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A Case of a Chicago Public School

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Well we should protest and use mathematics, showing them our reasoning. We should fight for this school to stay integrated. As an individual I think I can’t do anything because in order to make change you have to be with a bunch of people to make it happen. That’s how this school was built. (Mirta, Latina student, ninth grade)

I learned that Black kids ain’t wanted and you’re not supposed to be anywhere where you’re not wanted. (Alice, African-American student, ninth grade)

In May 2001, fed up with what they perceived as evasive stalling tactics from city officials about their promise of a new high school for Chicago’s Little Village community, 14 neighborhood residents started a hunger strike (Russo, 2003; Stovall, 2005). Nineteen days later, they called off the strike for health reasons. Within weeks, Chicago Public Schools (CPS) administration found the funds they had allocated and promised to Little Village in 1998. At that time, the CPS Board was also committed to building two college-prep, selective-enrollment high schools in whiter, more affluent Chicago communities. CPS built those schools, on time and without community struggle, leading many in Little Village (and elsewhere) to view the situation as the “rich getting richer.” But activists in this Mexican immigrant community did not let up easily; the hunger strike culminated a decade-long struggle for a new school in the densely populated neighborhood where many students attended a nearby, overcrowded high school.

The resulting school, the Little Village/Lawndale High School (LVLHS), cost $68 million and is the most expensive public school ever built in Chicago. It houses four small schools that opened in fall 2005. Each has a separate administration and its own two-story corridor that opens on both ends into an outer ring with shared spaces (lunch room, auditorium, library, gyms, pool, etc.). Residents were surveyed by community activists to determine what they felt was important in the new school. Based on the responses, organizers and community members decided to have four small schools with separate emphases and 350 to 400 students each. The four schools are the World Language High School; the Multicultural Arts High School; Infinity: Math, Science, and Technology High School; and Social Justice High School. This article is about the mathematics program at Social Justice High School (known informally as “SoJo”).

I am a university mathematics educator and have been a member of Sojo’s design team since December 2003. I currently work with the school’s mathematics (and other) teachers, and am considered part of the staff. As I write this in September 2008, Sojo, like the other LVLHS schools, just enrolled its fourth class of a little less than 100 ninth graders and currently has about 375 students. Thus, there are about 1500 students in the building.
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Despite the community victory, things rarely go as planned—especially in Chicago. The hunger strikers fasted for a new school in overcrowded Little Village. When CPS fulfilled its promise, residents expected the new school would serve their neighborhood. However, larger political forces interceded. Because Chicago has an ugly history of racist exclusion, the federal government sued CPS in 1980 for its segregated schools. The ensuing “consent decree” mandated that new schools be racially balanced, if possible, which meant mixing white students and students of color (CPS schools are currently less than 9% white). However, the Board’s interpretation was to change the campus’ attendance boundaries to include parts of North Lawndale, the African-American community immediately north of Little Village (in fact, Little Village is South Lawndale). The hunger strikers and others had demanded the school be nonselective and have open enrollment for students in its attendance boundaries. But to do this and include North Lawndale students, the Board narrowed the boundaries to exclude part of Little Village. This caused divisions in Little Village because some children would be “displaced” from LVLHS by African Americans. While the hunger strikers, many residents, and other community activists argued that the schools should be for both communities, others were upset. Complicating the situation is Chicago’s historical neighborhood and turf issues and an ambivalent relationship between the two parts of the greater Lawndale community.

Complicating the Mix: Mathematizing Students’ Social Realities

The schools opened in Fall 2005 with an enrollment that was 30% African American and 70% Latina/o. Relationships between Black and Brown students are generally good. Students work and play sports together, there is virtually no violence, and students occasionally sit together across racial lines in settings where they can choose seats (e.g., the cafeteria). We have observed much physical affection between students of different races, although there are language, style, and cultural differences to which students sometimes react. Sojo staff have tried to create a safe, welcoming space for African-American students and orchestrated a series of conversations about race in the 2005 to 2006 school year to emphasize that commonalities between the students and their communities outweighed differences. However, despite relatively harmonious surface relationships, African-American staff reported that Black students say that they feel isolated, marginalized, and excluded. The school clearly has a long way to go. And staff’s efforts inside the building cannot easily overcome the hostility outside. If they stay after school, Black students have to navigate a half-mile walk in Little Village to the bus to North Lawndale (city buses come to the building but only right after school ends). Tensions between racially divided, rival neighborhood gangs affect students as well, even if only a few students are gang affiliated.

This complex mix surfaced in January 2006 when a local Latino politician (Mr. Sandoval) held a press conference and proposed that a nonbinding referendum to reinstate the original school boundaries be on the March 2006 (regular) ballot—in essence, eliminating African-American students. That day, Black Sojo students began asking teachers if they were going to be kicked out. Although the Sojo principal took a strong public stand that the school would continue to be for all of Lawndale (and was castigated in a local Latino newspaper), Black students were scared, angry, and unmollified. One of the Sojo mathematics teachers suggested that students do a week-long mathematics project in which the central question was: What is a fair solution for both communities? In the rest of this article, I examine this project (the “Boundaries Project”) and situate it within a framework on teaching and learning mathematics for social justice.
Teaching and Learning Mathematics for Social Justice

A central part of our framework (the mathematics team at Sojo is myself and the three mathematics teachers) is a dual set of goals. One set concerns mathematics: the goal is for students to learn mathematics in rich, connected ways and develop mathematical power, conceptual understanding, and procedural proficiency. We want students to have the mathematical competencies to pass “gate-keeping” tests (like the ACT) and have the opportunities to pursue advanced mathematics courses and mathematically based careers. We also want them to reorient their views about mathematics away from the traditional one of mathematics as a decontextualized series of disconnected, discrete pieces of knowledge to be rote memorized and regurgitated upon demand. Instead, we want students to view mathematics as a way to make sense out of the world. Sojo teaches the *Interactive Mathematics Program* (IMP) (Fendel, Resek, Alper, & Fraser, 1998), an NCTM-aligned, National Science Foundation-funded, “reform” curriculum. These goals about mathematics learning comprise what Ernest Morrell (2005) referred to as a “pedagogy of access.” In these ways, the mathematics program at Sojo is similar to that of many other schools that have equity as a central part of their framework.

What makes Sojo different from many other schools, however, is its social justice emphasis. In the mathematics program, we also have social justice goals (Gutstein, 2006). These goals are that students use mathematics to begin to develop (1) critical sociopolitical knowledge of their local and broader social realities (“reading the world” with mathematics); (2) a sense of social agency, that is, a view of themselves as capable of effecting meaningful change for social justice (“writing the world” with mathematics); and (3) strong cultural and social identities. These constitute what Morrell (2005) called a “pedagogy of dissent” whose ultimate purpose is to prepare youth to take on their role as change agents toward a more just society. It is insufficient that students have access and opportunities, even if necessary to more toward equity. Ultimately, this is an individual solution because a pedagogy of access may not challenge the institutional structures that create inequality and injustice in the first place. Thus we advocate for the unity of both sets of goals, mathematics and social justice, for pedagogies of both access and dissent.

However, teaching mathematics for social justice is complex. Not only do mathematics teachers need strong, conceptually grounded content knowledge, they also need pedagogical content knowledge (Shulman, 1986); general pedagogical knowledge; knowledge of human development; and most importantly, knowledge of their students and their cultures, languages, and communities as well (Ladson-Billings, 1994). On top of all this, to effectively teach for social justice, in any subject, teachers need strong knowledge of history, politics, and social movements (Camangian & Yang, 2006; Christensen, 2000; Gutstein, 2008).

Nor is social justice curriculum a simple matter. Although examples of social justice mathematics units and projects exist, there is no connected, comprehensive curriculum (e.g., like IMP) for students to achieve the above social justice mathematics goals. At Sojo, we have adopted a framework related to Paulo Freire’s (1970/1998) insistence that an education oriented toward reading and writing the world should start from “the present, existential, concrete situation, reflecting the aspirations of the people” (p. 76). Freire wrote this about adults in community-based literacy settings in Latin America in the 1960s, but his ideas have deeply influenced educators around the globe for decades. His perspective involves acknowledging that learners have valuable, valid knowledge about their lives and social realities. Freire advocated that teachers investigate and then use what he called “generative themes” (key social contradictions in students’ lives and how they understand them) from which to develop curriculum. These themes are part of what
we call “community knowledge,” which also includes informal mathematical knowledge (Mack, 1990); other informal, out-of-school knowledge; knowledge and perspectives about everyday life; and also students’ language and culture. The issues of the Boundaries Project constituted a generative theme in our students’ lives, and their fears, understandings, prejudices, and uncertainties about their neighborhoods, identities, and interrelationships with others were all part of their community knowledge.

Figure 48.1 presents how students’ community knowledge relates to developing “critical knowledge” of mathematics (Frankenstein, 1987, 1998) and our mathematics goals, which we collectively refer to as learning “classical knowledge” (of mathematics). The lines between the knowledges are meant to be permeable and vague, and their separations often unclear, for they can transform into each other. Utilizing a Freirean-like approach, we aim to build on students’ community knowledge (i.e., generative themes) and, from that starting point, attempt to have students use mathematics to develop deeper critical knowledge of their sociopolitical realities as well as the mathematical competencies they need for various life opportunities. However, it is our experience that synthesizing and honoring these three knowledges in meaningful ways is quite difficult. To our knowledge, there are few examples of this being done in mathematics classrooms (for reports from Brazil see Gandin, 2002; O’Cadiz, Wong, & Torres, 1998).

The Boundaries Project

The project took a week (we had 400 minutes a week of mathematics the first year of school) and was quite intricate. We used the 70:30 ratio of Latinas/os to African Americans as a central idea from which to explore other issues. Each school had about 100 students at the time, and we asked students what the school and campus would look like in subsequent years if the ratio stayed the same or changed in various ways. With the full-capacity campus estimate of 1,400, there would be 420 African Americans and 980 Latinas/os. Using census data, students then investigated the probability of a Little Village or North Lawndale student getting into the school by lottery, given different ratios. This was complicated because although we had an estimate of 4,000 high school age
students in Little Village, we had none for North Lawndale. The Census gave the number of 15- to 19-year-olds (a 5-year cohort) so students had to adjust to find how many high school-aged students were in the community. This led to discussions and investigations of dropout rates of local schools because students knew not all high-school-age youth were in school. Furthermore, more youth drop out in earlier high school grades than later ones, and students knew that older Lawndale youth were more likely than younger ones to be out of the community—in the military, prison, or even the grave. This harsh reality affects how one creates a model to find the number of 15- to 18-year-olds given the number of 15- to 19-year-olds. Students eventually simplified, found 80% of the five-year total, and decided that North Lawndale had about 4,150 high-school age youth—while also mathematizing the oppressive conditions of their lives.

Based on the 70:30 ratio, we asked the chance of being accepted for students from each community. This was about a 24.5% chance for Little Village youth, but only about a 10.1% chance for North Lawndale—something most felt unfair. This raised the question of how to determine the ratio so that students from both communities had equal chances since there were different numbers of potential students in Little Village (4,000) and North Lawndale (4,150). Some students also examined dropout rates and capacities in neighborhood schools and tried to determine how many spots were actually needed for the students who still attended high school.

Analyzing the Project: What Did Students Learn, What Did We Learn?

A primary goal of the project was that students develop mathematical power. A large majority of the students were able to answer some simpler questions (e.g., if the ratio were 20:80 or 40:60, what would be the chance of being accepted for students from each community). To determine probabilities, many students used a percent bar, an intuitive, conceptual tool from a percentage unit in the middle-school Mathematics in Context curriculum (National Center for Research in Mathematical Sciences Education & Freudenthal Institute [NCRMSE & FI], 1997–1998). We taught parts of this unit previously because the teachers felt that students’ conceptual understanding of percentages was weak. But most students had difficulty with challenging problems. Few solved what was arguably the most convoluted: having found the number of 15- to 18-year-olds (in both communities), students then found the percentage of people who were in that age range (7.5% of all Lawndale residents). We gave them a census map with the number of residents for 16 sample North Lawndale blocks—they found the mean number of residents (171), then computed the average number of high school age youth per block using the 7.5% percentage (~13). Finally, they were to find how many of these “average” North Lawndale blocks the school boundaries would need to be extended by so that the chances of a North Lawndale student would be equal to that of a Little Village student—given their own personal ratio of choice (which ranged between 30:70 to 50:50 for most students, but did include 35:65 and 40:60). This was an extremely difficult problem to handle, and very few completed it.

This messy mathematics was quite challenging for students. We asked ourselves if students were doing high school mathematics because proportional reasoning is essentially middle-school work, although the probability and data analysis were more high school level. Their work provided evidence that they could mainly apply ideas in these content areas only when the problems were relatively straightforward. However, we would argue that to assess their mathematical growth, one has to consider that the mathematical complexity came not so much from the actual computations or algorithms students used but rather from mathematizing, understanding, setting up situations, and estimat-
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ing, with simplifying assumptions. While our analysis suggests that what they may have learned with respect to actual content was limited, they gained experience in a number of sophisticated mathematical processes—representation, reasoning, communicating, and problem solving.

Because our goals also included that students develop sociopolitical consciousness (i.e., critical knowledge of their social context) as well as a sense of social agency, we examined our observations and students’ writings for evidence. Our analysis was that students became more knowledgeable and clearer about the situation. They understood the (mathematical) reasons why CPS changed the racial composition (and boundaries), they heard some of the hunger strikers and their school principal support African-American students, and they also observed divisions in Little Village. Furthermore, their sense of agency was strongly evident. Students’ written responses to the question, “What do you think we should do about the situation?” were quite clear. Over two thirds answered that action should be taken to “fight,” “petition,” “march,” “protest,” “bring this to the board,” “speak out,” and more. Only five students wrote that nothing could be done. Fabiola (a Latina), gave a typical response that suggested agency: “Something other than math I learned was that LVLHS and especially SJ will continue to fight against Sandoval’s referendum so that our school will not be segregated.... We should continue to fight against this referendum...[and]...investigate to make the boundary fair.”

We also learned, or relearned, as Alice’s opening quote demonstrates, that the issues were volatile and close to students’ hearts. This was evident in how students addressed the central question. The issue emerged of whether Sojo (and the campus) should remain at the 70:30 ratio. We had students write and justify their views on that point. Most Latina/o students advocated that the ratio stay the same while many African Americans wanted the building to be 50:50. Almost no one suggested that African-American students leave and the school be segregated—at least not aloud or in writing. In one class, students heatedly discussed the ratio. Amara, an African-American student, argued that “fair” meant that the schools should be half Black, half Brown, but Virginia, a Latina, countered that because the school was physically in a Latina/o community, the current ratio made sense. She pressed Amara on what ratio she would propose if the school was in North Lawndale, to which Simon, a Latino, quipped that they (Latinas/os) would be chased if it was. Amara insisted on a 50–50 ratio regardless of where the school was. The discussion continued for a while and cooled off, but the emotionality was evident. An English class also took up this theme, and some students expressed their views in letters to Mr. Sandoval and the media. Almost all the letters supported the current boundaries with the ratio remaining the same or increasing to 50–50 (which some African-American students advocated).

We know that, in general, it is difficult to attribute responsibility to one particular aspect of a school when there are interacting, interrelated goals. This element surfaces when researching social justice mathematics pedagogy and curriculum in a setting with a whole school effort toward social justice. In that sense, we learned that the above lesson applied to our situation because students discussed the issues in other classes, the principal took a public stand, the story was in the news, and conversations occurred in both communities. Thus, the controversy was in the air. We do have evidence that students mathematized their social realities in several ways, such as the above discussion about finding the number of 15- to 18-year-olds, and that students began to develop critical knowledge and social agency in mathematics class. However, we do not suggest that this occurred solely through mathematics, nor do we claim that their mathematical analyses were necessarily decisive in the process. But because of the overlapping and interconnected processes in the school, we do not consider it productive to spend too
much time trying to tease out the role that each aspect played in the development of critical knowledge—we are satisfied with the position that mathematics class contributed and that we see evidence of reading and writing the world with mathematics.

We also learned that it is complicated to connect community, critical, and classical knowledges. For example, it was difficult to ensure students developed classical mathematical knowledge while simultaneously holding debates about what ratio was fair (i.e., critical knowledge). Conversely, we also saw instances in which some students’ difficulty with proportional reasoning, for example, hampered their capacity to answer questions about equity and fairness—that is, insufficient classical knowledge impeded the development of their critical knowledge. And when we consider the relationship of community to classical knowledge, while we were relatively successful in starting from students’ generative themes, our analysis suggests that students’ mathematics learning could have been stronger. Finally, although in this particular situation we were able to tie into students’ community knowledge, we are clear that in general it is not simple to grasp students’ generative themes, nor are they guaranteed to be the same as those of the adults in their communities. In a sense, we view these all as research areas to address and attempt to untangle as we move forward.

Conclusion

The project and what we learned need to be contextualized within a larger program of teaching and learning mathematics for social justice at Sojo. We present this not as an exemplar of what students learned but rather of some of the challenges, complexities, and potential in connecting students’ community knowledge to their critical awareness, while supporting their development of classical mathematical knowledge. The limitations and uncertainties present us with ongoing areas of research as well as of pedagogical and curricular development. We created the project in two days because the issue was immediate—we did not have the luxury of creating a well-thought out, cohesive unit connected to what students were already learning. We needed to seize the teachable moment, even though the work challenged and sometimes frustrated students because of its difficulty and open-ended, messy nature. We would argue that some of this is inevitable because of the ill-defined nature of daily and community life, but are working to minimize any incoherency. However, we also emphasize that, overall, most students were substantially more engaged in this project than at almost any other time during the year.

In the 2008 to 2009 school year, we aim to address several conceptual and practical issues we discuss here, such as strengthening students’ mathematical learning on these types of projects, creating more cohesive projects, and building on generative themes. We have planned an extended multiweek unit on the theme of displacement affecting both communities—North Lawndale, because the rampant Chicago gentrification is now displacing people from there to far reaches of the city or to desperately poor suburbs, and Little Village, because immigration policies threaten to displace people back to Mexico. The opportunity to politically connect both communities and emphasize the unified struggle is unfortunately present in the reality of common exclusion.

Of the various justice-oriented mathematics projects students completed that year, this stands out because of how well it connected to, and built on, a generative theme. In general, without comprehensively investigating students’ lives, it is hard to create authentic curriculum based on those realities. We had the opportunity to create this project because of the school and community political context—and we would have been remiss not to pursue it. Furthermore, generative themes are linked to genuine problems that are not easily answered. No one individual can answer the essential question we posed of
what was a fair solution—not a teacher, student, parent, community member, administrator, or politician. To resolve this issue will take concerted, collaborative efforts by all of these groups because ultimately this is a question of the allocation of resources. That is, as some students discovered, there are not enough quality schools for all Lawndale students, North and South, even with the new campus. Because of injustices like this, the fundamental purpose of teaching (mathematics) for social justice is to create opportunities for youth to become participants in solving the real problems of their communities and change agents who will stand up and fight for justice using mathematics and every other means with which to do so.

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Notes

1. All students’ names are pseudonyms.
2. According to the decree (Chicago Public Schools, 2008):

   ...the District currently applies specified racial goals to the extent practicable, in selecting applicants for admission in magnet schools and programs. The goal of each magnet school and program is to have an enrollment between 65-85 percent minority (Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaskan Native) and 15–35 percent non-minority (White) (p. 3).

References


