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Mathematics *With, About, and For* Social Justice

A Guide for Educators

Created By
Shandy Hauk
Lily Khadjavi
David Kung
Victor Piercey
John Staley

Table of Contents

3	Introduction
5	Teaching Mathematics With Social Justice
6	Teaching Mathematics About Social Justice
7	Teaching Mathematics For Social Justice
8	Next Steps
10	References

Introduction

The mathematical sciences are a human endeavor. From the earliest experiences of parents helping toddlers with counting, to the august hallways of the most esteemed research institutes, mathematics and statistics are done by and for people as part of social structures. It may be a universal truth that $2 + 2 = 4$, assuming the now-standard meanings of those symbols, but how we write, discuss, teach, and learn mathematics is inseparable from society as a whole.

The mathematics community is increasingly acknowledging the humanity of our subject, with growing calls to “rehumanize” mathematics (Ball et al., 2005; Goffney et al., 2018; Su & Jackson, 2020). Part of that process is understanding that the influence across society and mathematics goes in both directions. The goals of post-secondary mathematics teaching and learning can be to integrate the next generation into the status quo (e.g., become compliant employees) or to be the means by which people deal with the status quo as they participate in reshaping society (e.g., become innovating, employed, change agents). In fact, all of the activities of teaching, learning, and researching mathematics are intrinsically connected with social forces.

The interactions between mathematics and society impact how fair, equitable, and just society is, both outside and inside the college classroom. There are at least three ways justice and mathematics are intertwined in classrooms (Benjamin Banneker Association [BBA], 2017):

- **With** social justice concerns the nature of classroom interactions, where the discourse, norms, and habits of classroom conversations endorsed by the teacher encourage equitable participation and status.
- **About** social justice means a lesson is planned and purposeful in looking at serious or provocative issues using mathematics.
- **For** social justice is anchored by the idea that mathematics is a means to challenge the status quo, that mathematical activity can be part of actions that transform social, political, and economic conditions to reduce injustice.

We teach *with* social justice when we make classroom norms explicit, interrupting historical patterns of who speaks in class, and making the rules of college explicit. We teach *with* social justice to increase fairness within our existing educational structures.

We teach *about* social justice when we leverage students' interest in topics like global climate change, fair taxation, and police conduct in the service of learning mathematics. We teach *about* social justice because spurring student motivation to learn mathematics is good pedagogy.

We teach *for* social justice when we give students the tools, inclination, and support to question the status quo and work to improve it. We teach *for* social justice to emancipate our students and ourselves from a deeply unjust, unfair world.

As for the term *justice* itself, it is sometimes used interchangeably with *equity*. We see *equity* as a significant component of justice (although certainly not the only one). Justice and equity work together to form a kind of calculus of accumulating moments with and among people, curricula, and policies. Consider the following question: Why might it be important to pay attention to how and why students are hidden or ignored in a mathematics class? The answers have consequences for teaching, in terms of the mathematics learning opportunities among students who are and are *not* ignored/hidden. Such questions open the door for enormous learning by those who teach.

Consider your responses to each of the following:

(With) Think back to a classroom experience where social interactions adversely and unjustly impacted a student's experience. What social norms or understandings led to the experience? How could the instructor have handled the situation differently so as to avoid or at least mitigate the negative experience?

(About) Consider a topic in the news which includes aspects of fairness or justice. How could mathematics be used to better understand the issue?

(For) The students we teach today will be working, voting, and making decisions for decades to come. What mathematical content could help them make decisions that are better for society? In what course are they likely to learn that content?

Reflect

Teaching Mathematics With Social Justice

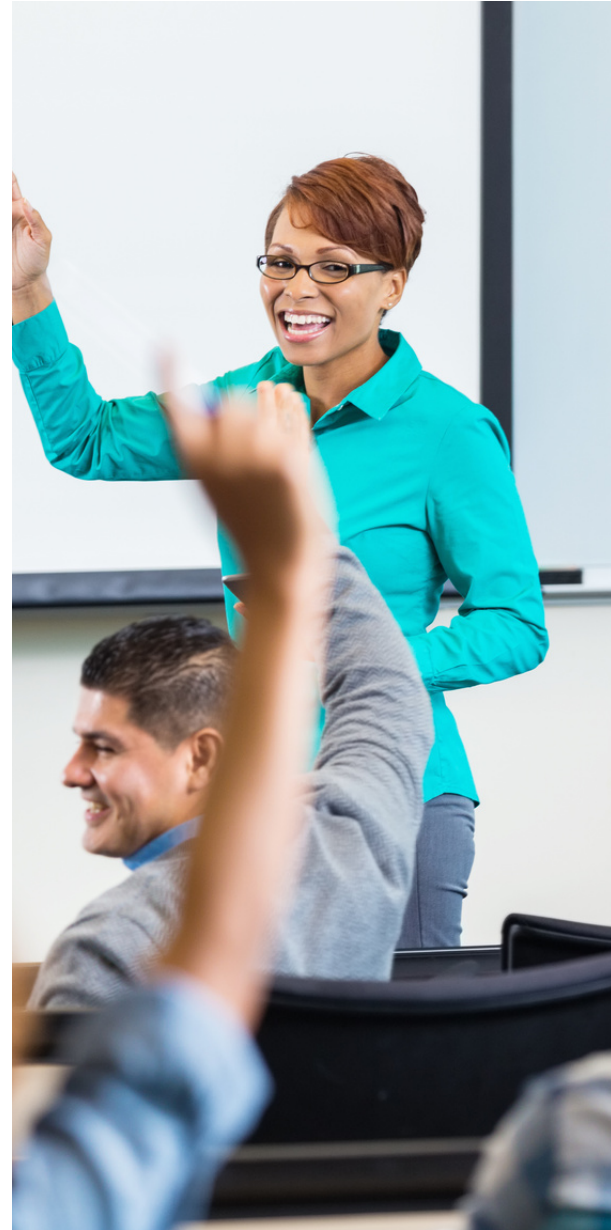
In preparing for teaching mathematics with social justice it is important to identify and be specific about the authenticity of the work in three contexts: the lived experiences of the people in the room, classroom community, and the critical thinking aims behind the lesson. All of this happens within existing educational structures: how people interact with each other in a classroom will become more humanized, but the structure (e.g., policies) of a department or school may remain unchanged.

Lived experiences

Teaching with social justice requires instructional practices and class routines that create and support equitable status and participation. This includes students as decision-making agents about how the challenges they face in life (in and outside the classroom) can be analyzed, critiqued, and addressed with/through/by mathematical knowledge and skills. Instructors and students learn about what matters to them, individually and collectively, by identifying and valuing the different ways of being mathematically capable in context. In each person's lived experiences are challenges for which mathematical knowledge and skills constitute some of the tools needed to meet (or change) the challenge. Other tools include the lived experiences, cultural practices, and co-constructed-on-the-fly innovations that people bring to making sense of the world. All of these are tools in teaching mathematics with social justice.

Classroom community

Community building begins in the syllabus (Taylor et al., 2019) and is rooted in what happens on the first days of class (Lang, 2018). Because college students are adults, instructors have opportunities for key moves (Bok, 2022) in the classroom that include students in the choices made by the group about how communication will happen, what norms for behavior are negotiated, and how these are maintained and calibrated by the class as the course continues. Singleton's (2015) courageous conversations framework has become a cornerstone in the work of teaching with, about, and for social justice. The framework is built on four agreements made by



participants in a conversation before it starts. These agreements contradict some tightly held U.S. majority cultural norms. To participate in a “courageous conversation” people agree to: (1) stay engaged, (2) expect to experience discomfort, (3) speak their truth and hear the truths of others, and (4) expect and accept a lack of closure. Navigating the four agreements requires awareness about oneself, others, and the flow of the conversation itself (Marano, 2019).

Critical thinking

Considering mathematics with justice is an acquired skill set. Be transparent about the rationale for teaching a particular issue and explain how you and the lesson are approaching it — the goal is not to get students to adopt a particular stance but to get them to think critically (Blonder, et al., 2022; Boudreau, 2022; Pace, 2021). Gradually build up your own and student capacity for discussing injustice as the year progresses. Resources like those found in [Civic Online Reasoning](#) and the undergraduate mathematics focused books by Karaali and Khadjavi (2019, 2021) can help in supporting productive persistence.

Teaching Mathematics About Social Justice

Teaching mathematics about social justice involves planning a lesson to look at serious or even provocative issues using mathematics to understand it, in which (Berry et al., 2020):

- students grapple with social and mathematical goals simultaneously
- instructors orchestrate classroom interaction by anticipating, monitoring, selecting, sequencing, and connecting mathematical and social justice topics.

Choosing lessons

Such lesson planning includes [preparing yourself and your students to explore injustice](#) (Osler, 2021). Essential in selecting [K-12 lessons about social justice issues](#) or [college-level activities about issues of social injustice](#) is choosing lessons you and your students will be stretched to do and that have useful pre-lesson work about the context of the issue to scaffold you and your students in the effort (e.g., a reading, video, podcast). If you are just getting started, select lessons that have supports for instructional use (e.g., Karaali & Khadjavi, 2019, 2021).

Supporting mathematical conversations about social justice issues

Instructors will encounter a variety of challenges. Facilitating effective group discussions includes handling those who decline to participate and those who could end up dominating conversation (tip: ask one or more members of a group to take on the role of purposeful non-verbal observer who later report to the group about the observed interaction). Good, mathematically dense conversations about injustice will involve uncertainty (Marano, 2019). The instructional goal is to support clarity and specificity -- about both mathematics and justice -- in discussions where awareness of values and the role of evidence are agreed upon by those in the conversation (Sheridan Center, 2022).

Remind yourself and students the conversation is about mathematical ideas and social justice ideas, not personalities. Before, during, and after each lesson, consider your role as teacher and conversational participant, and your plans about if/when to play devil's advocate, ally, or referee as you support students to use mathematics to understand controversial issues that include open questions in terms of how mathematics is used and society is (re)shaped (Pace, 2022).



Teaching Mathematics For Social Justice

While college math classrooms are typically structured around shorter-term content learning goals, teaching for social justice requires thinking about longer goals that frame students in a larger roles as citizens, activists, and change agents. With that lens, the act of teaching mathematics takes on broader purposes.

Reducing injustice

Teaching mathematics for social justice is based on the idea that mathematics is a way to reshape the status quo, that mathematical activity can be part of actions that transform social, political, and economic conditions to reduce injustice (BBA, 2017).

Necessary (but not sufficient) to teaching mathematics for social justice is instruction that seeks to develop students' identity, how they view themselves as thinkers and doers of mathematics, so they apply their mathematical knowledge and skills outside the classroom. It seeks to foster a sense of agency among students. For example, a class might have an explicit goal for students to leverage their knowledge of mathematics to make a positive difference in the world (Kung, 2019).

Increasing relevance to life outside the classroom

Using lessons that allow students to use mathematics to explore social injustices in a classroom setting helps build their skill set so that they can transfer lessons learned during the classroom experience to authentic life injustices they may encounter. Lessons learned must extend beyond using mathematics to solve “classroom problems” to ones that prepare students to cultivate the skills, habits, and dispositions for participation in their community. Such lessons break out of traditional academic silos, incorporating content from history, political science, economics, environmental students, and other fields – all with the goal of not just understanding a challenge better, but doing something to address the challenge, whether during that term or in the future. This learning includes attention to open questions in terms of how mathematics is used and society is (re)shaped (Pace, 2022).



Next Steps

The challenge for any instructor is: how do I teach so that all students have opportunities to learn, not just the students with whom I experience cultural or experiential alignment? Berry III, Conway IV, Lawler, and Staley (2020) provide guidance (see Figure 1). These instructional strategies pull together all three aspects discussed: with, about, and for social justice. The professional skills needed by instructors include developing preconditions established in earlier work in teaching mathematics with and about social justice (e.g., first column in Figure 1), along with instructional characteristics (second column), and intentional strategies in teaching mathematics for social justice (third column). Consider these strategies as you build your practice and skills in teaching with, about, and ultimately for social justice.

Teaching Mathematics for Social Justice Instructional Strategies

PRECONDITIONS FOR TEACHING SOCIAL JUSTICE	CHARACTERISTICS OF TEACHERS WHO TEACH SOCIAL JUSTICE	SOCIAL JUSTICE TEACHING STRATEGIES
Recognize and validate students' perspectives.	Incorporate student mathematical strengths and varied perspectives.	Engage students in the varied perspectives of other students.
Appreciate varied perspectives in school.	Demonstrate high expectations of each and every students.	Engage students in actionable social change.
Value teacher-student relationships.	Facilitates discussions between students that ensures opinions are valued.	Legitimize students' real-life experience.
Value the stories and lived experiences of others.	Form emotional affiliation with each and every student.	Provide storytelling of others to shape and describe varying perspectives.
Provide space for authentic student voice.	Exhibit a genuine caring attitude toward each and every student.	Use investigative learning processes.
Ensure security for marginalized youth.	Engage with the community.	Provide real and meaningful opportunities to engage with data and contextual situations.
	Listen actively and synthesize student voice.	Include content relative to students' lives - social and cultural experiences.

Figure 1. Social justice teaching strategies (Berry, Conway, Lawler, & Staley, 2020, p. 69). Reprinted with permission by Corwin Press

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