

Book Review

Reading and Writing the World with Mathematics:
Toward a Pedagogy of Social Justice
By Eric Gutstein
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What happens when the focus of mathematics education in the classroom changes from an alleged values framework (Arbaugh & Brown, 2005) to a framework that envisions mathematics as a tool to understand and shape cultural, societal, and political values? (Dede, 2006). How does student understanding of mathematics transform when students are encouraged to use mathematics to make sense of the world around them, a world that includes questions that are not usually raised in mathematics classrooms and answers that are rarely straightforward? (Orey & Rosa, 2006). This leads us to consider whether mathematics is a value-free academic subject or, indeed, as is all of education, a political one (Bishop, Clarke, Corrigan, & Gunston, 2006; Freire, 2000).

Eric Gutstein (2006) addresses these questions in his recent book, *Reading and Writing the World with Mathematics: Toward a Pedagogy for Social Justice*, stating that the context within which mathematics is taught shapes our political and sociological awareness. When students use mathematics to frame their vision of the world, they begin to recognize variability and inconsistencies associated with class, race, culture, and community. Gutstein argues that, to become agents of change in the world, students have to grasp mathematical nuances.

In many humanities classrooms, teachers introduce questions of lo-

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cal, national, and global importance and ask students to consider moral and ethical consequences of decision-making (Jaeger, 2006). Students explore such issues as “isolationism versus internationalism,” or “the competing demands of the labor movement and economic outsourcing.” Many mathematics classrooms also tackle weighty concerns and students consider how mathematics frames such issues as economic planning and job restructuring (Dede, 2006). They may consider such questions as: How is a nation’s economy affected by the decision to go to war? How do companies’ profits change when labor unions step in to represent the workers? What is the financial impact on companies when they move their manufacturing plants outside of the United States? In mathematics, the solutions to these questions are assumed to be straightforward: identify the correct algorithm to complete the necessary calculations and the answer is evident.

However, when teachers introduce students to the ethical consequences of mathematically-based decision-making, students learn to use the most important tool available to create change in their lives and their world: understanding social justice through the lens of mathematical evidence (Mukhopadhyay & Greer, 2007). When teachers change the way mathematics is taught, students recognize the broader contexts in which mathematics is used and understood and have the opportunity to take control and make changes in their lives well beyond the classroom (Gonzales, Andrade, Civil, & Moll, 2001; Gutstein & Peterson, 2005). By putting mathematical decision-making in political and economic contexts, students begin to recognize that mathematics gives them the power to identify and acknowledge injustice, measure the societal costs and benefits of global decision-making, and take action and make changes in society (Mukhopadhyay & Greer, 2007; Orey & Rosa, 2006).

Despite its potential, mathematics is rarely recognized as a powerful tool for societal change. Mathematic algorithms are seen as direct, given repetition and practice. The mathematical implications of social justice considerations, however, introduce gray areas and uneasy possibilities, not usually associated with the clear-cut answers expected from mathematical strategies. Yet, Gutstein has argued effectively and insightfully that tying mathematics knowledge to students’ cultural and experiential backgrounds, while helping them develop the tools of critical thinking and mathematical rigor, empowers them in all areas of their lives, inside and outside the classroom (Gutstein, 2003; Gutstein, Lipman, Hernandez, & de los Reyes, 1997).

In *Reading and Writing the World with Mathematics: Toward a Pedagogy for Social Justice*, Gutstein (2006) documents the power of a socially just mathematics curriculum in the lives of his middle-school

students and their families. Simultaneously, he ponders his role as teacher, mentor, facilitator, and community member. He watches as his students grow beyond their years, as they enter adulthood, and articulate the impact of this socially just mathematics education on their lives.

At Rivera Middle School in “Morningside,” an immigrant Mexican neighborhood in Chicago, where the students were assumed to be troubled, troublesome, and non-academically inclined, Gutstein invited his 7th and 8th grade students to think about the larger world around them. The mandated curriculum, either *Mathematics in Practice* or the *Connected Mathematics Project*, presented a problem-based mathematics course, contextualized within a set of middle class presumptions, values, and expectations, such as shopping, music, and vacation travel. For Gutstein’s students—poor, minority, and often saddled with adult responsibilities—the scenarios presented in the texts were aseptic and devoid of a context from which to make the mathematical answers meaningful in their lives. Thus, the equity framework for mathematics education, espoused by state and federal agencies (National Council of Teachers of Mathematics, 2000), could not be realized. Instead, Gutstein introduced his students to a mathematical understanding that encompassed the realities of their lives, including such concerns as institutional racism, community gentrification, the politics of immigration, and the loss of “traditional” Mexican family values.

Using current standards-based mathematical curriculum, tied to questions that related to their lives and families, Gutstein prepared his students for Illinois’ high stakes state exams, while helping them become cognizant of the power of mathematical thinking and understanding. He gave his students data from newspapers, textbooks, and advertising, as well as introduced them to mathematical algorithms and ways of thinking about and organizing ideas, which allowed them to both recognize and deconstruct underlying patterns in the data.

Asking critical questions about institutional motivation and individual choices, they interpreted their observations within the context of their own experiences. Students were challenged to reconstruct the data and to use mathematical evidence to explain how money, communities, and politics affected their lives and the Morningside community. Mathematics became a tool to support an argument, and the mathematics classroom became a place to debate policy and change within modern society. Rather than letting the high stakes tests drive the classroom curriculum, instead, mathematics was situated within a rich curriculum that acknowledged and incorporated the knowledge that students brought to classroom, bearing in mind the protocols of the standardized tests that students were expected to pass.

Gutstein treated his students as stakeholders in Morningside, a neighborhood in transition from poverty to gentrification that was struggling with disparities in housing availability and job opportunities. Within this context, students explored whether institutional racism in bank loan practices was associated with the lack of Mexican home ownership. A student volunteered that her cousin joined the army to offset the cost of college. This led to a critical mathematical evaluation of the cost of developing fighter planes for the military, the impact of those costs on local educational funding, and the vocational options within their neighborhood. Students expressed frustration because they were not allowed to apply for admission into Chicago's elite public high schools because their standardized test scores were too low. Thus, standardized test scores were evaluated in light of language and cultural inequities in the Chicago public school system. Notably, after a year of this type of contextualization, nearly all of Gutstein's students passed the state exam, surprising many members of the school's administrative team.

Socially-just pedagogy has many detractors, who fear that this type of education is a form of propaganda, whereby students are expected to agree with a single political and economic analysis of the world. Yet Gutstein's students did not always agree with his analyses, nor did they agree with each other. In fact, what they learned was how to articulate their opinions, share possibilities, and support their perspectives with mathematical insights, community knowledge, and evidence-based interpretations of interpersonal interactions. They learned to create coherent arguments that could be analyzed, modified, and articulated. When describing the financial impact of gentrification in Morningside, students recognized the complex balance between jobs and infrastructure on one side and the potential destruction of a cohesive Mexican community on the other. Mathematics was used to calculate the financial impact on the community, but, alone, it could not explain how changing finances might influence family structures and neighborhood identity. However, the mathematics in conjunction with knowledge of the community empowered students to create mathematical meaning that went beyond the financial calculations. Thus, Gutstein's middle school mathematics class created examples illustrating the power of mathematical understanding and the use of mathematical evidence. Mathematical "answers," once viewed as inviolate, were placed within economic, political, and community contexts that precluded clear assignment of right or wrong, true or false.

Gutstein pulls no punches. His teaching style was not always acceptable to the school's administration, and he was removed from his classroom for several months. Even some of his students questioned his non-traditional approach to teaching mathematics, and they lacked

interest in participating fully in class discussions and activities. Gutstein decries his own “lack of consistency, inflexibility in adapting to students’ conditioning” (p. 159), as well as his outsider status, which limited his knowledge of cultural codes associated with effective communication.

Nevertheless, consistently, parents were his supporters, explaining that “education was meaningful if it helped prepare their children to be aware of, and respond to, the injustices that they would face as members of marginalized communities” (p. 197). The parents understood that the combination of traditional mathematics and social justice pedagogy within the mathematics class offered their children a way out of the limited world of Morningside. Moreover, years later, even students who were not happy during their years in his classroom expressed their appreciation. As one student explained, “What the class gave me was the ability not only to recognize social issues, but I also believe it harvested an attitude which does not allow me to feel helpless” (p. 169).

Changing the context of mathematics education to include opportunities to critique the world around them empowered students and gave them the autonomy and authority to question their world and explore alternatives. The recognition that the world is nuanced and textured and that mathematical answers are not “truth,” but rather options and opportunities, is an important lesson. Ultimately, Gutstein reminds us that all education—especially mathematics education—is political. If school mathematics introduces students to questions of limited depth that only acknowledge superficial ideas, then students only understand mathematics to be a simplistic tool. But in the hands of an astute and aware teacher, who recognizes how critical thinking can transform mathematical answers into evidentiary instruments, students begin to acknowledge their own agency in transforming themselves and their community.

Teaching mathematics in the context of the students’ lived communities is a large and unwieldy undertaking, but one that offers wide-ranging, long-term results. This type of mathematics education requires that teachers become at least partially embedded in the students’ families and community experiences, which allows teachers to recognize what is important for the students’ educational welfare. Teachers who choose to teach mathematics for social justice need to recognize, understand, and integrate locally relevant mathematics encounters in the classroom and be able to help students understand both community and global implications of mathematical solutions. From the students’ perspective, placing mathematics within the context of their own lives gives them opportunities to make sense of memorized algorithms and other mathematical ideas within a framework that recognizes their own priorities, struggles, and doubts.

Teaching mathematics within this type of contextualization is powerful, but it also presupposes that teachers are well equipped to understand the sociological, political, and economic implications of mathematical solutions. For teachers of mathematics, especially at the elementary and middle school levels, this may be a daunting task, pushing them beyond the bounds to which they are exposed during their teacher training. Yet, as Gutstein so clearly articulates, if all education is political, then perhaps we are obligated to reconceptualize teacher education to ensure that these broader content and context goals are recognized and incorporated into all classrooms and all pedagogical decisions.

Gutstein asks his readers to recognize three explicit strengths of teaching mathematics for social justice. By grounding mathematical understanding in a world beyond the life of a teenager, mathematics becomes a sense-making activity and a descriptive tool to organize real data in the real world. Second, by grappling with different ways of deconstructing political and economic concerns, students understand mathematical concepts at a deeper level. They recognize that different processes highlight different realities: for example, mean income and median income tell different stories. Finally, critical uses of mathematics illuminate gray areas. Only in traditional mathematics textbooks are the answers right or wrong. In the real world, mathematical answers are colored by the situations within which the mathematical questions are asked.

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