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GUEST EDITORIAL

Does That Count? How Mathematics Education Can Support Justice-Focused Anti-Racist Teaching and Learning

Gloria Ladson-Billings
University of Wisconsin–Madison

> "Numbers is hardly real and they never have feelings…"
> – Mos Def, 1999, 3:30

In 1999 the hip hop artist Mos Def (a.k.a. Yasiin Bey, born Dante Terrell Smith) released an album that contained the song "Mathematics." The song speaks to the disparities between Black urban and White lives in the United States by quoting a litany of statistics, including the differences in defense spending and spending on social services along with statistics on incarceration rates, minimum wage, unemployment rates, and the way that mathematics reduces human beings to numbers—social security numbers, phone numbers, zip codes. Mos Def's (1999) declaration that "It's a number game, but sh%t don't add up somehow" (1:09) helps to dispel the notion that mathematics does not enter into the question of equity and justice in our society.

For more than 30 years I have been working with teachers, teacher candidates, graduate students, and community members about the role of teaching and learning in promoting and supporting equity, justice, and democracy in our schools and broader society. Those who teach history/social science, English/language arts, and fine arts often recognize the connections among questions of culture, race, and inequality and their disciplines. However, colleagues in what we deem the STEM fields (i.e., science, technology, engineering, and mathematics) often reject the notion that their subjects are amenable to what we consider racial, ethnic, or cultural issues. It is not unusual for me to hear someone remark, "I teach physics (or mathematics); this stuff doesn't apply to me!" They make claims of objectivity or neutrality that should shield them from having to engage in conversations of diversity, equity, and inclusion. Other colleagues who do not reject the notion that there is a relationship between STEM fields and issues of diversity, equity, and justice often connect with superficial aspects of "multiculturalism" and believe sharing information about diverse scientists

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GLORIA LADSON-BILLINGS is the former Kellner Family Distinguished Professor of Urban Education in the Department of Curriculum and Instruction at the University of Wisconsin–Madison and currently serves as the President of the National Academy of Education. Her research on culturally relevant pedagogy and critical race theory has been widely influential in the field of mathematics education, and many others.

and mathematicians is sufficient. Thus, students hear about Benjamin Banneker, Garrett Morgan, Katherine Johnson, or the ancient Egyptian pyramids and the Mayan concept of zero as exemplars that "different" people participated in STEM fields. However, these isolated bits of information are rarely, if ever, connected to big ideas that aid students in the understanding and application of the science.

Mathematics educator Eric "Rico" Gutstein from the University of Illinois–Chicago has demonstrated a more seamless integration of justice issues when teaching students at Social Justice High School in Chicago (see Gutstein, 2013). Gutstein taught the students how much people actually paid when they purchased a home by showing them what happens with compound interest and the need to get private mortgage insurance for homeowners who purchase a home with a conventional mortgage and less than 20 percent down payment. Gutstein helped students see that poorer buyers of color were more likely to be in this position, and once the students began to calculate what those buyers would pay overall versus what a buyer with a 20 percent or greater down payment would pay, they were shocked to see the large difference in the amount paid for houses of the exact same costs. The justice applications of mathematics both surprised and angered the students while making them determined to understand mathematics at a level that would prevent their being cheated in the future.

In another instance, a student complained to his teacher that the school's "no hat" rule was applied in a discriminatory way against Black students. According to the student, Black male students were singled out by teachers and administrators for violating the hat policy far more than their White peers. The teacher asked the student for evidence of his claim. When the student could only provide anecdotal evidence from his own encounters and those of a few of his friends, the teacher worked with the class to design a study. The teacher helped the students write a hypothesis about the likelihood of race being a predictor of whether or not a student would be stopped and sanctioned for wearing a hat inside the building. The class was divided into four groups with each group charged with sampling at least 25% of each of the classes (i.e., freshmen, sophomores, juniors, and seniors). Then the students designed a brief survey with student demographics (race, gender) and two questions—"Have you ever been stopped for wearing a hat in the building?" and "If yes, what happened after you were stopped?" When the students brought their data back, the teacher used their results to teach mean, mode, and median and how to construct graphs. Their results proved the students' hypothesis. The students asked to look at gender as a predictor and found that, taken together, race and gender (i.e., being Black and male) were the strongest indicators of whether one would receive a sanction for wearing a hat indoors. The students wrote up their findings and presented them to the school principal. To his credit, the principal shared the findings with the faculty and declared that the results were unacceptable. He required the teachers and staff to modify their

behavior in the monitoring of the hat rule. The students were able to use their mathematics knowledge to solve a real personal social problem.

Mathematics, like most science disciplines, is about solving problems and understanding patterns. The patterns that emerge in mathematics can be understood through the prism of race, class, gender, and other forms of difference. On almost any dimension of human well-being, we can see a pattern of disparity. The question for mathematics is how to explain the pattern followed by what problem can we solve that emerges from the pattern. For example, students might examine the pattern of the relationships among educational attainment, employment, and income. If higher educational attainment is a predictor of better employment and higher income, what explains the fact that the unemployment rate for Black college graduates is higher than that for White high school graduates (Morrison, 2020)?

Within the mathematics education community, scholars have taken a position to align mathematics education with social justice. For instance, in *Mathematics Education Through the Lens of Social Justice: Acknowledgment, Actions, and Accountability*, a joint position statement from the National Council of Supervisors of Mathematics and TODOS: Mathematics for ALL, the organizations committed to four broad goals: eliminating deficit views of mathematics learning; eradicating mathematics as a gatekeeper; engaging the sociopolitical turn of mathematics education; and elevating the professional learning of mathematics teachers and leaders, with a dual focus on mathematics and social justice.

Tate, Ladson-Billings, and Grant (1993) discussed how one of the nation's most noted Supreme Court cases, *Brown v. Board of Education* (1954), allowed school districts to provide a mathematical remedy to the problem of school segregation. Schools could have just as easily redrawn attendance boundaries or paired schools so that part of the education students received was in each of the two schools. Instead, most school districts determined that a certain number of students was needed to desegregate a school.

Because mathematics is so embedded, indeed reified in U.S. society, there are numerous mathematical examples throughout the nation's history that can be used to explain patterns of inequity, injustice, and the denial of democratic citizenship rights. For example, when students learn of the 3/5ths Compromise, are they ever asked to determine exactly how many representatives that added to slave holding states? Or students can use U.S. census data to determine the various ways groups have been counted over time (e.g., Mexican Americans were once counted as White). Presidential elections make excellent data sources for understanding polling.

On a more personal level, students can look at housing assessments in their communities versus assessments in other neighborhoods in their cities or towns. They can draw inferences about what the differences in assessments may mean. An interesting exercise for students is to look up the assessed value of their homes when they were initially sold and determine the difference between then and the current value.

This exercise can give students an understanding of how people who can afford to stay in a home can build equity and accumulate wealth, whereas those who are renters are not building equity or wealth through real estate.

The challenging headlines provide mathematics teachers with ample data for constructing mathematics problems. For instance, the horrific stories of police shootings of unarmed citizens can be placed in a larger context. How many unarmed people were actually shot in a particular municipality? What are the characteristics of those people? What is the likelihood that certain people will become victims of a police shooting? The very topic of disparity is an excellent one for exploring mathematical problems—issues of differentials in life spans (exploring actuarial tables), incarceration rates, suspension rates, high school graduation rates, or dropout rates are good sources of problems.

If we return to Mos Def's (1999) "Mathematics," we find a line that says, "Like I got, sixteen to thirty-two bars to rock it but only 15% of profits, ever see my pockets…" (1:11). For students, this can mean tracking album sales and calculating how much the artist actually nets. Students with part-time jobs should be able to calculate how much of their income goes to federal, state, and local taxes, social security contributions, and other deductions. The point is mathematics surrounds our lives and should never be relegated to only one group of students.

Perhaps the most significant reason I think mathematics educators must be engaged in work dealing with diversity, equity, and justice has to do with its civic imperative. In the 1950s and 1960s when African Americans were fighting for their constitutional right to the franchise, many civil rights activists realized how important it was for African Americans to be literate. From the earliest days of arrival on American shores, people of African descent who were enslaved were prohibited from learning to read. Becoming literate meant they could read documents that pertained to their futures (e.g., proposed sales and mortgages involving enslaved people as collateral, etc.). Being able to write meant enslaved people could produce manumission papers and make their way to free states and territories. This placed literacy at the center of the movement for liberation.

As we moved into the 20th century, it became clear that success in U.S. society would require citizens to have more advanced education in a variety of areas. One area that was a key to career success in this modern world was mathematics. Although the "average" American was thought to only need a rudimentary knowledge of mathematics (i.e., arithmetic), those who would be leaders and innovators would need knowledge and facility in advanced mathematics. They would have to understand algebra, geometry, trigonometry, calculus, and statistics. Civil rights leader and mathematician Robert Moses recognized the connection between mathematics and civil rights. His book *Radical Equations: Civil Rights From Mississippi to the Algebra Project* (Moses & Cobb, 2002) described how he saw Black students being excluded from the thinking and reasoning that undergirds mathematics. Moses saw

economic freedom as the key to full participation in U.S. society and mathematical literacy as the key to economic advancement. By insisting that all students can and should have access to algebra, Moses was breaking a longstanding paradigm that suggested only *certain* students should have access to algebra. Moses's notion that mathematical knowledge was a civil right brought the discipline out of the narrow confines of academic learning and into the notion of basic skills citizens need to function in a democracy.

In 2009, the Commission on Mathematics and Science Education declared,

> Our nation needs an educated young citizenry with the capacity to contribute to and gain from the country's future productivity understand policy choices and participate in building a sustainable future. Knowledge and skills from science, technology, engineering, and mathematics—the so-called STEM fields—are crucial to virtually every endeavor of individual and community life. All young Americans should be educated to be "STEM-capable" no matter where they live, what educational path they pursue, or in which field they choose to work. (p. vii)

So, if we see mathematics as a key aspect of our citizenship and we know that large segments of our students are not able to access high-quality mathematics teaching and learning, what does that say about us as a nation?

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