REINVENTING FREIRE: MATHEMATICS EDUCATION FOR SOCIAL TRANSFORMATION

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For Paulo Freire, education was a necessary part of the political process of changing society. Mathematics education can play that role, supporting young people to read and write their worlds with mathematics as a key analytical means. In urban Chicago, our mathematics work in a social-justice-oriented high school of low-income African American and Latino students attempts to reclaim Freire's purpose. In this paper[2], I describe our praxis—teaching, learning, and research in mathematics education which involves teachers and the students themselves in collaborative efforts. We focus on preparing both the youth and adults to participate in social movements and political change.

> No oppressive order could permit the oppressed to begin to question: Why? (Freire, 1970/1998, p. 67).

Paulo Freire left us many things from which to learn, and several of them have particular meaning for my work. First and foremost is that education needs explicitly needs to be in the service of the people of the world, standing firmly with the oppressed against capitalism and neoliberalism (1994, 1998, 2004). Though Freire acknowledged the limitations of education by itself in changing society by itself, he believed it played an important, essential role in social transformation. For him, education needed to be for liberation rather than for domination and submission which is how it functions in urban US schools (and elsewhere). His terms, *reading the world*, or developing a deep sociopolitical consciousness of relations of power and the genesis of structural oppression, and *writing the world*, or taking one's own destiny into one's hands one's own destiny to make history, are useful ways of understanding education in relation to changing the world.

Second, he argued that teachers and students need to be partners, learning from and working with each other, in various movements for liberation, including in anti-colonial, independence struggles (e.g., Guinea-Bissau and Cape Verde, Freire, 1978), adult literacy campaigns (e.g., Brazil, Nicaragua, and Grenada, Freire, 1994), and school settings for children and youth (e.g., São Paulo, and the United States, Freire, 1993; Freire & Macedo, 1987). Teachers need to see students as allies in common struggles for social justice; this perspective echoes the long history and tradition within the US of African American education for liberation (Anderson, 1988; Bond, 1934/1966; Du Bois, 1935; Perry, 2003; Provenzo, 2002; Siddle Walker, 1996; Woodson, 1933/1990).

Third, he saw history "as possibility." By this, he meant that "the future does not make us. We make ourselves in the struggle to make it" (Freire, 2004, p. 34). He wrote repeatedly that humans are *conditioned* by structural and institutional forces,

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but not *determined*, and the fact that we are able to be conscious of that conditioning means that we can transcend it (1994, 1998, 2004, 2007). He believed that humans are "unfinished," and our unfinishedness implies our constant search for deeper understanding and social (and individual) transformation.

Fourth, Freire had a deep appreciation for what he called "popular knowledge," that is, the knowledge of the "popular classes" (1978, 1994). His writings are full of vignettes of how he learned from workers, peasants, fisherpeople, and other so-called "ordinary" people. He came to understand the limitations of his own class position, to understand the meaning of "class suicide" (1978), and to appreciate the perspectives, analyses, values, beliefs, and hopes of the oppressed (1994). In discussing his early work with culture circles in his home city of Recife, he wrote:

> In the beginning of my work, my surprise in the face of the critical positions assumed by these unschooled workers arose from the perception that I had up to that time that these were positions held exclusively by university students. My surprise had its origin in my own class position, increased by my university training—perhaps, to be more accurate, I should say by my elitist university training. (Freire, 1978, pp. 116-117)

Freire believed that educational programs needed to tap into and build on this community knowledge. He argued that "the starting point for organizing the program content of education or political action must be the present, existential, concrete situation, reflecting the aspirations of the people" (1970/1998, p. 76). In his work, these contexts were uncovered by studying the people's *generative themes* (the dialectical interrelationship between key social contradictions in their lives and how they understand and interact with them, Freire, 1970/1998). Teachers in Brazil (and elsewhere, including in the US) have successfully developed curriculum from these themes (Freire, 1993; Gandin, 2002; O'Cadiz, Wong, & Torres, 1999).

Finally, although Freire's work covered many other ideas, currently the most relevant to me, and perhaps the most important, was that political experiences are essential to develop political consciousness, and this conscientization is key to learning to read—or to do mathematics. When people are involved in political struggles and social movements, their engagement can lead to a deeper understanding of relations of power and how they can affect the course of history. Furthermore, and dialectically, this increased awareness can then lead people to become more involved and committed to transforming society. In particular, since he was involved in literacy campaigns in which people were learning to read both the *word* (acquire textual literacy) and the *world*, a fundamental issue was that of motivation—why should people learn to read, or, in our case, to do mathematics?

Freire's experience taught him that this motivation was directly related to how people politically understood the social necessity to be literate. This was a key lesson from his work in Brazil, Guinea-Bissau, Chile, and Nicaragua (Freire, 1970/1998, 1978, 1994; Freire & Macedo, 1987). Commenting on where they chose to conduct literacy campaigns before the 1964 Brazilian coup (which exiled him), Freire (1978) wrote,

"between acting in an area where popular consciousness was still buried and one where popular rebellion was visible, we did not hesitate in choosing the second" (p. 111). It was clear to him even then of the relationship of political engagement to the demand for literacy: "In Brazil…literacy in rural areas…made sense only to those within the peasant population who were involved in situations of conflict and who saw within them one more tool for their struggle" (p. 112). Others shared this view. Describing a 1975 UNESCO study on literacy, Freire (Freire & Macedo, 1987) wrote: "the relative success of literacy campaigns evaluated by UNESCO depended on their relation to the revolutionary transformations of societies in which the literacy campaigns took place" (p. 108). Freire's analysis of why that was so has to do with how people develop their sociopolitical consciousness through writing the world, or, in other words, acting politically to change society. He described the process in Nicaragua after the Sandinista revolution:

> Literacy in the case of Nicaragua started to take place as soon as the people took their history into their own hands. Taking history into your own hands precedes taking up the alphabet. Anyone who takes history into his or her own hands can easily take up the alphabet. The process of literacy is much easier than the process of taking history into your own hands, since this entails the "rewriting" of your society. In Nicaragua the people rewrote their society before reading the word. (pp. 106-107)

How is this relevant to mathematics education in an US urban context? Freire worked mainly with adults, who were volunteers, in economically developing countries, on literacy campaigns, with no high-stakes tests, and the freedom to design curriculum from learners' generative themes. In contrast, we are working with youth in a Chicago public high school, who are mostly not volunteers, in a so-called "advanced" capitalist country, on mathematics, with plenty of high-stakes tests, and, mostly with a mandated curriculum that is irrelevant to our students' lives. What can we learn from his experiences and from those who have tried to actualize in practice his theory and principles, and how can we apply this to our contexts?

Before addressing this, I want to make a few points. First, this is not to "import" Freire. He consistently argued that that this was not possible, that the particularity of local contexts was fundamental. As he put it, "In order to follow me it is essential not to follow me!" (Freire & Faundez, 1992, p. 30). A central idea of Marxism that I draw on is that external conditions are only that—conditions—while internal contradictions or dynamics are the basis for development. As Mao Zedong (1937/1971) wrote, "In a suitable temperature an egg changes into a chicken, but no temperature can change a stone into a chicken, because each has a different basis" (p. 89). In other words, reinventing Freire means to concretely analyze the concrete conditions in front of one. Second, Freire did not write much about certain contradictions in his own country, let alone in the US. A number of African American scholars (e.g., Haymes, 2002; Ladson-Billings, 1997; Murrell, 1997), while upholding Freire, questioned his lack of deep analysis of questions of race in Brazil—

the country with the second largest number of people of African descent on the planet. No one doubted Freire's commitment to anti-racist politics, but his overall focus on issues of social class and oppression and lack of attention to racialization seem problematic. At the very least, in the US, we have to turn elsewhere on these issues. For me, the record of African American education for liberation is a major source of inspiration, theoretical clarity, history, and practical direction (Anderson, 1988; Bond, 1934/1966; Harding, 1990; Perry, 2003; Watkins, 2001; Woodson, 1933/1990). Third, Freire's treatment of gender issues has also been critiqued (Ellsworth, 1989), or at the very least, extended (Weiler, 1991), although some, like bell hooks (1994) and Freire himself (1994, 2004), made clear that his weaknesses just reinforced the notion of human unfinishedness. Finally, one last point is that Freire's historical harsh critique of capitalism and his scathing condemnations of neoliberalism in his later writings (1994, 1998, 2004) dealt much more with ideological aspects than with structural ones. That is, Freire wrote very little about political economy, which, for me, is essential to understand our current sociopolitical contexts. Those points notwithstanding, as we have tried to comprehend the settings in which Freire wrote, to grasp the larger principles and how they emerged from those situations and in turn guided his efforts, his work been extremely important in providing a political orientation for our work in urban US contexts.

THE CONTEXT OF MATHEMATICS EDUCATION IN THE US TODAY

The educational situation in the US today, particularly that of mathematics (and science and technology) education, cannot be understood outside of the larger, global political situation. From the perspective of the US government and capital, there is a near-crisis. Their analysis is that the US is in danger of losing its dominant hold on the global economy (while maintaining its military might). A rash of influential policy documents have recently come out, with disaster-evoking titles (*Rising Above the Gathering Storm, The Looming Work Force Crisis, Tough Choices or Tough Times,* and *America's Perfect Storm*). The primary theme in the reports is that the US may be unable to maintain its global economic supremacy due to its underprepared workforce and poorly performing student body in the face of the "*billions of new competitors* [who] *are challenging America's economic leadership"* (Dept. of Education, 2006, p. 4). The imagined solution to what is framed as a national problem is to increase productivity through innovation; upgrade the US workforce; and step up mathematics, science, and technology education. The central policy scheme is the *American Competitiveness Initiative* (ACI) which President Bush unveiled in 2006. He later signed the *America Competes Act* in August 2007 which partially codified the ACI and put large resources into the initiatives.

Although the ACI has several components, the most relevant here is the major focus on mathematics education as a central part of the solution. As the logic goes, improving mathematics education will help improve productivity and that will raise the standard of living of the US people (National Academies, 2006). However, recent

history shows that productivity increases in the US have benefited only the wealthiest, not the majority. Over the last 40 years, real wages stagnated, while productivity markedly increased. “The typical, or median, workers’ hourly wage was just 8.9% higher in 2005 than in 1979…. In contrast, productivity has grown by 67% since 1979” (Economic Policy Institute, 2007). More recently, “from 1980 to 2004, while U.S. gross domestic product per person rose by almost two-thirds, the wages of the average worker fell after adjusting for inflation” (Tabb, 2007, p. 20). Economist and New York Times columnist Paul Krugman (2004) added, about income inequality in the US more generally:

> According to estimates by the economists Thomas Piketty and Emmanuel Saez—confirmed by data from the Congressional Budget Office—between 1973 and 2000 the average real income of the bottom 90 percent of American taxpayers actually fell by 7 percent. Meanwhile, the income of the top 1 percent rose by 148 percent, the income of the top 0.1 percent rose by 343 percent and the income of the top 0.01 percent rose 599 percent. (Those numbers exclude capital gains, so they're not an artifact of the stock-market bubble.)

If the past is any indication of the future, the productivity increases that the ACI may create will not likely not go to the majority of the US people, but will accrue to the richest as they have in the recent past. Thus, the ACI goal to boost mathematics education is a way to serve capital by developing mathematical adept professionals who will help the US produce its way to continued world economic dominance and greater prosperity—for the wealthiest in the country. Nothing in it advocates for the transformation to a more socially just planet (Gutstein, in press).

The ACI is a particular and current manifestation of positioning mathematics education to serve capital in the US, but education in the service of the status quo and profitability for the financial and corporate elite of the country is nothing new. Freire (1978), citing Marx, pointed out that capital’s use of the means of production and workers’ labor power to produce commodities with high exchange value had a potential ally in education: “Education in the service of this lucrative combination obviously cannot have as its objective to reveal the alienating character of the process. What it must do, therefore, is to hide it, reducing education to the mere transference of know-how, seen as neutral” (p. 109).

In opposition to this role, Freire wrote about the changes taking place in Guinea-Bissau, right after liberation from Portugal, in which education was intended to support the transition of society to one which supported humanity and social justice: “In the society seeking to reconstruct itself along socialist lines, on the contrary, basing itself on the new material reality which is taking shape, education should be preeminently revealing and critical” (p. 109). Although we are far from having socialism in the US, and the general problems of democracy and socialism were not solved in the 20th century, Freire’s words about education are just as meaningful for our preparation today in the US as they were for a newly independent country in

Africa emerging from over 500 of colonial occupation. This is a potential role for mathematics education, in urban schools populated by low-income students of color in the US. I now turn to our Chicago experiences in trying to reframe mathematics education.

TEACHING MATHEMATICS FOR SOCIAL JUSTICE: PROVIDING OPPORTUNITIES FOR POLITICAL EXPERIENCE

I have worked with public schools in Chicago for the last 14 years, first for 10 years with an elementary school I call Rivera, in a low-income Mexican immigrant community where I taught 7th and 8th grade mathematics for about four years (just one class, as part of how I defined my work as a university professor). For the past four years, I have been working with a new high school in a similar community whose students are 30% African American and 70% Latino, mainly of Mexican descent, essentially all of whom are low income. That school is the Greater Lawndale/Little Village School for Social Justice (called "Sojo" by most), and I support the mathematics teachers, work with students, participate in developing social justice mathematics curriculum, and co-teach the social justice mathematics projects (which range from a few days to two weeks). In both settings, I have studied the process as it unfolds, with students and teachers as coresearchers (Gutstein et al., 2007; Sia & Gutstein, 2008).

Briefly, I understand social justice mathematics education to be when teachers and students work together to provide students the opportunity to read and write the world with mathematics (Gutstein, 2006). These ideas owe much to my interpretation of Freire's work and of the history and tradition of African American liberatory education. My goals include that students learn both mathematics and about the world. They should develop deep sociopolitical consciousness of their immediate and broader contexts and also acquire a sense of social agency, that is, see themselves as capable of changing the world. In the process, they should develop strong cultural and social identities, to be rooted in who they are as a people and to develop the confidence to stand up for their beliefs. They should learn rich mathematics so that they have opportunities to study, pursue meaningful lives, and support themselves, families, and communities, but even more, so that they can use mathematics to fight injustice and improve society. (Our data suggest that developing sociopolitical awareness and a deeper understanding of injustice demands mathematical sophistication and maturity). And finally, we want students to change their orientations toward mathematics, to realize that it has real meaning in life and can specifically be used to read and write the world.

I am well aware that at Sojo and Rivera, I am an outsider to the communities, languages, and cultures. However, I am a close outsider because I have a good deal of life experience in such communities, and I consciously try to stand in solidarity with the people there. Also, I am a anti-Zionist Jew with the memory of the Holocaust and anti-Semitic racism in my being, and thus have some empathy for other people's

suffering. Nonetheless, attempting to teach for social justice is complicated enough, and to attempt to do so while teaching "other people's children" (Delpit, 1988)—crossing lines of social class, race, age, gender, culture, language, ethnicity, experience—is even more complex. Although I do not have space here, this is important to my story (see Gutstein, 2006).

There is evidence from our work that the above goals can be partially realized—that is, youth can *begin* the process of reading and writing the world with mathematics, while learning rich mathematics—but the work is complicated, slow, and difficult (which I say more about below). A positive outcome is that Sojo's 11th graders (the class on which we have focused, about 90 students) have normalized learning mathematics for social justice. When they were 10th graders, we conducted focus group interviews with about two thirds of the class. We proposed to them that we do a mathematics project about neighborhood *displacement*, which has politically related but distinct specific meanings to the school's two populations. It means gentrification in North Lawndale (the Black community) and exclusion from the country altogether in South Lawndale (the Mexican immigrant community). During the interviews, we described mathematics as a weapon in the struggle for social justice. No student expressed surprise, and all students we interviewed except one reported being interested and said they wanted to do the project.

We suggest this is so for several reasons. Sojo has an explicit mission statement about social justice, although that means very different things, in theory and practice, to different teachers, parents, and students. Nonetheless, the class I refer to here has intermittently completed social justice mathematics projects since the week they started school. Although we have only spent perhaps 15% of our total time, on three or four projects a year, they have been evidently been sufficient meaningful and memorable to students that none reported it as unusual to hear that particular framing of mathematics.

When students were 9th graders (2005-6, the year Sojo opened), they completed a project on racial profiling with which many students were familiar or had personal experience. Part of their work was to simulate (with their calculators' random number generators) the number of supposedly random traffic stops police made in an area for which we had the real data. Before we began, we explained that we would "use mathematics to check up on the police" to verify if they were conducting unbiased stops. Our framing was explicit: to use mathematics to collect and analyze data to evaluate police behavior, to pose other questions and possible further investigations, and to fight for social justice.

This year (2007-8, their 11th grade), we started out school with a two-week project about the criminalization of youth of color, specifically about the *Jena Six*, six African American male high school students from Jena, Louisiana, a small town in the southern US. In December 2006, they were initially charged with attempted murder in a schoolyard fight that developed out of a racist incident a few months

earlier. The first of the six (Mychal Bell) was tried and convicted by an all-white jury in June 2007 and was awaiting sentencing in September 2007, the beginning of the school year. The focus question was: Given Jena's demographics (85.6% white, with 2,154 adults as of the 2000 census), what was the probability of randomly choosing an all-white (12-person) jury for Mychal Bell? The project contributed to students taking action—they walked out of school and organized an impromptu protest on a nearby corner on Mychal Bell's sentencing day. This happened when students discovered that a local Black college was holding a rally, but the school principal was unable to satisfy students' demands for a bus to take them there.

When students were 10th graders, they completed a project, "Reading Hurricane Katrina with Mathematics." It began: "This is an investigation into Hurricane Katrina. The main question we are asking is: What story can mathematics tell us about what happened with Hurricane Katrina—and who did it happen to and why?" We had students look at pictures of displaced people, all African American who had nowhere to stay but in the "Superdome" (a sports stadium), and asked. "This picture looks like only African Americans were in the Superdome, so maybe only African Americans lived in New Orleans. Is that true? Or maybe they were the only ones who stayed/got left behind? We will investigate these questions." They used a very confusing graph from the New York Times to answer a series of questions. The final part of the assignment was:

> Now that you've done all this investigation, it's time to pull together the story that your data tell. Write a good, solid essay explaining your analysis of Hurricane Katrina on the people of New Orleans. You *must* use mathematical arguments from your work here and create one (or more) *well-labeled* graphs to present your data/mathematical arguments. Here are some questions to help you:
>
> a) What data are most convincing and what do they tell you? Why are these data convincing to you?
>
> b) How do the data help explain the story? Could there be other explanations?
>
> c) What other data would you need to know or do you want to know? What questions do *you* have?

Students' essays were emotional, strongly worded, and uneven. Although the mathematics was essentially proportional reasoning and not overly challenging, making sense of the graph was quite difficult. Students had to understand that the ratio of *poor-African-Americans-with-no-car* to *poor-whites-with-no-car* was relevant and key to arguing why more African Americans were stranded in New Orleans versus whites and why their percentage was higher. For the most part, students used mathematics to argue their points, although there were weaknesses and errors. I include some student data here to give a sense of the issues and perceptions of Sojo students. Guadalupe, a Latina student, wrote in her essay:

> It was 3.2 times more likely for a black person to be poor than a white person in New Orleans. The question we really need to ask is did the African American people get left behind for their skin color?…. A large percent of the people that got left behind were poor & Black. 14 to 1 ratio of not having a car for poor Black person vs. a poor white person. It was 8 more times as likely for a Black person [regardless of income] not to have a car.

And Jermane, an African American male wrote:

> The most convincing piece of data was that it was 3.2x more likely to be a poor black in New Orleans than white. This basically tells me that it is more likely for you to see a poor black than a poor white [in the Superdome]. This data is the most convincing because I saw a lot of this on TV. This helps to tell the story because when you look at the pictures, that is all you see.

Mirella, a Latina, after doing a lot of careful mathematical analysis is her paper, wrote:

> Mathematics helped me make a realistic picture, how many black people were left behind because they didn't have any type of transportation. I think using math was an amazing way [of] dealing with huge problems around the world. You could use mathematics for almost anything in the everyday world. Projects like this keep people aware [of] what's going on.

Virginia, also Latina, made a few points that were mathematically not quite accurate: "Another ratio that is very unfair is that for every one white household, there are 14 black households w/out no car [this is actually the ratio of poor Blacks w/out cars to poor whites w/out cars]. So there are more black people in New Orleans, but still there are more whites w/ cars" [actually true, but she may have confounded rates with actual numbers].

She continued, suggesting that despite some confusion, she learned from the project:

> From this project, I found out that in New Orleans, racism is going on. I really never thought of there being such things around. This opened my eyes to see that math helps us find REAL percentages of what really happens. This showed me that I don't need no one to come tell me and lie to me about who are being left behind when I can do it myself.

As a final note, Jeronda, an African American female wrote in anger about President Bush and captured a very common sentiment expressed by Blacks in the US at the time:

> Bush don't like Black people, forget him. If Bush cared about us Blacks, the Hurricane Katrina victims wouldn't be in the predicament they are in now. According to the project we did, "Reading Hurricane Katrina with Mathematics," mostly Blacks were left behind. Fewer whites than Blacks and others were left behind…. Suffer hell! With NO help, no money, no food, no transportation, etc. You can tell Bush don't care. Forget Bush. Elect Bush OUT!

Although we can point to possibilities, as well as actual achievements in our work, there have been (and continue to be) significant difficulties and obstacles. I cannot give them the space they demand, but that is certainly not to minimize the challenges (see Gutstein, 2006 for further discussion). Probably the most significant issue we have faced is how to reconcile the contradiction between, on the one hand, having a mostly mandated curriculum and a set of high-stakes assessments (e.g., the ACT exam), and, on the other hand, trying to develop —and teach— mathematics for social justice curriculum that builds on students' generative themes. An alternative framing is: How can we build on students' community (popular) knowledge while simultaneously supporting the development of critical (mathematical) knowledge and classical (academic) knowledge (Gutstein, 2007)?

This dialectic has numerous complexities. First, no social justice mathematics curriculum exists. There are several collections of "mathematics for social justice" projects, units, and lessons (e.g., Gutstein & Peterson, 2005; Mistrik & Thul, 2004; Shan & Bailey, 1991; Stocker, 2006; Thul, 2004; Vatter, 1996), but no actual curriculum that is cogent and cohesive. Second, a *published* mathematics for social justice curriculum is an oxymoron in a sense because it could not stem from students' generative themes, although one could develop a general framework for creating such a mathematics curriculum (none exists). Third, building curriculum from students' lives and knowledge is extremely difficult and time consuming (witness the 10-step process in the Porto Alegre, Brazil, *Citizen Schools Project*, Gandin, 2002). Fourth, writing rich mathematics curriculum in general is daunting. To create each of the National Council of Teachers of Mathematics-based curriculum in the US (there are 13 "reform" curricula) took millions of dollars and years of work. One "solution" to these quandaries has been to use rich mathematics curricula and interjecting, as coherently as possible, social justice mathematics projects, while working with students to co-create an environment that supports political relationships between students and teacher (Gutstein, 2006). But much remains to be done. At Sojo, we are ambitiously planning to teach a senior-level mathematics class next year (2008-9) that will blend pre-calculus and quantitative literacy with the social justice contexts to be determined collectively with students. In effect, we will try to move from our current 85-15 ratio of "standards-based mathematics" to social justice mathematics and reverse that proportion so that 85 to 90 percent of the contexts are ones in which students investigate their social realities.

A second major difficulty is the complexity of teaching —as opposed to developing— social justice mathematics curriculum. The literature in mathematics education is clear that even experienced teachers cannot easily teach good mathematics curricula in ways the developers intended (Fennema & Scott Nelson, 1997). One should expect that teaching mathematics for social justice would be even harder given the interdisciplinary complexity and the background knowledge teachers need. If we accept Freire's (1978) formulation of the relation of political experiences to conscientization, then teachers themselves will need to develop, in myriad ways,

the necessary sociopolitical consciousness to teach for social justice and to build political relationships with students (Gutstein, 2008). At Sojo, the mathematics teachers are dedicated, but inexperienced and young. They have had to learn to teach, to teach mathematics, to teach a standards-based curriculum (new units each year), and to teach mathematics for social justice, all in the context of a new, complex school. None of it has been easy.

A third challenge has been to support students in using mathematics to present and mathematically defend their views and analyses about social justice issues. For example, we would like them to argue using mathematics (as one of multiple criteria) whether Mychal Bell's jury selection was fair or biased. This has not been easy. We acknowledge that teaching students in general to use mathematical argumentation and justification is not simple, especially given their lack of experience in doing so in elementary school (which we surmise). As evidenced by our data from a 2006 project (when students were 9th graders, Gutstein, 2007), students reported feeling strongly that there were things they could do to effect change —but almost none of their "action" suggestions used mathematics (Gutstein et al., 2007). In other words, students might be learning to *write* the world —but not necessarily *with* mathematics. This contrasts with our data from multiple sources which showed that students were beginning to *read* the world with mathematics. This raises the question of whether it matters if students advocate for specifically mathematical ways to change the world, as long as they make sense of social reality with mathematics and act as historical actors in whatever ways they see fit. We are not settled on this but plan to continue to work with students to defend their ideas mathematically and with words.

CONCLUSION

How does students' participation in learning mathematics for social justice relate to political experiences that can lead to political consciousness? The mathematics education of Sojo youth, I believe, has generally been divorced from their concrete reality since they began school at age five. We are all aware of the perennial question students ask mathematics teachers: "When am I ever going to need this?" The vague answer is usually along the lines of "you will need this in the future," or "when you get to college." Engagement, commitment, perseverance, and motivation in learning mathematics, and more generally, in school, clearly matter. Why should students who have been excluded, marginalized, criminalized, and discriminated against spend the time and effort to commit to school? Perry (2003) raised this question about African American education, though she could also have been talking about other people of color:

> Why become literate in contemporary America? Why become proficient in reading and writing?… Why work hard at school, or at anything else for that matter, if these activities are not inextricably linked to and address one's status as a member of a historically oppressed people? (p. 19).

Her response is powerful:

> *The Autobiography of Malcolm X* takes up these questions and provides an answer, *the* answer that has become embedded in African Americans' collective consciousness and narrative tradition: Read and write yourself into freedom! Read and write to assert your identity as an act of resistance, as a political act, for racial uplift, so you can lead your people well in the struggle for liberation! (p. 19)

Framing mathematics as a weapon in the struggle for social justice is a way of explicitly and intentionally politicizing mathematics education in particular, and school in general. Freire (1978) wrote of the clear choice between working with people whose consciousness "was still buried…[as opposed to] where popular rebellion was visible," (p. 111). Because one cannot force rebellion, one has to create opportunities for youth to be involved in political experiences and social movements, in appropriate and various ways, both directly and vicariously. In this case, the social justice mathematics projects at Sojo and Rivera become a form of political experience, fitting for youth in urban US schools. In 10 years of teaching social justice mathematics projects, although not all students loved them or were enthralled, some things are clear. I never heard a student ask, "When will I ever need this math?"

Overall, students have consistently been more engaged in the projects than in any other mathematics, regardless of context or content. This is because the projects are, in Perry's (2003) words, "linked to and address one's status as a member of a historically oppressed people." They position learning mathematics as a liberatory tool that provides students deeper understandings of Hurricane Katrina, racial profiling, conditions of immigrant agricultural workers, disparity in mortgage rejection rates, wealth inequality, the cost of the Iraq War, the impact of different world map projections, gentrification in their neighborhoods, and many other issues that we studied. These matter to the Sojo and Rivera students because of the righteous anger and powerful sense of justice that they bring with them into the classroom due to their location in an oppressive society. Furthermore, the projects at times give them ways to begin to see themselves as agents of change, whether through demonstrating in support of the Jena Six, attending city hall hearings about displacement, or just coming to know that, although they have the capacity to do so, their prior schooling has not prepared them to read and write the world (Gutstein, 2006).

Some students at Sojo are beginning to understand that they have been profoundly "miseducated" (Woodson, 1933/1990) in US schools that prepare them mostly for low-skill service-sector jobs, prison, the military, or the grave (Lipman, 2004). In North Lawndale (the African American community), the mathematics is grim—two males for every three females, because, to quote one male student from the community, "all the brothers [Black men] are locked up or in the ground." This realization of an incomplete, inaccurate education—which one student, Charles, wrote about on a project that examined world map projections, "It makes me feel like I was lied to all these years"—is related to what a farmer in post-colonial Guinea-

Bissau told Freire: “Before [liberation], we did not know that we knew. Now we know that we knew. Because we today know that we knew, we can know even more” (Freire & Macedo, 1987, p. 114). Rigoberto spoke to this well, also on the map project:

> I feel as if someone was trying to take advantage of me as a student. That just because I am a student, that I should believe anything that I was told…. The project really made me think more about the information being provided in many schools. I now start to question the material being taught. I really enjoyed doing the project because now I can think about maps and their differences. I can also see the differences in peoples’ different point of views. I can imagine what other people think and see about how the globe and world really is.

This broader consciousness, gained through the political experiences of learning to read and write the world with mathematics, will be necessary for Rigoberto, other Sojo students, and youth like them to become effective change agents in the larger historical motion. Their mathematics education *can* contribute to this process. I end this paper with a quote from Rogelio, who was a part of our co-researcher team until he moved from the community:

> Before this [participation in the research project], everything was like a black and white picture. I just went to school, like I was a student soldier doing the same thing over and over, just went to school, came home, did my homework and didn’t care about anything. But now, when I started doing this, everything started getting full with color, being understanding and getting ideas and not just learning the same things, but pushing it to the limit into what a person can do and actually understanding what’s really going on in the world.

NOTES

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