

CONNECTING COMMUNITY, CRITICAL, AND CLASSICAL KNOWLEDGE IN TEACHING MATHEMATICS FOR SOCIAL JUSTICE

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Abstract

In this article, I describe conceptually, and give an example of, an aspect of teaching mathematics for social justice—teachers’ attempts to connect three forms of knowledge: community, critical, and classical. The setting is a Chicago public high school, oriented toward social justice, whose students are all low-income African Americans and Latinas/os. Drawing from the experience of creating and teaching a mathematics project that emerged from a central disruption in the life of the school community, I discuss complexities and challenges of creating curriculum from students’ lived experiences that simultaneously develops their critical sociopolitical consciousness and mathematical proficiencies.

INTRODUCTION

Teaching and learning mathematics for social justice has its roots in the mathematics education work of Skovsmose (1994, 2004) and Frankenstein (1987, 1998), among others. It builds on work in critical pedagogy, in particular, Freire’s (1970/1998) and others such as Giroux (1983) and McLaren (2007), and also draws upon culturally relevant pedagogy (Ladson-Billings, 1994, 1995b; Tate, 1995). Though proponents and researchers describe it in different ways (e.g., some refer to it as “critical mathematics”), there are certain common pedagogical aims. Two of the most central are that students develop both critical consciousness and mathematical competencies, and there is also the view that these two areas of learning need to be dialectically interwoven by both teachers and students in a conscious manner. That is, mathematics should be a vehicle for students to deepen their grasp of the sociopolitical contexts of their lives, and through the process of studying their realities—using mathematics—they should strengthen their conceptual understanding and procedural proficiencies in mathematics. One of the principal ways for teachers to support students in moving toward these interconnected goals is for the students to engage in mathematical investigations in the classroom of specific aspects of their social and physical world (see Gutstein & Peterson, 2005 for reports by K-12 teachers on efforts to do so).

There are few extended studies of teaching and learning mathematics for social justice in K-12 urban classrooms (Brantlinger, 2006; Gutstein, 2006c; Turner, 2003). These reports shed light on the complexities of enacting critical mathematics pedagogy and certainly point out some of the difficulties in what is mostly uncharted territory. In this brief article, I will highlight one particularly challenging quandary and illustrate it with a short vignette. There is much work to do in theorizing and practicing social justice mathematics, and my purpose here is to point out some issues that I believe currently face those of us who want students

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to learn mathematics as a vehicle for social change. The matter I discuss is the complexity of building on students' and communities' knowledge while simultaneously supporting the development of their mathematical competencies and critical awareness. I examine it from the perspective of my own work in Chicago (and its public schools) where I have lived, worked, and taught for the past 12 1/2 years, first teaching my own middle-school mathematics class for several years, and for the past few years, working with a new social justice high school in mathematics classes.

CONNECTING COMMUNITY, CRITICAL, AND CLASSICAL KNOWLEDGE

We¹ have adopted a framework in the school's mathematics team of trying to synthesize what we call *community*, *critical*, and *classical knowledge* (Gutstein, 2006c), or the "three C's." These concepts are not new, but their interrelations have been under-elaborated with respect to mathematics education. We recognize that these may be contested definitions, and we consider the categories (and our thinking) to be provisional and fluid. By *community knowledge*, we mean several different but related components of knowledge and culture. It refers to what people already know and bring to school with them. This includes the knowledge that resides in individuals and in communities that usually has been learned out of school (e.g., their *funds of knowledge*, Moll, Amanti, & González, 2005). It involves how people understand their lives, their communities, power relationships, and their society. We also mean the cultural knowledge people have, including their languages and the ways in which they make sense of their experiences. Some refer to this as "indigenous knowledge," "traditional knowledge," "popular knowledge," or "informal knowledge" (including with respect to mathematics, e.g., Knijnik, 1997; Mack, 1990). Two examples serve to illustrate our meaning. In *Rethinking Columbus*, Tajitsu Nash and Ireland (1998) describe the knowledge of a typical Amazonian elder, who

...has memorized hundreds of sacred songs and stories; plays several musical instruments; and knows the habit and habitat of hundreds of forest animals, birds, and insects, as well as the medicinal uses of local plants. He can guide his sons in building a two-story tall house using only axes, machetes, and materials from the forest. He is an expert agronomist. He speaks several languages fluently; knows precisely how he is related to several hundred of his closest kin; and has acquired sufficient wisdom to share his home peacefully with in-laws, cousins, children, and grandchildren. Female elders are comparably learned and accomplished. (p. 112)

The other example is one from Freire's *Pedagogy of Hope* (1994, pp. 44-49). In it, Freire recounted a conversation with a group of Chilean farmers. They were having a rousing discussion when the farmers suddenly silenced themselves and asked the "professor" (i.e., Freire) to tell them what he knew. Freire wrote that he was unsurprised by this, having experienced it before, and proceeded to challenge the farmers to a game. They were to stump each other with questions that the other could not answer. Freire went first and asked, "What is the Socratic maieutic?" The farmers laughed, could not answer, then baffled Freire with the question, "What's a contour curve?" The game continued, each stumping the other, until finally the score was 10-10. The point was clear—Freire's knowledge and the farmers' knowledge were both valid and valuable. Each knew things that the other did not; each had to respect the others'—and their own—knowledge. What the farmers knew, from years of shared lived experience, is what we term community knowledge.

Critical knowledge is knowledge about the sociopolitical conditions of one's immediate and broader existence. It includes knowledge about why things are the ways that they are and about the historical, economical, political, and cultural roots of various social phenomena. Various authors (e.g., Giroux, 1983; Macedo, 1994) described *critical literacies*, and we

essentially mean the same idea. Freire (Freire & Macedo, 1987) referred to it as "reading the world." In his earlier work on literacy campaigns, he discussed *culture circles* in which groups of workers, peasants, and farmers studied *codifications* (representations of daily life, usually pictorial) and reflected on their meanings (Freire, 1970, 1973). Those sessions allowed the culture circle members to examine their lives from different perspectives, and the process of collectively decoding the representations led the individuals to deepen their understanding of the phenomena. Freire's pedagogy thus provided the opportunities for people to transform their community knowledge about the everyday world that they had often normalized (e.g., we have no work because there are no jobs) into critical knowledge about the same situations (e.g., we have no work because those in power control the distribution of jobs and land, and it is to their advantage to keep some of us unemployed).

It is often the case that community knowledge already is critical, but context matters. For example, relatively young adolescents (e.g., middle-school students) may have knowledge about their life situations, but it is not often critical. Whether or not it is critical depends on several things, including their experiences, those of their families and communities, the level of political consciousness at the time, and the strength of existing social movements. In contrast, adults who are engaged in various struggles may have community knowledge that is quite critical. As an example, a battle is currently taking place in Chicago to stop the displacement of low-income people of color (in particular, African Americans) through gentrification (Lipman & Haines, in press). Many adults in the affected communities have a clear and critical understanding of the political forces allied against them, including their geneses and various forms of subterfuge. I have heard parents in communities where public housing has been demolished (and not replaced) and schools closed (and reopened for "new" residents) eloquently elaborate who and what forces are responsible for their removal, and why. So the lines between community and critical knowledge are not always clear. A major thesis of Freire's work is that *problem-posing* pedagogies can present life situations back to people (whether in or out of school) so that they may pose questions themselves and transform their community knowledge into a more critical state, and consequently be drawn into action to challenge unequal, oppressive relations of power.

The lines between classical and the other forms of knowledge are not so clear either. *Classical knowledge* generally refers to formal, in-school, abstract knowledge. Our focus in terms of classical knowledge is that students have the competencies they need to pass all the gatekeeping tests they will face and to have full opportunities for life, education, and career choices. Classical mathematical knowledge clearly has high-status in society as many have commented (e.g., Apple, 2004) as well as a strong Eurocentric bias (Frankenstein & Powell, 1994; Joseph, 1997). Nonetheless, while we critique it, we recognize its power and cultural capital and argue that students need to develop it for several reasons. They need it for personal, family, and community survival, especially for students who come from economically marginalized spaces. But even more than that, we believe it is crucial that students appropriate, in this case, the "master's tools" with which to dismantle his house (cf. Lorde, 1984). We subscribe to Freire and Macedo's (1987) orientation toward what they referred to as "dominant" knowledge:

To acquire the selected knowledge contained in the dominant curriculum should be a goal attained by subordinate students in the process of self and group empowerment. They can use the dominant knowledge effectively in their struggle to change the material and historical conditions that have enslaved them. (p. 128)

To connect the three types of knowledge is no simple matter for many reasons. First, there is the question of how might teachers learn students' community knowledge. In Brazil,

where Freire and others practice(d) these ideas, the process by which teachers investigate the *generative themes*² of a community is complicated. In Porto Alegre's *Citizen School Project*, there is a lengthy and involved ten-step process through which teachers, in collaboration with neighborhood adults, study community knowledge to develop school-wide, interdisciplinary curriculum based on the generative themes (Gandin, 2002). Freire (1970) elaborated his view of how researchers might investigate the themes within a specific community, and this also involved a detailed, multi-step process. There are still more issues, such as the question of how might teachers study community knowledge when they are outsiders to the community, language, and culture of their students (Delpit, 1988), or the fact that the generative themes identified by neighborhood adults may not coincide with those of the youth in schools (I. Martins de Martins, personal communication, July 2003).

Once educators begin to have a grasp of the community knowledge of their students and their families, then they can try to create curriculum, based on those themes, that will support both the development of critical and classical knowledges. This also is quite complicated. First, there are the time constraints imposed on teachers and their working day (which also affects their capacity to investigate generative themes, although in Porto Alegre, teachers were paid for that work). When do teachers have the time to develop new innovative curriculum, let alone cope with all the other demands of teaching? For example, creating standards-based reform mathematics curricula in the U.S. took massive amounts of time, money, and people. The reform curriculum with which I am most familiar, *Mathematics in Context* (MiC) (NCRMSE & FI, 1997-8), required perhaps \$8 million, 5 years, and close to 50 people working in two countries before it was fully operational. It is true that MiC was a connected, cohesive curriculum spanning four years (grades 5-8), and obviously developing curriculum for just one school community would require less time. But the time and people power alone needed to create quality curricula testify to the necessary resources required.

Second, to develop curriculum requires a different knowledge base than teaching, despite the interrelationship of the two. My personal knowledge of MiC's development and my professional judgment suggest that there are talented curriculum designers who would have difficulty teaching MiC in urban classrooms because, for example, they may not connect that well with the students nor their communities. This is also probably true for other successful curriculum projects whose authors are primarily university-based mathematics educators. Conversely, there are successful mathematics teachers in urban schools who do not have the knowledge to create rich mathematics curriculum.

Third, successfully navigating the requirements of a standards-based mathematics curriculum is difficult enough, especially under the pressure of neoliberal accountability constraints like the *No Child Left Behind* legislation in the U.S. that mandates repeated testing. But to do so while simultaneously providing opportunities for students to develop critical knowledge in mathematics classes is an added layer of complexity (Brantlinger, 2006; Gutstein, 2006c). It is generally accepted that good (mathematics) teachers need to have content knowledge (Hill & Ball, 2004), pedagogical content knowledge (Shulman, 1986), and knowledge of students and their communities (Ladson-Billings, 1995a, 1995b); but in addition, to develop critical knowledge, teachers also need deep knowledge of social movements, history, culture, political economy, and local and global sociopolitical forces affecting students' lives, as well as particular dispositions toward social change and the politics of knowledge (Gutstein, 2006a). Even when teachers do have these various knowledge bases, ensuring that the mathematics does not get lost when developing critical knowledge and supporting students' sociopolitical consciousness (in mathematics class) is

no easy task—the dialectical interrelationships are complicated and more attention needs to be focused in this area, and more experience accumulated (Brantlinger, Buenrostro, Gutstein, & Mukhopadhyay, 2007).

In short, for many reasons, it is quite complex to create curriculum that starts from students' and their communities' lived experiences/knowledge and then simultaneously and with rich interconnections supports *both* mathematical power/ classical mathematical knowledge *and* a critical awareness of one's social context. No such mathematics curriculum currently exists that is broadly applicable partly because of the specificity of local situations, although there are several examples of projects and units of social justice mathematics that have been taught in urban schools (see, for example, Brantlinger, 2006; Frankenstein, 1998; Gutstein, 2006c; Gutstein & Peterson, 2005; Osler, 2006; Turner, 2003). It will not be easy to create high-quality social justice mathematics curricula that teachers can adapt to their local settings, and even allowing for good curricula, the school change and professional development literature is clear that curriculum alone does not ensure effective and appropriate teaching—nor real learning (Fennema & Scott Nelson, 1999). Efforts to work on connecting the “three C's,” however we describe them, are needed, and how to do so is an open question with respect to both theory and practice.

An Example of Connecting The Three C's in Practice

I turn now to a short example of our work in a Chicago public high school for social justice in which we attempted to connect community, critical, and classical mathematical knowledge (see Gutstein, 2006b, for details). Briefly, a new school was built and opened in Fall 2005 after a group of residents in a Mexican immigrant community (Chicago's *Little Village*) went on a 19-day hunger strike in 2001 (Russo, 2003). The residents struck for a new school for their community; the school board promised it, then reneged; and the hunger strike was the culmination of a multi-year struggle for a new school in the overcrowded neighborhood. The new school building houses four small schools, each with a maximum of 350-400 students, and each with a different community-determined theme. The school I work with is the social justice high school (known to most as “Sojo”).

Although Little Village is overwhelmingly Mexican, the Chicago public school (CPS) board, under a 1980 federal desegregation mandate, racially integrated the open-enrollment, neighborhood school by drawing the attendance lines into a bordering African American community, North Lawndale. Thus the schools are 30% African American and 70% Latina/o. However, by changing the attendance boundaries, the school board also limited Latina/o enrollment, causing friction for some Little Village residents who saw their children's spots in the new building “taken” by African Americans from North Lawndale. Furthermore, given Chicago's history of segregation, racist exclusion, and neighborhood and turf lines, there is an ambivalent relationship between the two communities. Students for the most part intermingle and work together in the school, although there are real tensions outside in the neighborhood.

In January 2006, during the first year when each school had about 100 ninth graders, a local Latino politician held a press conference and proposed a public referendum that the boundaries be redrawn to exclude North Lawndale African American students. Black students, understandably angry, hurt, and scared, immediately went to teachers to voice concerns about being removed from the school. Our mathematics team, on the initiative of one of the math teachers, quickly developed a mathematics project (the “Boundaries Project”) whose central question was this: What is a fair solution for both communities?

While our assessment is that there were weaknesses in the project (e.g., we threw it together in two days because of the immediacy of the issue, and it was not clear how much mathematics students learned), our analysis also suggests that there were some considerable strengths. Most notable was that students were quite engaged, and we believe this is because the work students did was genuine. No one knew (or knows) the answer to the central question because, in fact, the solution to the problem has to be eventually determined by the two communities working together in concerted effort to ensure that there are enough spots in quality schools for all the students—something that is not the situation now, even with the new school. The project tied directly into students' lived experiences and generative themes—that is, it built on students' (and their families') community knowledge. The issues of interconnections between the two neighborhoods, their histories, and students' stereotypes toward each other all surfaced. Politically, the two main points with which we wanted students to grapple (i.e., the development of critical knowledge) were that the differences between the communities were far outweighed by the commonalities, despite historical divide-and-conquer techniques used to pit communities of color against each other, and the above point that ultimately there were not enough quality schools for all the students. Mathematically, we asked students several questions about the numbers of Black and Brown students in the building at full enrollment given ratios different than the current 30:70, and the probability of a student from each community being accepted in a lottery (using different possible ratios). We also had them study census tract data and consider how to enlarge the boundaries in North Lawndale so that students from there would have the same chance to be accepted as the Little Village students. This entailed calculating acceptance probabilities for both communities, with various ratios of African American and Latina/o students—and this was further complicated mathematically because each neighborhood has different numbers of high-school aged students. Students also examined data for other nearby schools, as well as local area maps, and overall, they mathematized the central problem of having one new school building for too many students from two different communities. In our assessment, the complexity of the mathematics lay more in this requirement to draw out the mathematical components of the situation, than in any specific subpart or individual problem within the project.

While we know that a week-long project can have only limited impact, we locate the project within a four-year program of teaching and learning mathematics for social justice. We appreciate that the political aim of students using mathematics to develop an awareness of common issues for both communities is difficult to achieve (although we also note that the whole school is making its way toward social justice pedagogy and curriculum). First, the way CPS altered the originally planned school boundaries was something we had to contend with—that is, the historical tensions were reignited and in the air. Second, the local politician exacerbated these by pitting the neighborhoods against each other and proposing that the schools serve only Little Village students. Third, the politics of the immigration rights movement and the huge immigration marches nationally and in Chicago (where close to a million people participated in two large demonstrations) interacted with the specific conditions in the school campus in which African American students reported (to African American staff) that they did not fully feel their place in the building.

The opportunity is there to work with students to deconstruct and politically explore this polarized context, but existing contradictions can impede the process. For example, only 5 of about 30 African American Sojo students attended the May 1, 2006 pro-immigrant rights rally in Chicago (the larger of the two). I ran into an African American friend at the march who felt uncomfortable with two of the ubiquitous, mass-produced signs at the rally: "We Are All Immigrants" and "Immigrants Built America," neither of which is historically accurate and both of which negate the presence, contributions, experiences, and exploitation of both

African Americans and Native Americans. There is a racially coded subtext here that is visible in the school and larger society both, with respect to "good" and "not-so-good" "minorities." Chicago employers report that they prefer hiring Mexican workers to African American ones because they were supposedly more "compliant" (Lipman, 2002). When asked about popular perceptions in their community about African Americans, Latina/o students report the stereotype that "Black people are lazy," while some African American students suggest that Mexican workers are "taking our jobs." A recent New York Times article (Swarns, 2006) conveyed these misconceptions well. In a Southern U.S. town in the state of Georgia, where Africans and African Americans created most of the wealth and toiled mightily for centuries either as slaves or low-paid, exploited workers, a 51-year old Mexican worker was quoted as saying:

They don't like to work, and they're always in jail. If there's hard work to be done, the blacks, they leave and they don't come back. That's why the bosses prefer Mexicans and why there are so many Mexicans working in the factories here.

The point here is that community knowledge *is* affected by popular misconceptions and myths.

Although this project had its limitations (Gutstein, 2006b), a strength was that we were able to tap into and build on students' community knowledge, and students were able to develop some critical and classical mathematical knowledge. The experience gives us (and others) some insight into the challenges and possibilities of teaching mathematics for social justice, although this was not a case in which we consciously investigated students' community knowledge. Rather, the generative theme emerged because of the dynamics of the situation. We might have ignored students' realities and kept to the already planned curriculum. Our analysis is that to have done so would have been a mistake and a missed opportunity to engage students and provide them a chance in school to examine their own lived experiences, deepen their sociopolitical awareness, and learn mathematics. One positive outcome we point to is that involving students in this particular project played a role in enculturating students to social justice pedagogy and reshaping their views of mathematics; their journaling after the project provided evidence for this assertion.

Conclusion

In the current school year (2006-07), our mathematics team has begun planning a more in-depth, extended unit centered around *displacement* in an attempt to build on a generative theme salient for both communities. The specific local and broader national contexts shape our understanding of displacement. First, gentrification is a major issue in Chicago. While it affects many urban areas in the U.S., it is particularly severe here because the city power structure (i.e., Mayor Daley and his administration, major finance capitalists, and the real-estate/development machine) is in the throes of attempting to reshape Chicago as a global city (Lipman, 2004). The mayor and the school board are currently in the process of closing 60-70 neighborhood schools and creating 100 "new" ones, most of which are in the same school buildings but with large infusions of resources historically denied in the past (Lipman & Haines, in press). Many of the communities experiencing school closings are being rapidly gentrified. North Lawndale is very much on the list of affected neighborhoods, and has been referred to as "ground zero" by activists battling the redevelopment although the amount of new construction (e.g., condos) is still relatively small as of this writing. Thus displacement in the North Lawndale context refers to the oncoming gentrification in the community. Second, in Little Village, displacement refers to the removal of people out of the country altogether, back to Mexico. The U.S. House of Representatives passed a bill in September 2006 to build a 700-mile fence along the Mexican-U.S. border, and shortly afterwards, the

Senate began considering the fence as well. In a small town of 37,000 located about 40 miles from Chicago, in early October 2006, town officials proposed an ordinance to penalize landlords who rented to undocumented immigrants and employers who hired them. Three thousand people showed up at the Town Hall in protest. Many residents of Little Village are undocumented, and the threat of expulsion from the community and country altogether is quite real. Thus both communities are faced with issues of displacement.

An appropriate challenge which we pose to ourselves is how do we know that this matters to students and community members, that this is really a generative theme when we have not done (for example) the thorough investigation conducted by Brazilian teachers to uncover community knowledge? In October, 2006, we conducted focus group discussions and in-class discussions with small groups of students to explore this. In our conversations with close to 60% of the sophomore class, students overwhelmingly expressed support and interest in the proposed unit. We also know, by the strength of the social movements for immigrant rights and against gentrification, that these issues matter profoundly to people (both adults and youth) in the affected communities. The tremendous number of people in the streets in support of immigrants and their rights is powerful evidence of this, and while the struggle against gentrification involves far fewer people, the level of consciousness and determination in impacted neighborhoods is quite high (Lipman & Haines, in press). We can *read the world* (Freire & Macedo, 1987) and understand clearly that the issue of displacement has deep meaning in Chicago.

While we have sketched out a political framework for this project, and have some clarity on how the community and critical knowledge fit in, there are certainly multiple challenges ahead of us. A key one is the connection of classical knowledge. The mathematics of change is central in understanding displacement in North Lawndale and Little Village. Specific issues we plan to have students investigate include the changing demographics of the communities, the change in the cost and availability of properties, and the issues of affordability for people in the area. We want students to analyze the trends and the possibilities, as well as to think about possible actions to take, in conjunction with activists in their communities. We know from other gentrifying Chicago neighborhoods that the battle to stay in the area is an extremely difficult one, but there are community development corporations that are building or rehabilitating housing that is fairly affordable to many existing residents. This also entails mathematical analysis. Finally, we plan on having students investigate the mathematics of home ownership, loans, mortgages, and development schemes so that they begin to understand how capitalism works, and how real estate developers and banks profit while communities such as theirs experience extreme economic poverty and dis- and under-investment in basic human needs. All this will equip them with knowledge they will need as they become adults and have to fight to maintain their place in the neighborhood, city, and country. This, ultimately, is the goal of teaching (mathematics) for social justice—that students become agents of social change and join in, and eventually lead, the struggles to remake our world for peace and justice.

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REFERENCES

- Apple, M. W. (2004). *Ideology and curriculum* (3rd ed.). New York: Routledge Falmer.
- Brantlinger, A. (2006). *Geometries of inequality: Teaching and researching critical mathematics in a low-income urban high school*. Unpublished doctoral dissertation. Evanston, IL: Northwestern University.
- Brantlinger, A., Buenrostro, P., Gutstein, E., & Mukhopadhyay, S. (2007, March). *Teaching mathematics for social justice: Is the math there?* Presentation to be given at the annual meeting of the research pre-session of the National Council of Teachers of Mathematics, Atlanta.
- Delpit, L. (1988). The silenced dialogue: Power and pedagogy in educating other people's children. *Harvard Educational Review*, 58, 280-298.
- Fennema, E., & Scott Nelson, B. (1999). *Mathematics teachers in transition*. Mahwah, NJ: Erlbaum Associates.
- Frankenstein, M. (1987). Critical mathematics education: An application of Paulo Freire's epistemology. In I. Shor (Ed.), *Freire for the classroom: A sourcebook for liberatory teaching* (pp. 180-210). Portsmouth, NH: Boyton/Cook.
- Frankenstein, M. (1998). Reading the world with math: Goals for a criticalmathematical literacy curriculum. In E. Lee, D. Menkart, & M. Okazawa-Rey (Eds.), *Beyond heroes and holidays: A practical guide to K-12 anti-racist, multicultural education and staff development* (pp. 306-313). Washington D.C.: Network of Educators on the Americas.
- Frankenstein, M., & Powell, A. B. (1994). Toward liberatory mathematics: Paulo Freire's epistemology and ethnomathematics. In P. L. McLaren & C. Lankshear (Eds.), *Politics of liberation: Paths from Freire* (pp. 74-99). New York: Routledge.
- Freire, P. (1970/1998). *Pedagogy of the oppressed*. (M. B. Ramos, Trans.). New York: Continuum.
- Freire, P. (1973). *Education for critical consciousness*. (M. B. Ramos, Trans.). New York. The Seabury Press.
- Freire, P. (1994). *Pedagogy of hope: Reliving Pedagogy of the Oppressed*. (R. R. Barr, Trans.). New York: Continuum.
- Freire, P., & Macedo, D. (1987). *Literacy: Reading the word and the world*. Westport, CT: Bergin & Garvey.
- Gandin, L. A. (2002). *Democratizing access, governance, and knowledge: The struggle for educational alternatives in Porto Alegre, Brazil*: Unpublished doctoral dissertation. Madison, WI: University of Wisconsin.
- Giroux, H. A. (1983). *Theory and resistance in education: Towards a pedagogy for the opposition*. Westport, CN: Bergin & Garvey.
- Gutstein, E. (2006a). Building political relationships with students: An aspect of social justice pedagogy. To appear in (E. de Freitas & K. Nolan, Eds.), *Opening the research text: Critical insights and in(ter)ventions into mathematics education*.
- Gutstein, E. (2006b). *Developing social justice mathematics curriculum from students' realities: A case of a Chicago public school*. Manuscript submitted for publication.
- Gutstein, E. (2006c). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. New York: Routledge.
- Gutstein, E., & Peterson, B. (Eds.). (2005). *Rethinking mathematics: Teaching social justice by the numbers*. Milwaukee, WI: Rethinking Schools, Ltd.
- Hill, H., & Ball, D. L. (2004). Learning mathematics for teaching: Results from California's mathematics professional development institutes. *Journal for Research in Mathematics Education*, 35, 330-35.
- Joseph, G. G. (1997). Foundations of Eurocentrism in mathematics. In A. B. Powell & M. Frankenstein (Eds.), *Ethnomathematics: Challenging Eurocentrism in mathematics education* (pp.61-81). Albany, NY: SUNY Press.

- Knijnik, G. (1997). Popular knowledge and academic knowledge in the Brazilian peasants' struggle for land. *Educational Action Research*, 5, 501-511.
- Ladson-Billings, G. (1994). *The dreamkeepers*. San Francisco: Jossey Bass.
- Ladson-Billings, G. (1995a). Making mathematics meaningful in multicultural contexts. In W. G. Secada, E. Fennema, & L. B. Adajian (Eds.), *New directions for equity in mathematics education* (pp. 126-145). Cambridge: Cambridge University Press.
- Ladson-Billings, G. (1995b). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32, 465-491.
- Lipman, P. (2004). *High stakes education: Inequality, globalization, and urban school reform*. New York: Routledge.
- Lipman, P., & Haines, N. (in press). From accountability to privatization and African American exclusion – The case of Chicago public schools. *Educational Policy*.
- Lorde, A. (1984). *Sister outsider: Essays and speeches*. Freedom, CA: Crossing Press.
- Macedo, D. (1994). *Literacies of power: What Americans are not allowed to know*. Boulder, CO: Westview.
- Mack, N. (1990). Learning fractions with understanding: Building on informal knowledge. *Journal for Research in Mathematics Education*, 21, 16-32.
- McLaren, P. (2007). *Life in schools: An introduction to critical pedagogy in the foundations of education* (5th Edition). Boston: Pearson/Allyn and Bacon.
- Moll, L. C., Amanti, C., & González, N. (Eds.) (2005). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. Mahwah, NJ: Erlbaum Assoc.
- Tajitsu Nash, P., & Ireland, E. (1998). Rethinking terms. In B. Bigelow & B. Peterson (Eds.), *Rethinking Columbus: The next 500 years* (p. 112). Milwaukee, WI: Rethinking Schools, Ltd.
- National Center for Research in Mathematical Sciences Education & Freudenthal Institute. (1997-1998). *Mathematics in context: A connected curriculum for grades 5-8*. Chicago: Encyclopedia Britannica Educational Corporation.
- Osler, J. (2006). *Radical math website*. <http://radicalmath.org/>
- Russo, A. (2003, June). Constructing a new school. *Catalyst*. Retrieved March 3, 2004 from <http://www.catalyst-chicago.org/06-03/0603littlevillage.htm>.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15, 4-14
- Skovsmose, O. (1994). *Towards a philosophy of critical mathematical education*. Boston: Kluwer Academic Publishers.
- Skovsmose, O. (2004). *Critical mathematics education for the future*. Aalborg, Denmark: Aalborg University, Department of Education and Learning.
- Swarns, R. (October 3, 2006). A racial rift that isn't black and white. *New York Times*. Retrieved October 4, 2006 from <http://www.nytimes.com/>
- Tate, W. F. (1995). Returning to the root: A culturally relevant approach to mathematics pedagogy. *Theory into Practice*, 34, 166-173.
- Turner, E. (2003). *Critical mathematical agency: Urban middle school students engage in mathematics to investigate, critique, and act upon their world*. Unpublished doctoral dissertation. Austin, TX: University of Texas—Austin.

ENDNOTES

1. "We" refers to the school's two mathematics teachers (Phi Pham and Joyce Sia) and the other mathematics support staffperson (Patricia Buenrostro). Together, we constituted the school "mathematics team."
2. In brief, *generative themes* are key social contradictions in people's lives and the ways in which they understand them.