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Cover Page Footnote

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No Simple Formula: Navigating Tensions in Teaching Postsecondary Social Justice Mathematics

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Abstract

Instructors of Social Justice Mathematics (SJM) have shared important insights into the powerful potential of connecting classroom mathematics with authentic data about social justice topics, but they have also warned about the harm such teaching can cause when done poorly. In this article, I consider what is necessary to teach SJM at the postsecondary level. I share research that has supported me in learning to teach SJM and highlight challenges that are particular to doing this work in postsecondary contexts. I then describe my experiences navigating the central tensions of this work while honoring its complexity.

1. Introduction

We live in a society in which quantitative data and arguments are increasingly prevalent and politicized. Many have argued that the best way to help students develop mathematical literacy that they can apply to these contexts beyond the classroom is to analyze and discuss authentic data about high-stakes and socially relevant topics in mathematics classes — a practice sometimes known as Social Justice Mathematics (SJM).¹

¹ Different authors have used various names and frameworks for this type of teaching, including Teaching Math for Social Justice [6, 15], Teaching and Learning Math for Social Justice [13], and sociopolitical mathematics [3]. I follow Kokka [10] in using Social Justice Mathematics for its succinctness and specificity and because I have found her article [10] to be one of the most useful resources for helping me improve my SJM teaching practices.

The use and misuse of data in the early days of the COVID-19 pandemic highlighted the ever-growing importance of data literacy [2], and the Movement for Black Lives in response to the police murders of George Floyd and other Black people in the summer of 2020 pushed more people to consider the roles of racism and systemic inequality in our society. Both of these events led many teachers to be newly interested in SJM. In subsequent years, many states have incorporated a focus on equity and social justice into their educational requirements for students and teachers, while other states have moved in the opposite direction, outlawing educational discussion of race or inequity which they often inaccurately label “Critical Race Theory” [14]. This combination has resulted in the simultaneous increase in resources intended to support teaching SJM and potential risks for teachers who choose to do so.

The proliferation of curricular resources has had benefits and drawbacks. The large number of resources may be overwhelming for teachers who are uncertain of where to start or how to identify which resources and lessons are of high quality. Researchers have identified developing diverse sample lesson plans as a key step for enabling more teachers to engage in teaching SJM [6], but they have also warned that teachers implementing pre-made SJM lessons poorly could be counterproductive or even harmful for students [7, 11, 13, 15]. Educators interested in teaching SJM must first develop their pedagogical skills and critical consciousness so that they do not harm their students accidentally. This commentary focuses on resources that are specific to teaching SJM, but educators’ development of critical consciousness must also include interrogating their personal roles, beliefs, and actions with respect to white supremacy, cisheteropatriarchy, ableism, and other interlocking systems of oppression in society.

Beginning to teach SJM may be particularly challenging for postsecondary mathematics instructors. Educators working at the postsecondary level are statistically likely to come from relatively privileged backgrounds, especially in comparison with their students. Postsecondary institutions tend to provide little time or supports for instructors to deepen their critical consciousness. Much of the research on SJM has come from schools of education, and there are many interrelated labels and frameworks that can be confusing (see Footnote 1 for examples). There are relatively few resources that have been created specifically for teaching at the postsecondary level, and much of what has been written focuses on preparing undergraduates to be teachers [3, 12]. SJM lessons center class discussions of societal topics that are often emo-

tionally charged, which depend on supportive relationships between students and instructors and careful facilitation by instructors. The necessary community norms and pedagogical skills are often dramatically different from the experiences students and instructors expect from mathematics courses. The necessary classroom environments may be difficult or impossible to develop in the context of large lectures or coordinated courses. Finally, articles about learning to teach SJM often focus on the importance of mathematics instructors collaborating with other teachers and/or activists who have expertise related to the community and social justice topics the SJM tasks will focus on [3, 7]. While this is excellent advice and many postsecondary institutions have faculty with relevant expertise, collaboration across disciplines at the postsecondary level is often more challenging than it might be for teachers at a high school. The relevant colleagues are often in separate departments or even separate colleges and may have limited bandwidth for teaching-related collaboration. It can also be difficult to identify a community context that will feel relevant to all students if they are coming from diverse geographical and cultural backgrounds.

These challenges are daunting but not insurmountable. When done well, SJM can be incredibly rewarding for instructors and students. It can fundamentally shift the ways that students (and instructors) think about themselves, their world, and mathematics [6, 10, 15]. Learning to teach SJM does not require perfection, but it does call for a particular stance towards teaching that runs counter to what many people expect in mathematics classrooms. Because so much of teaching SJM is complex and dependent on the context and individuals involved, there cannot be a single formula or rule of thumb for doing it. Rather, teachers need to be aware of the many challenging tensions involved and continually make decisions and adjustments that respond to the needs of their context and their students. In the following commentary I briefly share my background and the context in which I teach. Then I describe some of the core tensions I have experienced, with a focus on ones that may be particularly relevant to postsecondary instructors.

2. My Journey to Teaching Postsecondary Social Justice Mathematics

I teach mathematics courses for undergraduate and masters preservice teachers at an R1, public university in the Midwest. I work in a state and university that are relatively liberal and supportive of addressing equity and social

justice in education. My university's faculty includes leading critical scholars such as Danny Bernard Martin, Gregory Larnell, and Rico Gutstein. Teaching SJM was not a norm in math education content courses when I started teaching them, but it has become an ongoing conversation among a subset of the faculty. Some of my students are mathematics majors, some are non-majors, and all are studying to be teachers. My courses are focused on their mathematical learning (content courses) rather than teaching them how to teach (methods courses). The demographics of the students in my courses largely reflect the university's high level of racial diversity and large proportion of first-generation college students. Many of the courses I have taught incorporate a few SJM tasks, and in one course that I have designed and taught multiple times almost all of the units incorporate SJM.

I came to postsecondary teaching indirectly. My original teacher training was for elementary and middle school, with a specialization in mathematics, in a program focused on preparing teachers to work in our local, urban context. I worked in a K-8 school for 7 years: first teaching middle school math and leading small-group interventions and later collecting and analyzing data in collaboration with teachers, administrators, and students. When I decided to pursue a graduate degree, my interest in educators' data literacy and the opportunity to teach courses for future teachers led to my dissertation focus on implementing SJM in teacher preparation math content courses. I have been able to continue that work as a full-time faculty member at my university. As a white person who grew up in a wealthy suburb of a different city, my critical consciousness has been strongly influenced by my interactions with teachers, mentors, peers, and students throughout these experiences. My ongoing critical education included some formal courses as part of my masters and doctoral programs, but my current learning centers less formal learning environments including podcasts and social media interactions, my involvement with the faculty union, my membership in a local public school advisory council, and most importantly critical-friend relationships with my peers.

3. Critical Tensions in Teaching Postsecondary Social Justice Mathematics

Many important decisions in teaching are characterized by conflicting pressures, and a central part of learning to teach is learning how to navigate the

tensions of those conflicting pressures based on one's context [4]. In mathematics, contradictions are frequently conceptualized as puzzles to be resolved or evidence of logical errors or flaws in an initial premise. In teaching, however, there is often no universal optimal choice, but rather positives and negatives to all possible choices that depend on the situation and the people involved and must be continually reevaluated and adjusted. For example, at the postsecondary level many general education mathematics courses are taught to large numbers of students. These courses may include a large lecture component and smaller discussion sections led by TAs and/or multiple sections taught by multiple instructors. At my university, many aspects of these courses are standardized by course coordinators with the goal of creating a more equitable experience for students across sections and providing support to TAs and instructors with varying amounts of teaching experience. At the same time, standardization can limit instructors' ability to adapt to students' needs or to adjust for their personal creativity and pedagogical strengths and weaknesses. There is no perfect balance of how much should or should not be standardized — the level and focus of standardization varies from course to course and from year to year depending on many complex factors. Teaching SJM brings numerous additional sources of tension, and it is critical that instructors explore and respond to such complexities as they teach rather than attempting to ignore them or resolve them arbitrarily. The following are some of the tensions that I grapple with when teaching SJM.

Tension 1: How can I foster the relationships and vulnerability that are key to SJM without coercing or mandating them? When classes were online due to the COVID-19 pandemic, some of my students lamented that it felt impossible to build relationships and have conversations about politically-charged topics when their peers did not want to talk on Zoom. The students said they wanted to respect their peers' privacy, but the silence was deeply frustrating. Rather than mandating that students turn their cameras on and participate in class verbally, I worked to create a wide range of contexts and modalities in which students could participate and use questions that allowed for varying degrees of vulnerability. I also initiated explicit conversations with the whole class about the fact that students with racial and economic privilege were often the ones talking the most during whole class discussion, and that balancing discussion needed to be a collaborative effort. Of course, challenges around balancing participation can occur in any course, but students often feel a heightened sense of stress and vulnerability when discussing SJM.

This stress may be particularly acute for marginalized students (including students of color, queer students, and disabled students), especially if they are a minority in the class population. It is critical that students belonging to systemically oppressed groups not be expected to speak on behalf of those groups. Both mandating participation and the alternative of only hearing the perspectives of relatively privileged students can be particularly harmful when discussions include politically-charged topics.

Tension 2: Should I use existing lessons, modify them, or design my own? Using existing lessons such as the ones in [8, 9] can require less planning time and may include background information and structures that can supplement an instructor's political knowledge. However, this can also lead to challenges, because if the context is unfamiliar to the instructor or they do not have sufficient related knowledge, they may accidentally lead students to inaccurate and harmful conclusions [11]. Relatedly, if the data and contexts in lessons are very distant from students' experiences, they may have trouble making sense of and emotionally investing in the context [3], but if the data and context are too closely tied to students' experiences, then the lessons may demand extremely high levels of vulnerability from students and class discussions can potentially be traumatizing [10, 13]. This balance may vary between students within a single class. For example, many of the activities for my SJM course analyze data from the local school district. Some of my students who did not grow up in the area had a hard time making sense of and feeling emotionally invested in the data. Meanwhile, some students who did grow up in the district had strong emotional reactions to the data. There have also been cases of some students making assumptions about other students' experiences that have unintentionally reinforced racial and class stereotypes, such as assuming that all suburban schools are wealthy, and all city schools are dangerous and ineffective.

Tension 3: Which comes first: the math content or the real-world context? In an ideal world SJM activities would seamlessly integrate the mathematical content students need to learn with data that is meaningful for them. In practice this synchronicity is often difficult to reach, but it can be approximated through an iterative process. My process is similar to what Gutstein [6] used when he taught SJM in a middle school. I usually start with the general content that I need to cover over a semester and some examples of rich mathematical activities. Then I consider topics that may be relevant to my students based on my teaching experience, input from previous classes,

surveys, and topics that are in the news. Sometimes topics in the later part of the semester are responses to questions students raise early on. I then match mathematical topics with social justice topics that have relevant types of data and identify articles and other texts to introduce topics and supply data that we can analyze. Finally, I adjust the actual questions in my lesson plan to try to make them authentic to the context and to create a logical flow between reflection questions and analytical questions. If I were using or adapting pre-existing tasks, I would still need to consider both issues in my selection process. Even in courses with very specific mathematical content goals, instructors may be able to select which mathematical topics to teach through SJM by considering which can best match with data and contexts that are meaningful for students.

Tension 4: How narrow or broad should the activity and discussion be? The goal of SJM should be building students' critical thinking and critical consciousness, not indoctrination. To this end it is important that SJM activities and discussions be relatively open-ended so that students can practice mathematical and political autonomy. However, unstructured conversations and analyses may be overwhelming for students or may be unfocused and unproductive. Flexible discussions are more unpredictable and more difficult to plan for and facilitate well. They may increase the chance that an instructor will say something harmful or not know how to respond to a student's potentially harmful comment. For example, in a recent iteration of my SJM course I had small groups of students pick their own topics, identify relevant data, and lead short class discussions with mixed results. The groups struggled with the openness of the assignment, and in the future I intend to give them more guidance and a more structured planning process.

Tension 5: How should I select topics that will be meaningful and effective for my students? This may be the most challenging tension to navigate, and as with the others there will never be a final "correct" answer. It also highlights why it is important to do SJM thoughtfully and intentionally. For example, there were many anecdotal accounts in 2020 of teachers deciding to analyze COVID-19 data in mathematics classes to try to make math relevant for their students. Some scholars expressed concern that such conversations could be traumatic and alienating for students, especially for Black and Latinx students who were more likely to know people who died from the disease or whose higher chances of mortality were being analyzed as a statistical curiosity; see, for example, [1]. Similar harm can occur in other contexts,

even when instructors have the best of intentions or are using pre-existing curricular materials [13]. Even data that instructors may think are apolitical can make heteronormative assumptions and reinforce simplistic gender binaries [16]. I have found Kokka's affective pedagogical goals [10] very helpful for clarifying the ways in which I think about these challenges. As she highlights, all students need to feel a degree of safety to meaningfully engage in SJM, but beyond that teachers engaged in SJM should help students identify and process emotions that can lead to collective healing or taking action to address injustices. As mentioned above, this can be complicated even further when classrooms include students with diverse backgrounds and relationships to the topics being discussed. Whatever topics and activities instructors eventually choose, they must consider students' potential reactions and how best to respond to them and support their learning before, during, and after each activity.

4. Closing Words

Hopefully this short commentary can help post-secondary mathematics instructors begin to engage in SJM thoughtfully and not fall into harmful practices. For those interested in learning more, I strongly recommend Kokka's paper [10] for thinking about goal setting and planning SJM and Felton-Koestler's paper [3] for thinking about the types of knowledge necessary for teaching SJM and ways to develop and integrate those types of knowledge. Wager and Stinson's book [15] is a bit older and a more extensive read, but it is a great resource for the history of SJM and related pedagogies and examples of many different educators sharing their thoughts and experiences related to teaching SJM. For educators who work in institutions or states where social justice teaching is not supported, I recommend Gutiérrez's article [5] on creative insubordination, which has helpful, concrete strategies for mathematics instructors trying to support their students in ways that are not endorsed by the institutions in which they work.

Above all, self-reflection and critical relationships in which instructors are continually learning from colleagues, community members, and their students are central to SJM. When instructors are guided by their principals, sensitive to their context and their students, and working as part of critical communities, they can avoid simplistic formulas and genuinely engage in SJM.

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