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Teaching College Mathematics With, About, and For Social Justice

A Guide for Educators

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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 within societal structures. It may be a universal truth that $2 + 2 = 4$, assuming the now-standard meanings of these 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 society and mathematics influence each other. Here, “society” includes the social, political, and economic aspects of the United States. Within that society, the goals of postsecondary mathematics teaching and learning can vary along a continuum. At one end is the educational aim of integrating the next generation into the status quo (e.g., becoming compliant employees). At the other end is the aim to be the means by which people deal with the status quo as they participate in reshaping society (e.g., becoming innovating, employed change agents). In fact, all of the activities of teaching, learning, and researching mathematics are intricately connected with societal 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 that social justice can be realized in mathematics 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 social 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 being purposeful in articulating the rules of college. 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 such as 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 transform a deeply unjust and unfair world.

As for the term justice itself, it is sometimes used interchangeably with equity. The authors see equity as a significant component of justice, although certainly not the only one. Justice and equity work together in a mathematics classroom 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 or hidden. Contemplating such questions opens the door for enormous learning by those of us who teach.

This guide was written by and for college mathematics educators. It offers strategies and resources to help create equitable and just learning environments that may also support students to productively explore important social topics through mathematics.

Consider your responses to each of the following:

Reflect

(With) Think back to a classroom experience where social interactions adversely and unjustly impacted your experience as a learner. 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 that 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 courses are they likely to learn that content?

Teaching Mathematics With Social Justice

When 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, the classroom community, and the critical thinking aims behind the lessons. All teaching happens within existing educational structures—how people interact with each other in a classroom can become more humanized, while the structure (e.g., policies, procedures) of a department or school may remain unchanged.

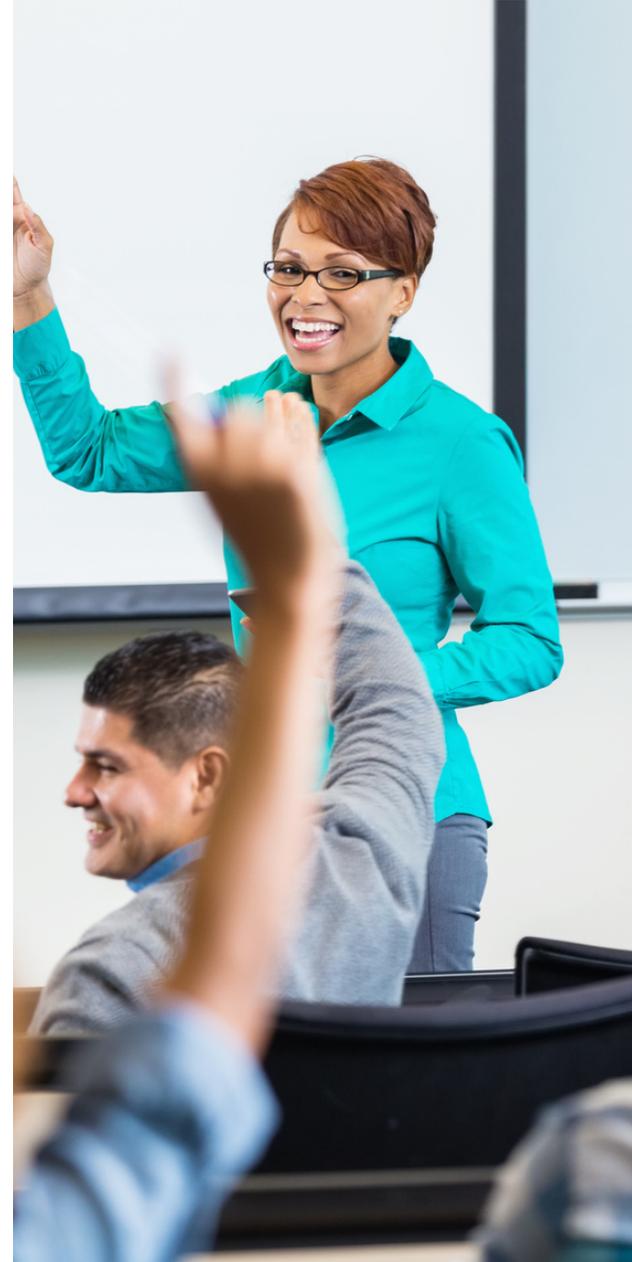
Lived experiences

Teaching with social justice requires instructional practices and classroom routines that create and support equitable status and participation. This equity-based approach includes positioning students as decision-making agents who understand how the challenges that they face in life (inside and outside the classroom) can be analyzed, critiqued, and addressed through 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. Each person has likely experienced challenges for which mathematical knowledge and skills constitute some of the tools needed to meet (or address) the challenge. Other tools include the cultural practices and co-constructed-on-the-fly innovations that people bring to making sense of the world. All of these are tools that can be referenced and used when 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 day of class (Lang, 2018). Because college students are adults, instructors have opportunities for key moves (Derek Bok Center for Teaching and Learning, 2022) in the classroom that include students in the choices made by the group about how communication will happen. The framework in *Courageous Conversations About Race* (Singleton, 2015) 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 (a) stay engaged, (b) expect to experience discomfort, (c) speak their truth and hear the truths of others, and (d) expect and accept a lack of closure. Navigating those four agreements requires awareness about oneself, others, and the flow of the conversation itself.

Critical thinking

Considering mathematics with justice is an acquired skill set. As an instructor, 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, 2022). Gradually build up your own and your students’ capacity for discussing justice and injustice as the year progresses. Resources such as those found in [Civic Online Reasoning](#) (Stanford History Education Group, 2022) 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 lessons that use mathematics to examine and understand serious or even provocative issues in which (Berry et al., 2020)

- students grapple with social and mathematical goals simultaneously; and
- 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). When selecting [lessons about social justice issues](#) (Radical Math, 2022) or [activities about issues of social injustice](#) (Karaali & Khadjavi, 2021), it is essential to choose lessons that provide productive

challenges and have useful pre-lesson work (such as a reading, video, or podcast) about the context of the issue to scaffold you and your students in the effort. 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

There are many challenges in teaching mathematics about social justice. For instance, facilitating effective group discussions will include handling students who decline to participate and those who dominate conversation. (Tip: ask one or more members of a group to take on the role of purposeful non-verbal observer who later reports 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 your students that the conversation is about mathematical ideas and social justice ideas, not personalities (Learning for Justice, 2022). Before, during, and after each lesson, consider your role as teacher and conversational participant and think about when to play devil’s advocate, ally, or referee as you support students to use mathematics to understand controversial issues.



Teaching Mathematics For Social Justice

While college mathematics classrooms are typically structured around relatively short-term content learning goals, teaching for social justice requires thinking about longer-term goals that frame students in 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 ideas that mathematics is a way to reshape the status quo and 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' identities—how they view themselves as thinkers and doers of mathematics—so they can 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 apply mathematics in a classroom setting to explore social injustices 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 communities. Such lessons break out of traditional academic silos, incorporating content from history, political science, economics, environmental studies, and other fields—all with the goal of not just better understanding challenges, but doing something to address those challenges, whether during the term of their mathematics class or in the future. This learning includes focusing attention on [open questions about how mathematics is used and society is \(re\)shaped](#) (Pace, 2022).

Next Steps

The challenge for any instructor lies in answering the question, “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 on instructional strategies that incorporate social justice (see Figure 1 below).



These instructional strategies pull together all three of the aspects discussed in this paper: with, about, and for social justice.

Figure 1. Social Justice Teaching Strategies

PRECONDITIONS FOR TEACHING FOR SOCIAL JUSTICE	CHARACTERISTICS OF TEACHERS WHO TEACH FOR 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 student.	Engage students in actionable social change effort.
Value teacher-student relationships.	Facilitate 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.

Source: Berry III, Conway IV, Lawler, & Staley (2020, p. 69). Reprinted with permission by Corwin Press.

As shown in Figure 1, the elements needed to incorporate social justice into classrooms include instructor mindsets, skills, and practices that support and facilitate teaching mathematics with and about social justice (the first column in Figure 1); instructional characteristics that support a productive learning environment for each student (the second column); and intentional strategies for teaching mathematics for social justice (the third column). Consider these strategies as you build your practice and skills in teaching with, about, and ultimately for social justice.

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