

In the beginning part of this section Karl portrays himself as using some of his authority to persuade. He did so through "discussion", recognized the students' perspective, and expressed confidence in their ability to see beyond the parks. The students brought up things, "that [he] never thought about". Karl clearly views this as a positive ("really good") even though it positions him as less knowledgeable in this area than some of his students. He believed that his students' ideas were valuable enough to share them with the rest of us. Karl also admitted his lack of knowledge on the subject to his students (frequent use of "I don't know" and variations). In previous discussions we had constructed teacher authority as closely connected to knowing more than students, this admission appears to work against that link. This admission was not related to mathematical knowledge. It is possible that Karl feels safe admitting a lack of knowledge about park funding, but not mathematics.

Discussion

Dominant discourses appear to link knowledge to authority. By doing so they either leave no space for SJM, an unwillingness to engage SJM, or inequitable relationships within SJM. Only occasionally were we able to break out of this link as Karl did.

No Space for SJM

In the discourses that left no space for SJM we struggled to even understand if or how SJM might be possible. This view seems to be consistent with Bartell's (2013) finding that teachers, after planning a SJM lesson, often focused on either the social justice or the mathematics. This discourse operates by restricting our ability to imagine alternative relationships between knowledge and authority and require a reimagining of what knowledge is valued in a school context (Gutiérrez, 2015). A potential alternative to this view of knowledge and authority would be one that recognized that both teachers and students have varying levels of knowledge in different areas. While the teacher may have more knowledge of school mathematics, students also have knowledge relevant to learning mathematics. However, the dominant discourses of school mathematics shape the roles of teacher and students to prioritize school mathematical knowledge. As a result, our relative lack of knowledge of social justice issues shut down discussions of SJM. Discussions that draw on dominant discourses feel "safe" (Yoon, 2012) by not disrupting the dominant view of mathematics with the racio-political views of SJM. Further, they can help participants maintain an image as "good" (white) teachers (Applebaum, 2008) by staying within knowledge domains that are comfortable.

White Ignorance

Discourses of white ignorance of social issues, especially of racism reflect a colorblind discourse that support racist structures in society (Bonilla-Silva, 2015). It is important for teachers, especially white teachers, to recognize the limits of their knowledge and experience. However, this recognition should be accompanied by a sense of responsibility, rather than a justification. This discourse restricts SJM by reducing the teacher's role to mathematics, since that is the area of knowledge expected for mathematics teachers and prioritized in teacher preparation. Alternatively teacher preparation might value multiple forms of knowledge, such as

the classical, critical, and community knowledge suggested by Gutstein (2006). Importantly this discourse came about in response to Esperanza's explanations of how and why teachers must address sociopolitical issues. She was able to successfully draw from her experiences as an immigrant woman of color to access discourses that were temporarily disruptive. She may have done so because of an experience of "double consciousness" (Du Bois, 1903). As a woman of color in a white space she could see both the dominant discourse and alternatives.

Problematic Relationships

Importantly, even when we did successfully discuss SJM we often did so from within a dominant discourse linking knowledge and authority. The result, for us, was that we discursively constructed inequitable classroom relationships between teacher and students. These relationships emphasized teacher authority, the teacher as agent, and the beneficiary of SJM. There is little room left to construct an active role for students. Gutiérrez (2012a) in discussing identity and power explains that students should have opportunities to bring their full self, including knowledge and capabilities. Further, students need opportunities to participate in mathematics that is personally meaningful. This is more likely to happen when students have voice, which is part of Gutiérrez's equity dimension of power. In mathematics education we need to construct classroom dynamics that value and include student voices.

Shared Authority

Finally, Karl's description of his experience attempting to address a social inequity in his mathematics class shows potential for constructing more equitable classroom relationships. This occurred as students brought up ideas that Karl had less knowledge of. He was willing to listen to and learn from his students as they raised their voices and their ideas in the classroom. To further develop these relationships, students would also need opportunities to participate in similar ways with both mathematical and social issues and the teacher would need to demonstrate a similar willingness to listen to and learn from students.

Recommendations

Dominant discourses linking knowledge and authority imply that the simple solution to teachers' lack of knowledge of social issues, such as racism, is to gain knowledge in these areas. While increasing teacher knowledge is necessary, it is insufficient and may lead to inequitable relationships. In addition, teachers will need to create opportunities to learn from their students; white teachers in particular, will need to listen to their students of color. Teacher education programs largely focus on what Gutstein (2006) identifies as classical knowledge. This knowledge is developed both in mathematics content courses and pedagogy courses. Courses, such as multicultural education, may help to develop teacher candidates' critical knowledge, but a single course will not be enough. The embedding of critical themes throughout teacher education and beyond will likely be necessary. Community knowledge is challenging and is typically not included in teacher preparation. While community knowledge will vary and needs to be learned in conjunction with students and their communities, this process can be modeled as teacher educators also learn from and with their students.

Conclusion

Within mathematics education dominant discourses frame knowledge and authority in ways that challenge our ability and willingness to teach SJM. These challenges affect even those who desire to teach SJM. The challenges range from the more obvious where we struggle to conceptualize SJM or are forced to face our lack of critical knowledge to the more subtle concerning classroom relationships and the risk of diminishing student agency as we seek to take responsibility for a socially just mathematics classroom. The need for equitable mathematics is

growing and it will require better and more thorough preparation. This preparation will likely need to include modeling and increased emphasis on critical and classical knowledge.

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