

Proportional Reasoning as a Tool to Understand Structural Racism in a Senior Capstone Course

Molly Robinson
Portland State University

Eva Thanheiser
Portland State University

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Teaching mathematics in exclusively de-contextualized ways sends students the message that mathematics is not a tool that people can use to make sense of or change the world (Aguirre et al., 2019; Stephan et al., 2021). Lord (2020) found that the perception that mathematics is not useful in making the world better is one reason that some girls who achieved high levels of mathematical success choose not to pursue mathematics in college. Students of Color have shared that the ways mathematics can be used to impact their lives was missing from their secondary mathematics experiences, and that they wanted to use mathematics to promote social justice (Jett, 2019; Rodriguez et al., 2020; Varley Gutierrez, 2009). Adult undergraduate learners have lower levels of math self-efficacy than more “traditional” college students in mathematics content that is perceived as academic, but similar levels when math is seen as useful (Jameson & Fusco, 2014). So, learning about how mathematics can be used in social justice contexts can support students in choosing to continue their mathematics education.

Mathematics is a tool that humans have developed for specific purposes as the needs and wants of their communities have changed over time (Joseph, 2011), including making sense of social justice issues. Proportional reasoning in particular is the foundation of most arguments about equitable treatment and outcomes in politics, media, and education (e.g. Crenshaw, 1989). But students may understand concepts like percentages and ratios procedurally without being able to apply them in social justice contexts (Simic-Muller, 2015). Given the primacy of this content in understanding (in)justice, we wanted to study how a group of college students in a course titled “The Mathematics of Racism” made sense of ratios *and* racism together. We developed a lesson in which students explored claims in newspaper articles about the election of Indigenous Congresspeople through making sense of proportions. Our research question is: To what extent do students see mathematics as connected to social justice issues after the lesson?

Methods and Preliminary Results

The lesson was developed for a synchronous online senior capstone course at a public university in the Pacific Northwest in the Spring of 2023. The data were all 10 participating students’ recorded video reflections on the lesson captured in FlipGrid in response to three questions: What did you learn about mathematics? What did you learn about racism? What do you want to know more about? We analyzed the data by identifying which features of Gutstein’s (2006) teaching mathematics for social justice framework and Kokka’s (2020) critical mathematics consciousness were indicated by students’ video reflections.

Students did connect their mathematical learning to social justice by helping them see how mathematics can help them make sense of the world and advocate for change. Every student referred to at least one issue of the representation of Indigenous people in Congress that they thought was unfair or wrong, and all but one student shared that mathematics helped them make sense of the (un)fairness they saw. This is an example of what Gutstein (2006) describes as reading the world with mathematics. Also, 7 students expressed a desire to have things change or to be part of the change themselves, suggesting that students developed their sense of being agents for social change as described by Kokka (2020).

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