

Humanizing Mathematics:
Students' Perspectives on Learning Math for Social Justice

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THESIS

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LIST OF ABBREVIATIONS

ACT:	Originally an abbreviation of American College Testing
ALSC:	Advisory Local School Council
CRFN:	Co-Researcher Field Notes
CPS:	Chicago Public School
DDS:	Discrete Dynamical Systems
IMP:	Interactive Mathematics Program
LCDC:	Lawndale Community Development Corporation
LVDC:	Little Village Community Development Corporation
LSC:	Local School Council
M4SJ:	Math for social Justice
NCTM:	National Council of Teachers of Mathematics
PD:	Poll difference
SJ:	Student Journal
TJ:	Teacher Journal

1 INTRODUCTION

1.1 *Rationale for Study*

Poor performance by U.S. students on national and international measures of mathematics achievement have raised concern and prompted a host of policy documents urging educators and researchers to make mathematics education a top priority in K-12 settings (Lappan & Ferrini-Mundy, 1993). The National Council of Teachers of Mathematics (NCTM) has unarguably led this effort in the classroom with the establishment of new standards in the teaching of mathematics that promote student engagement with complex mathematical problems, the ability to communicate their ideas with peers and teachers in both written and oral form, and a reliance on their reasoning, not the teacher, to determine the accuracy and correctness of a problem's solution (Clark, 1997). In concert with new standards in mathematics education, there has also been a greater focus on developing students' conceptual understanding and procedural fluency (as opposed to procedural efficiency) where students make connections and exhibit flexibility with procedures (Hiebert & Carpenter, 1992). There has been a de-emphasis on rote learning of skills and concepts in isolation to engaging in complex, contextualized problems that require students to develop flexible thinking, adaptive reasoning, and strategic competence (NCTM, 1989, 2000; NRC, 2001). In short, reform-based mathematics has been defined within this national agenda of improved outcomes by requiring students to learn both the content of mathematics (algebra, calculus concepts, etc.) as well as adopting a host of norms, practices, and dispositions likened to those performed routinely by mathematicians such as generalizing, abstracting, and productive struggle (Lampert, 1990; Forman, 1996).

Scholars have documented studies that point to the promise of reform-based teaching resulting in, for example, an improvement in students' attitudes towards mathematics (Boaler,

1998; Boaler, 2002), an increase in students' conceptual understanding of mathematical ideas and problem solving skills (Schoenfeld, 2002), and more flexibility with procedural application (Hiebert & Carpenter, 1992). Despite these encouraging data, other scholars have problematized the notion that standardization in mathematics alone can address the persistent underperformance in mathematics by low-income, youth of color (Apple, 1992; Martin, 2000). They argue that such standardization has the potential to further exacerbate the so called achievement gap (Apple, 1995; Zevenbergen, 2000) due to inequitable distribution of resources and failure to recognize the particular needs of Blacks and Latinos (Martin, 2003). In fact, for low-income students of color, mathematics achievement continues to be dismal. A look at the 2009 National Assessment of Educational Progress (NAEP) data shows slight gains in mathematics for all racial groups from 2005 but no change in the achievement gap among Blacks and Latinos when compared to whites and Asians (www.nces.gov/nationsreportcard).

I use the term *achievement gap* to index a familiar paradigm for readers but not without caution and restraint. Scholars of color have challenged the use of such terms as *achievement gap*, *underperformance*, and *at risk* to describe and reify the marginalization of particular groups of students (Gutierrez, 2008; Ladson-Billings, 2006; Martin & McGee, 2009). For example, Gutierrez (2008) has suggested that researchers should avoid the use of narrowly-defined notions of achievement such as tests scores and instead document more effective learning environments and more successful intervention programs and strategies in practitioner-friendly format. In other words, always referring to the achievement gap does little to inform our practice and much less to inform issues of equity. Moreover, Martin & McGee (2009) have argued that such deficit framing of African-American children has served the interests of White children and has done little to nothing in the service of Black children and other marginalized groups. This is not to engage in any way the notion that

performance outcomes for students of color are not significant. Simply put, as marginalized communities, we must reframe education in liberatory terms for our communities. While these high-stakes yet narrow measures have real consequences for students when it comes to access to colleges, universities, and employment, we need to expand our notion of how academic success is defined, by whose standards, to whose benefit, and to what end (Horn, 2003).

Given the prevalence of poor mathematics instruction in low-income communities of color and the need to rethink education along equity lines, scholars have argued for providing students with a pedagogy of access as well as a pedagogy of dissent (Morrell, 2004). For example, Gutierrez (2002) has proposed an agenda for equity that coordinates the goals of teaching *dominant* (i.e., mainstream, university-accepted) mathematics and, simultaneously, critical perspectives of society and the world. That is, she has proposed that a fundamental goal of mathematics education should be to achieve equity through the coordination of these two perspectives in order to facilitate “a more positive relationship between mathematics, people, and equity on the planet” (p. 145). Similarly, Martin & McGee (2009) have argued “for mathematics education that allows African-American learners to use mathematics...to change the conditions and power relation in their lives” (p. 208). Martin (2007) called on teachers to “conceptualize mathematics not just as a school subject but as a means to empower African-American students to address their social realities” (p. 25). Furthermore, Gutstein (2006) and Turner (2003) have proposed using mathematics as a tool for equity whereby students learn and use mathematics to investigate and critique inequity, to alter unequal conditions, and impact their world towards greater equality. While the above stated goals are ambitious and perhaps idealistic, there is a growing body of scholarship that is concerned with the engagement of youth in learning mathematics, science, and language arts in this critical sense (Camarota, 1997; Camangian, 2008; Duncan-Andrade, 2009; Yang,

2009; Morales-Doyle, 2015, Tan, Barton, Turner, & Gutierrez, 2012). That is, learning concepts in any particular domain should aim to unpack and alter conditions that create inequality and suffering for all humankind.

Despite a popular notion that education for liberation is counter to academic rigor, critical educators committed to improved social justice outcomes concomitantly understand the value and uncompromising commitment to engaging students in *more* rigorous academic study. For example, Duncan-Andrade (2009) has called for an additive model of education in which students of color are exposed to relevant pedagogies that “prepare them to confront the conditions of social and economic inequity in their daily lives *and* give them access to the academic skills that make college attendance an option” (p. 450, emphasis added). A fundamental difference in critical pedagogy classrooms from traditional (or even reform) classrooms is that students develop academic competencies by engaging in meaningful problems from the students’ standpoint—problems worthy of sustained engagement, examination, and resolve. Engagement with issues of social import to young people of color was the focus of this study. I begin below with my entry into this particular context.

1.2 BACKGROUND CONTEXT

My entry into this particular school community is unique, complex, and significant as I embark on this scholarship. But I would be remiss not to share my entry into Little Village as an educator because of the ways in which I was profoundly shaped at Latino Youth Alternative High School (LYAHS). I taught math at LYAHS from 1993-1995 after being disillusioned by my studies in mechanical engineering; disillusioned by the thought of working in an impassive environment disconnected from my desire to impact the world in socially conscientious ways. The young people at LYAHS taught me a great lesson in their disillusionment with and rejection of schools; schools (unlike their experiences at LYAHS)

that felt like jails full of policies meant to keep young people of color under extreme control and scrutiny. These young people taught me about their struggles with drugs, gangs, self-esteem, parenting, police harassment, health, access to resources, and survival. But most importantly, the LYAHS staff and students taught me about the reality that schools were not designed for these young people; hence, their fate in an alternative high school. At LYAHS, students' concerns and realities became the center of the curriculum and their collective interests informed the school rules and policies. Teachers and students formed relationships that were based on trust, respect, accountability, and love. I cannot overstate enough how this experienced shaped how I learned to be an educator from here on out. I went on to work in several start-up charter schools—I had a degree in mechanical engineering not a teaching certificate—where I constantly pushed for a similar student-centered design as I had experienced at LYAHS. From this point onward, I too committed myself to work and design environments that honored young peoples' voices, experiences, and desires. My involvement in the following struggle stemmed from this commitment.

1.2.1 A School Born Out of Struggle:

My participation in the focus class of this study represents more than an academic interest. This small school sits on a state-of-the art high school campus that houses four schools, of which Sojo is one. The campus¹ construction was the result of a decade-long, grassroots campaign for a new high school in the community of Little Village during which I joined in during the latter months. Despite the fact that our state representative had secured

¹ I use the word campus when I am referring the four school multiplex as a whole whereas when referring to the Greater Lawndale Little Village School of Social Justice, I use the school's colloquial name of Sojo.

\$30 million in state funds for a new high school in my community of Little Village 3 years earlier, the school district's administration chose to spend it on "other projects" (District Board Meeting, 5/23/01). After almost a year of organizing in the community to raise awareness and repeated attempts to petition the school board for answers to funds unaccounted for, our group was unrelenting in our demand to get a concrete response. It was at this point that our "education committee" decided to pursue a more drastic organizing tactic—a hunger strike on Mother's Day. Initially, only a few of us were willing to consider not eating if it meant our cause could get good media coverage, strong community support, and an answer from the school board regarding the missing funds. By the end of the first night on May 13, 2001, our group grew from 4 to 14 members—a combination of youth, mothers, fathers, and elders. Our site became a campground where media frequently visited, community residents rallied, and the hunger strikers slept and organized. The amount of community and city-wide support surpassed our expectations. Our group persevered and we continued to gain media coverage by following the city's mayor to various speaking engagements as well as his home. It was precisely the mayor who needed to be held accountable for three principled reasons: (1) in 1995, the state legislature passed a bill giving the city's mayor control of the public school district; (2) in January 1998, the same mayor during his mayoral re-election campaign stood on the empty lot of where the school now sits and promised to build 3 new high schools, one of which was for the community of Little Village; (3) in the spring of 2001 when the strike took place, 2 of the 3 promised high schools were up and running in more affluent neighborhoods while our high school's first brick had yet to be bought much less laid. The strike ended 19 days later on June 2, 2001, not because we had received a commitment to build our high school but because our bodies could not continue to go unfed--several strikers experienced medical issues throughout. As political timing would have it, the two top officials (CEO and school board president) resigned from

their post to run for political office (they both lost) and one of the first public commitments by the new administration was \$5 million to enter the planning phase for a new high school in Little Village².

Hence, this project has to do with both a short-term and long-term commitment to this school as an institution of learning and to education, in general, as a transformative, personal project that draws on youth's sense of social, economic, and political justice. Represented in this way, I was interested in how students in the M4SJ class interpreted their experiences in attending a school born out of a community struggle and that attempted to continue a legacy of social justice through the curriculum. Moreover, I wanted to understand how students experienced learning mathematics to unpack their own socio-political realities. It is their experiences told through their words that compelled me to go back and interview the participants that were in the M4SJ class and a part of this school from its inception. Through this investigation, I aimed to address the following questions:

1.3 RESEARCH QUESTIONS:

1. How did students experience attending a school focused on social justice? What aspects of this experience were most salient in students' narratives?
2. What meaning did students make of their experiences in the M4SJ class? What aspects of the class and their experience held salience for them? This includes reflections on the class learning with respect to experiences after high school

² I share more of the context and dynamics involved in starting up a new school through a community-driven process in Chapter 4: School & Community Research Context.

including but not limited to post-secondary experiences, career goals and general life events.

1.4 Significance of Study

This study is significant for several reasons. The first reason is that there are few examples in the literature documenting students' perspectives on learning mathematics for social justice in K-12 classrooms (Gutierrez, 2013; Turner, 2012; Gutstein, 2006) and no studies that I am aware of that interviewed students *long after* they have left the experience to understand the meaning they made and ways in which they did or did not integrate the experience into their daily, academic, and future lives. This study is significant to the field because the participant voices are not only lacking in the research but as subjects in this work, their perspective provides us with unique insight into some of the possibilities and the challenges to engaging in this work well.

This study is also significant precisely because of the context in which students engaged with using mathematics to study socio-political issues impacting their communities. Students attended a school known in the community for having emerged from a community-led struggle. Moreover, the school was founded on and attempted to carry out values based on social justice—transparency, collective struggle, self-determination, and democracy. For the 3 years leading up to the focus class of this study, students engaged a great deal with learning about social justice movements in their classes across disciplines including to a small but significant degree in their reform-oriented mathematics classrooms. Related to this, students engaged in a year-long study in which the context of their lives drove the content of the mathematics. To my knowledge, this experience has not been documented for teachers and teacher educators alike from which to learn and build. In this somewhat ideal situation, it

is significant to have been able to interview students years later to try and understand the implications for their lives and their communities.

Thirdly, this study is significant because the qualitative nature of the study allowed students' experiences and stories to be centralized. In this way their stories of struggle, perseverance, and triumph serve as a counter-narrative (Solorzano & Yasso, 2002) to the overwhelming framing of young Black and Latino youth as underachievers.

1.5 Limitations of Study –

One limitation is the notion that interviews are performances that are co-constructed by the interviewer and the interviewee (Wortham, 2000). Particularly in light of my status in the school and community, I was conscious of my influence over the interview process and product and tried to be attentive to the intersubjective and relational aspect of the interviews and the data they produced. Although this aspect of the interview was unavoidable, I dealt with this by looking across sources to understand and situate what the student shared in the interview. My goal was not to triangulate but rather to get a richer, perhaps more complex understanding of how students made sense of their experiences in relationship to their past, present and future lives. Searching to understand how students' made meaning of their experiences across data sources meant that at times their feelings, attitudes, memories were corroborated whereas at times they were contradicted.

In this study I did not attempt to make any claims about how much mathematics students learned. The purpose was to understand the meaning that students made and so I did not look at their mathematical work over time. In this vein, I aimed to harvest themes from students' stories and the import they identified. This created an additional limitation in that students raised themes that at times did not follow up on sufficiently not knowing they were

going to significant *a priori*. Nonetheless, there was plenty of data for me to analyze and compose rich narratives.

A third limitation was that I unpacked students' forms of participating through the eyes of the teacher and the co-researcher as opposed to my own field notes as I was a participant-observer on average 2-3 times per week from September through April. Unfortunately, I did not take field notes (with the exception of 5 days in September and October) so in this way, the study is limited albeit it in small ways. Often times, student participation and climate descriptions were corroborated across field notes and my own memory of the class. However, I recognize that by not taking my own field notes consistently, I may have missed out on different subtleties that the teacher (given his focus on facilitation) and the co-researcher (not having insider knowledge) may have not picked up on.

1.6 Outline of Dissertation

In the introductory chapter I have laid out the context and rationale for this study as well as the questions that drive this study and wanting to understand the significance and meaning that students who partook in the M4SJ class made from attending both a school focused on social justice and using mathematics as a disciplinary lens to examine socio-political issues impacting their community. In chapter 2, I lay out my conceptual framework that draws on a humanizing pedagogy in general terms and critical mathematics more specifically to explicate the premise of the M4SJ class. Chapter 3 is comprised of my research methodology within a qualitative research paradigm in which I draw on qualitative interviewing and a narrative methodology to analyze and represent my findings.

I provide the reader a description of the community context in Chapter 4 to give an overlay of the inter- and intra-neighborhood dynamics leading up to the opening of the school. The school opened up its doors to two neighboring but largely segregated

communities—one African-American and one Latin@. I give a brief description of each community and how the school district mandated the school to draw from both communities. I describe in the context both leading up to the school aperture and the first years, my perspective and understanding of the racial dynamics and how they came to play a role in how students experienced the school.

Because I drew on a narrative methodology, it was important to understand how students experienced not only the M4SJ class but also their experiences in school generally. Students' experiences in high school are therefore represented in Chapter 5 where I place students two major experiences of care and relevant curriculum under the umbrella of a critical care that defines care broadly—not just in terms of teacher-student relationships. In this chapter I share students' understanding of how teachers cared by investing in students through time, curriculum, and attempts to address the ongoing racial tension in the school and community.

Chapters 6, 7 and 8 describe students' experiences in the M4SJ with respect to how they came to experience the class. In chapter 6, I present students' *interdependent* engagement with *rigorous* mathematics. By and large, students described the material being difficult but as they learned to rely on one another as intellectual resources, they were able to understand the rigorous mathematics. I draw on multiple data sources including post-class interviews across the participants so that I could provide the reader with a thick description (Geertz, 1994) of the ways in which students worked together and were challenged by the mathematics. In chapter 7, I discuss students' reflections on their socio-political orientations. In other words, I present three sub-themes that highlight the 3 major ways students related to the curriculum and pedagogy in the M4SJ class. From students' perspectives, they found the topics to hold significant political import for their communities (theme #1), their experiences built on their sense of agency offering them opportunities to use mathematics as a tool in

fighting injustices (theme #2), and their experiences in the class bolstered their commitment to racial unity across communities (theme #3). In chapter 8, I share three student narratives on their mathematical learning over time. In these three storylines, I share student reflections on learning mathematics in high school with a reform-oriented curriculum in comparison to their learning mathematics with social justice themes as in the M4SJ class and finally in light of their college-level math courses. Through these narratives, we gain insight into students' varying mathematical trajectories and the ways in which they connected (or not) with mathematics.

2 CONCEPTUAL FRAMEWORK

In this chapter I lay out the theoretical constructs that situate and drive this study. I begin by explicating a critical and humanizing pedagogy as the primary rationale for engaging in this study. I draw on various frameworks within the field of critical mathematics education including empirical studies in the field of critical mathematics education. I conclude by discussing ways in which these constructs have informed and shaped this study.

2.1 *Critical Pedagogy*

Critical pedagogy is the enactment of an emancipatory education. In an attempt to raise consciousness towards the advancement of social agency and transformation, critical pedagogues engage students in the study and critique of society. I begin with a brief overview of some of Paulo Freire's contributing ideas to the field of critical pedagogy as his theories on education for liberation have "unarguably been the driving force behind North American efforts at developing critical pedagogy" (McLaren, 1999, p. 51). This view is consistent with my own review of the literature. Educators seeking to teach for social justice hold his work in high regard for his undying commitment to education as a liberatory practice and his far-reaching involvement in literacy campaigns across the globe (Gutstein, 2006). This is not at all to trivialize the great contributions by many scholars to both the theories and practical application of critical pedagogy but to affirm the influence of key ideas that have made their way into U.S. classrooms as a result of Freire's theories and applications.

In his germinal work, *A Pedagogy of the Oppressed* (1970/1999), Freire discussed his theory of engaging a critical pedagogy with great detail. This manuscript resulted from his work in critical literacy campaigns with peasants and marginalized people in Brazil and Chile (Elias, 1994). In his book, *Paulo Freire: Pedagogue of Liberation*, John Elias described this work succinctly:

The principal themes of the work include the following: Persons to be fully

human must become subjects and not be content to be objects. Education should be carried out by and with the oppressed and not for them. Pedagogy of the oppressed entails the conscientization of the oppressed; that is, it should attempt to make them aware of their oppressive situation and show them that through their praxis they can transform this state of oppression. (p.10).

In short, Freire's educational projects were about eradicating human suffering on all levels. He believed that suffering was a result of human agency and, consequently, could be eradicated by human agency, agency by those most afflicted. Freire advocated for an education that created an awakening of the masses (i.e. consciousness) to the ways in which domination worked, their own complicity within it, and a commitment to work against it. The premise that education is a political act is fundamental to engaging a critical pedagogy abdicating the myth of neutrality within education. Hence, education should explicitly serve a political purpose in the interest of all humanity. In this way, engaging a critical pedagogy serves the particular purpose of reestablishing a new social, economic and political order based on justice and equity for all human beings.

Freire (1970/1999) aptly criticized what he has termed *the banking model of education*. In a banking model of education, teachers transfer knowledge and/or facts to students in an uncritical manner treating students as passive recipients or vessels waiting to "filled" with knowledge. Freire described the banking model of education as "an act of depositing, in which the students are the depositories and the teacher is the depositor." (p. 53) Knowledge within this transference model of learning remains "far apart from inquiry" preventing both teachers and students from becoming fully human.

Inherently in the banking method of education we encounter the knowing teacher and the unknowing student; therein lays a power relation. Freire raised issue with this teacher-student power contradiction. In order to resolve the teacher-student contradiction, Freire

proposed a dialogical relationship between teacher and student; a relationship in which students and teachers produce knowledge collaboratively in a co-investigation of reality. Dialogue then becomes “an encounter between men [and women], mediated by the world, in order to name the world” (p. 69) and transform it.

Hence, in response to the banking method, Freire put forth the concept of a problem-posing education, signifying a different epistemological base for knowing. Knowledge, he argued, is socially constructed and therefore should be scrutinized according to whose interest it serves. For Freire, this meant establishing the content of education as problems or social issues to be confronted. The theory is that if education is to serve liberation and liberation is to be lead by the oppressed, than the educational program must deal directly with the oppressive conditions in which the marginalized find themselves. Freire committed his life to teaching people how to read their world (critical read of society) through reading of the word (literacy) in order to act upon and transform their world.

I offer the above description of Freire’s work humbly and with broad and quick strokes. I highlight a few of his major contributions to critical pedagogy in K-12 classrooms based on the principal ideas that emerged in the literature. That is, researchers and teacher-researchers that have engaged either themselves and/or others in critical pedagogy in U.S. classrooms have built upon, among others, the aforementioned Freirean principles. They have aimed to engage students in a dialogic, problem-posing curriculum that begins with important personal and social issues. They have sought to draw out students’ voices and experiences in the classrooms through both the content of the curriculum (i.e. their lives) and in dialogue *with* students. These same researchers have also been explicit about the political nature of their projects. They have done so by raising their students’ socio-political consciousness about the conditions in which they find themselves as a function of society—not their own cultural, social, or personal attributes. It is in this vein and within these theoretical principles

that the M4SJ classroom upon which this study is based, was largely modeled. (see Research Context, Section 3.3)

2.2 Humanizing Pedagogy

Educators orienting toward a humanizing pedagogy heed the call of Paulo Freire (1970), who laments the state of dehumanization in education and asserts that “the only effective instrument in the process of re-humanization is humanizing pedagogy” (p.55). A humanizing pedagogy is crucial for both teacher and student success and critical for the academic and social resiliency of students (Fránquiz & Salazar, 2004; Reyes, 2007). (Salazar, 2013, p. 124)

I join Freire (1970/1999), Salazar (2013) and critical pedagogues across the globe in establishing a critical and humanizing pedagogy as the ideological starting point for education as a means for liberation and freedom from all forms of oppression.

Salazar (2013), drawing on the work of Paulo Freire, described humanization as “the process of becoming more fully human as social, historical, thinking, communicating, transformative, creative persons who participate in and with the world.” (p. 126) Implicit in this description is the notion that in becoming more human one is an acting subject who actively engages with the world in order to transform it. It is through this transformation on the world that one also transforms themselves and in the process becomes *more* human. In her review of the literature (U.S. contexts and abroad) on various manifestations of a Freirean-based, humanizing pedagogy, Salazar discerned the following five essential precepts for engaging in the “pursuit of one’s full humanity through a humanizing pedagogy” (p. 128)

1. The full development of the person is essential for humanization.
2. To deny someone else’s humanization is also to deny one’s own.
3. The journey for humanization is an individual and collective endeavor toward critical consciousness.

4. Critical reflection and action can transform structures that impede our own and other's humanness, thus facilitating liberation for all.
5. Educators are responsible for promoting a more fully human world through their pedagogical principles and practices.

This list is not meant to be some kind of checklist nor is it intended to delineate a technical process for engaging in a humanizing pedagogy. These precepts are overarching guideposts that are to be carried out and reinvented through critical praxis—actions by reflective actors. The tenets listed above are interrelated and can collectively serve the same goal of humanization. I draw on a humanizing pedagogy to situate this study in which students believed to have learned how mathematics can be a tool for understanding and transforming injustice in their communities.

Returning to these 5 tenets as laid out by Salazar (2013), I begin with the final one (#5) in that I join humanist pedagogues in realizing our role as educators “responsible for promoting a more fully human world.” It is from this precept that I envision, engage, and analyze teaching and pay particular mind to students’ experiences in educational projects that aim to participate in the “journey for humanization”. In this way, education as a political project aims to restore humanity through critical engagement with the world (Freire, 1970/1999).

What is humanization and what is a process to becoming more human? Salazar (2013) laid this out rather succinctly in that humanization is working towards each person’s full development as a human being. In the first precept or tenet, the author explicated the importance of the teacher-student relationship as primordial to carrying out a humanizing pedagogy.

A humanizing pedagogy is inclusive of the psychological and emotional dimensions of the human experience; thus, a humanizing pedagogy is intentionally focused on the

affective domain (Bell & Schniedewind, 1989) and requires that educator interact with student on an emotional level (Cammarota & Romero, 2006) (Salazar, 2013, p. 129)

Salazar (2013) suggested that this aspect of a humanizing pedagogy aligned itself strongly to the literature on caring within educational settings, a concept I explore further in my explication of a critical type of caring in Section 2.2.1. The principle idea here is that central to a humanizing pedagogy are teacher-student relationships built on mutual trust, respect, and a commitment to one another's full humanity within and through humanizing relationships.

Accordingly, as we engage in a humanizing educational project collectively, to deny one's humanity is to also deny one's own (precept #2). In his critique of a banking model of education, Freire (1970/1999) contended that such a model is an oppressive act in that it "inhibits creativity and domesticates...the *intentionality* from the world, thereby denying people their ontological and historical vocation of becoming more fully human." (pp. 64-65) He unequivocally rejected the transference model of education in that it treats students as unknowing objects, empty vessels to be filled with knowledge. In this way, we are denying students their humanity and birthright as knowing subjects capable of reflecting critically on their world as a necessary precondition for transforming it.

In the 3rd precept, Salazar (2013) drew attention to the need for developing in ourselves with others a critical consciousness. In the preface to *Pedagogy of the Oppressed*, Freire defined the Portuguese term *conscientização*, of which critical consciousness is a correlate, as "learning to perceive social, political, and economic contradictions, and to take action against oppressive elements of reality." (p.17) The process of becoming critically conscious is one that, Freire argued, can only occur through dialogue with whom we are engaging in a humanizing pedagogy. Critical consciousness is, hence, not something teachers do *to* students but rather *with* students through, as Freire suggested, a problem-posing

education. He defined a problem-posing education as one that “regards dialogue as indispensable to the act of cognition...unveil[ing] reality....tak[ing] the people’s historicity as their starting point” (p. 64-65). In the context of this particular study then a problem-posing education entails engaging dispossessed youth (Camingian, 2015) in the study of their own reality in order to name their world and transform, or act upon, it. In bringing these ideas together, Salazar (2013) described the process of participating in a humanizing pedagogy as “critical, dialogical, and praxical.” (p 136) That is, by engaging in a collective critique of our lived reality through a process of dialogue, critical action and reflection, we concomitantly engage in a humanizing pedagogy. In this study, students collaboratively and interdependently examined and analyzed aspects of their social reality through generative themes—social and political contradictions in students’ lives.

The five guiding tenets are useful in directing a path towards humanization while not being prescriptive. This would be antithetical to a pedagogy aimed at centralizing human existence and relationships. Critical theorist, Donald Macedo, criticized a North American fetish for appropriating liberatory education methods such as those proposed by Freire.

The appropriation of the dialogical method as a process of sharing experiences is often reduced to a form of group therapy that focuses on the psychology of the individual....It invariably requires a political and ideological analysis as well. That is, the sharing of experiences must always be understood within a social praxis that entails both reflection and political action. In short, it must always involve a political project with the objective of dismantling oppressive structures and mechanisms.

(2009, p. 175)

Bartolomé (1994) too argued for teachers to develop first and foremost political and ideological clarity prior to engaging any type of educational reform claiming to work towards

equity and social change. Consistent with a framing of education as a purposeful and political act towards humanization, she asserted:

Teachers working towards political clarity understand that they can either maintain the status quo, or they can work to transform the sociocultural reality at the classroom and school level so that the culture at this micro-level does not reflect macro-level inequalities, such as asymmetrical power relations that relegate certain cultural groups to subordinate status. (p. 178)

Moreover, I heed Bartolomé's call for engaging a humanizing pedagogy that "respects and uses the reality, history, and perspectives of students as an integral part of educational practice." In this way students' lives are not checked at the door in order to engage with the discipline of mathematics as is often (mostly) the case. A humanizing pedagogy is one that tends to students' lived realities and their ways of knowing in order to transform and be transformed.

Although there are potentially infinite number of ways to develop and engage in a humanizing pedagogy, certain things must hold true for that pedagogy to work towards realizing our full humanity. In this way, Salazar (2013) offered up some principles around which many educators across the globe have built consensus when enacting a humanizing pedagogy and interpreting Freire's theories on liberatory education. These principles, as she encapsulated within the 5 tenets outlined at the start of this section, advance a framework that is counter to the current dehumanization that low-income, students of color disproportionately experience in schools across the country. As such, Salazar (2013) called for "studies that engage the voices of the oppressed as central to humanization in education." (p. 125). This is certainly one aim of this study.

2.2.1 Critical forms of Caring within a Humanizing Pedagogy

In his explication of dialogue, Freire (1970) argued that must be based on mutual trust and faith in humankind. He asserted that “love is at the same time the foundation of dialogue and dialogue itself” (p. 70). I raise this aspect of engaging in true dialogue to accentuate the relational aspects of engaging in a humanizing pedagogy. Critical pedagogues have advocated for adults and students to engage in a more humanizing pedagogy that places the welfare of human beings and positive relationships at the center of the curriculum.

For example, Cammarota and Romero’s (2006) Critically Compassionate Intellectualism aimed to engage the voices of disempowered Latin@s³, in part, by “promot[ing] student-teacher relationships characterized by respect, admiration, and love” (p. 16). The teacher-researchers asserted that they were able to engage their students only after explicitly tending to the lack of *mutual* trust that they initially overlooked. Students were at first hesitant to share personal stories and resisted to engaging in an authentic dialogue. This was partly because trust had not been established and partly because it broke with students’ overwhelming conceptions and expectations of receiving (and not partaking in) knowledge from their teachers within a banking framework of education. Drawing on a humanizing pedagogy, the teachers realized that they needed to interact with students “on an emotional level and [share] their deepest concerns and feelings about life.” (p. 20) It was this particular experience that influenced the teacher-researchers to include authentic care as one of three central components of their Critically Compassionate Intellectualism framework that brought together the concepts of critical pedagogy, authentic caring, and social justice content. Whereas the authors knew that they wanted students to be equal partners in identifying,

³ I use the term Latin@ to include all genders, male, female, and other.

analyzing, and reacting transformatively to their own oppression (critical pedagogy), when students were not readily open to authentic dialogue about their lives, the scholars realized the importance of building trusting relationships with the students. For them, it meant sharing their own stories and struggles with oppression prior to engaging the social justice content.

The construct of care has been addressed to some degree primarily and interestingly by female scholars. Thompson (2003), in her analysis of caring frameworks warned,

On the structural account, caring is at best a compensatory value that may help to mitigate the worst effect of patriarchal capitalism. In so doing, however, it may also disguise the systemic character it helps to ally. To the extent that caring does gain a place in the schools, it may mislead students into the oversimplified assumption that caring can eradicate racism, sexism, or other forms of inequity. (pp. 39-40)

In agreement with Thompson, I foreground her proclamation that caring alone is not only insufficient but can potentially “disguise the systemic character” of society’s social ills. This being said, I do not wish to disregard either the role of authentic care (Valenzuela, 1999) that is at the heart of humanizing relationships built on faith, trust, and an “armed love” (Freire, 1998). In chapter 5, I analyze how students’ discussed and understood the role of care in their lives. It is because the students spoke overwhelmingly about the significance of having caring teachers that I have chosen to hone in on this aspect of a humanizing pedagogy with more depth.

In studies highlighting Latin@ students’ perspectives on their schooling experiences, the concept of care has been a central feature (Antrop-Gonzalez & de Jesus, 2006; Rolon-Dow, 2005; Valenzuela, 1999). For example, Valenzuela (1999) notably underscored a clash between teachers engaging an *aesthetic* form of care focused on students’ academic success and Mexican (U.S.-born and immigrant) students’ expectation of *authentic* care based in students’ lived realities.

The predominately non-Latino teaching staff sees students as not sufficiently caring about school, while students see teachers as not sufficiently *caring for* them. Teachers expect students to demonstrate caring about schooling with an abstract, or *aesthetic* commitment to ideas or practices that purportedly lead to achievement. Immigrant and U.S.-born youth, on the other hand, are committed to an *authentic* form of caring that emphasizes relations of reciprocity between teachers and students (p. 61).

As Valenzuela documented above, students' interpretations of their teacher's lack of authentic care prevented them from trusting and subsequently engaging with their teachers in the learning process resulting in what the author termed *subtractive schooling*. Moreover, Valenzuela (1999) argued that trying to get Mexican youth to fit into mainstream society (vis-à-vis acquisition of academic knowledge) while ignoring their socio-cultural and political histories and identities results in an inadequate and harmful education. I turn to other scholars who, like Valenzuela, have explicitly tended to the political and ideological aspects of care (Bartolomé, 1994; Beauboeuf-Lafontant, 2002, 2005).

Beauboeuf-Lafontant (2005) in her study of six Black teachers' epistemological stance on teaching as an act of social justice uncovered three *womanist* positions, one of which was caring as a form of social activism. She found that the women, "modeling themselves after other Black women...also embraced a form of caring that is communal and political by definition" (p. 441). In her explication of care within a Black womanist tradition, Beauboeuf-Lafontant (2002) unearthed from her interviews three particular features of a caring narrative: mothering, political clarity, and ethic of risk. This caring narrative indexed the historical role that Black mothers and Black female teachers, in particular, have played in racial uplift of *their* children writ large. Beauboeuf-Lafontant connected this relational sensibility of mothering to Black teachers' political clarity. She contextualized "the profound relational capacities of womanist teachers [as] vitally connected to another dimension—their

identity as political beings who make constant parallels between schooling and society, school practices and social reality” (2002, p. 77). Hence, inasmuch as Black teachers have viewed teaching Black children as a communal and maternal responsibility, they have concomitantly carried out their teaching as a political commitment to racial uplift of the community as a whole.

Latin@ scholars similarly have “linked caring with racialized perspectives, discourses, and practices” (Rolón-Dow, 2005, p. 87) Drawing on tenets of Critical Race Theory (CRT) and Latino Critical Race Theory (LatCrit), Rolón-Dow (2005) analyzed racialized, care narratives of 9 Puerto-Rican middle school girls and their primarily white middle class teachers. In applying a race/ethnicity lens (CRT/LatCrit) to analyzing the narratives, Rolón-Dow revealed the different ways teachers (white, middle-class) viewed caring in contrast to the ways the girls (low-income, Puerto-Rican) viewed caring. The teachers primarily drew on deficit-based notions of the community maintaining that families did not care about their neighborhood or their children’s education. Rolón-Dow also pointed to teachers’ racialized ideologies as contributing to their perceptions of students’ alleged lack of care. The girls’ caring counter-narratives highlighted the demoralizing conditions of the school and teachers’ unfamiliarity with their realities as a form of *not* caring. In light of these contrasting narratives, Rolón-Dow advocated for a *critical* care praxis defined as care that “is grounded in a historical and political understanding of the circumstances and conditions faced by minority communities” and one that “seeks to expose how racialized beliefs inform ideological standpoints” (p. 104). She cautioned educators to look deeper into the caring narrative to explore ways in which it could be couched within racialized ideologies and instead advocated for a critical care that corresponded to students’ lived realities and accounted for the endemic nature of racism perpetuated on marginalized communities of color.

I have briefly reviewed some of the literature on care. My hope is to have drawn out sufficiently the political and ideological aspects of engaging in a critical care praxis—caring for students that extends beyond their academic development to include their development as social and political actors. Having interviewed students to elicit their schooling perspectives, this literature and theoretical framing of caring helped focus my own analysis of how the student participants’ understood caring in their context. I now turn to the literature specific to enacting a critical and humanizing pedagogy in the field of mathematics.

2.3 Critical Mathematics Education

Stinson and Wager (2012) asserted that a common criterion for engaging in critical mathematics education and its companion⁴, teaching mathematics for social justice (TMfSJ), is the notion of “teaching mathematics *about*, *with*, and *for* social justice” (p.6).

Teaching mathematics *about* social justice refers to the context of lessons that explore critical (and oftentimes controversial) social issues using mathematics. Teaching *with* social justice refers to the pedagogical practices that encourages a co-created classroom and provides a classroom culture that encourages opportunities for equal participation and status. And teaching mathematics *for* social justice is the underlying belief that mathematics can and should be taught in a way that supports students in using mathematics to challenge the injustices of the status quo as they learn to read and rewrite their world (Frerie, 1970/2000 cited in Stinson & Wager, 2012, p. 6).

At the heart of a critical mathematics (CM) education is social change towards a more equitable and humanizing society—from the most local or classroom level to more global

⁴ I use the terms critical mathematics education interchangeably with teaching mathematics for social justice—both to mean the commitment to employ mathematics as a lens to read, understand, and critique society with the goal of creating equitable and humanizing relationships across the globe.

relations. In this respect, critical mathematics educators and scholars share a political commitment to engage in critical mathematics that serve liberatory goals (Skovsmose, 1994; Gutstein, 2006, Turner, 2003). They are committed to challenging the current socio-political and economic structure of society that relegates particular groups to a subordinate status of second-class citizenry. This commitment to equality is inclusive of and extends beyond the walls of the classroom.

Critical mathematics (CM) educators are committed to a mathematics education program that “seeks to engage students, socially marginalized in their societies, in cognitively-demanding mathematics in ways that help them succeed in learning that which dominant ideology positions them to believe they are incapable.” (Powell, 2012, p. 27) Hence, it seeks to equip students with the mathematical skills and dispositions needed to succeed academically. In this way, educators aim to counteract the notion that only certain students from certain cultural and socio-economic backgrounds are intellectual beings and capable of engaging successfully in rigorous mathematics. In this vein, Gutierrez (2002) has proposed that a fundamental goal of mathematics education should be to achieve equity by addressing the power differentials that exist in patterns of achievement according to “race, class, ethnicity, sex, beliefs and creed, and proficiency in the dominant language” (p. 153). That is, she has proposed an agenda for equity that coordinates the goals of teaching *dominant* mathematics and critical perspectives of society and the world.

Beyond this type of individual, mathematical empowerment (Ernest, 2002), CM educators envision and are committed to an emancipatory mathematics education that can address “the most universal problem facing humanity, which is survival with dignity.” (D’Ambrosio, 2012). Hence, critical mathematics education and teaching math for social justice offer hope and transparency to this very end. As an alternative to the current educational agenda of privatization and marketization, it promotes engaging students in

activities that “can be potential modes of social criticism and transformation” (Apple, 1992, p. 423). For example, Martin & McGee (2009) have argued “for mathematics education that allows African-American learners to use mathematics...to change the conditions and power relation in their lives” (p. 208).

Scholars who have advocated for a critical pedagogy in mathematics understand that inequitable conditions and outcomes for certain populations is not about pre-ordained destiny or intellectual or personal deficiencies. Inequity is about political, social, and economic arrangements that privilege some while impeding the social advancement of others. The hope is that making such arrangements transparent will lead to profound understanding and commitment to create change towards more equitable relations among humankind. I turn now to several critical mathematics scholars whose work has helped illuminate some of the possibilities and challenges that teaching for social justice in mathematics has posed.

2.3.1 Reading and Writing the World with Mathematics

Gutstein (2003, 2006a, 2006b, 2008) has written extensively about his 15+ years of experience as a teacher-researcher of critical mathematics pedagogy. Gutstein has built on the scholarship of Freire who coined and defined the terms *reading the world* and *reading the word* as two dialectical processes that lead to critical consciousness and reflective action. In short, through his literacy campaigns, Freire’s pedagogical aims were to engage adults in learning how to read the word (literacy) through a practice of reading the world (critical read of society). In a similar way, Gutstein’s teaching of mathematics for social justice has entailed learning to *read the mathematical word* (classical mathematical knowledge) and simultaneously learning to *read the world with mathematics* (using mathematics to unpack relations of power). In combining reading the mathematical word with reading the world, Gutstein (2003) has asserted that reading the world with mathematics entails

To use mathematics to understand relations of power, resource inequities, and

disparate opportunities between different social groups and to understand explicit discrimination based on race, class, gender, language, and other differences. Further, it means to dissect and deconstruct media and other forms of representation. It means to use mathematics to examine various phenomena in both one's immediate life and in the broader social world and to identify relationships and make connections between them (Gutstein, 2003, p. 45).

Additionally, Gutstein has appended Freire's writing the world—acting upon the world in critical ways—with mathematics as well. Together, he has developed a pedagogy of reading and writing the world with mathematics or RWWM aimed at using mathematics as a disciplinary lens to examine, critique, and work towards transforming inequitable situations and relationships of power.

Gutstein's engagement of the 3 C's (Classical, Community, and Critical knowledge) has been an instrumental organizing principle in his design and implementation of social justice math projects within a RWWM pedagogy. Acknowledging that students come with vast knowledge and expertise on their lives, Gutstein has sought to develop curriculum that incorporates students' community knowledge, provides them access to the mainstream classical or school-sanctioned mathematical knowledge, and enhances students' critique of socio-political relationships (Gutstein, 2016). Through the study of issues such as inequitable housing lending practices, disproportionate map projections, and racial profiling, Gutstein (2006a) has engaged students in using mathematics to investigate complex social phenomena that are typically taboo in a mathematics classroom (eg. racism). Gutstein (2006) has argued that an important goal of this work, largely absent from K-12 mathematics education, is to "connect and synthesize all three knowledge bases [community, classical, and critical], while fully honoring and respecting each, to develop liberatory mathematics education in urban schools given the current high-stakes accountability regimes and larger political climate" (p.

206). In this way, his hope has been to raise students' socio-political consciousness and build on students' sense of justice to become change agents for themselves, their families, their communities, and subsequently the world.

While the literature is replete with studies pointing to the advantageous aspects of reform-based teaching (cf. Hiebert, 2003) for improving mathematics performance, critical mathematics scholars (Gutstein, 2003, 2006; Turner, 2003; Gutierrez, 2013) have raised its insufficiency in addressing long-standing patterns of underachievement. Notwithstanding, Gutstein (2006a, 2006b) has contended that reform-based curricula have the potential to support social justice pedagogy due to the foci of reasoning, argumentation, sense-making, and multiple viewpoints embedded within the curricular framework. Inquiry-based curricular models support social justice teaching because both call on students to enculturate themselves into a community that uses disciplinary knowledge to engage in and interrogate real-world contexts.

Gutstein's scholarship (2003, 2006a, 2006b, 2008, 2016) has provided the field with one exemplar of teaching for social justice. Gutstein has reflected on his teaching and students' development of sociopolitical consciousness and mathematics in his classroom-based research. As a result, Gutstein (2016) has advocated for developing political relationships with students, incorporating typically taboo issues into the mathematics curriculum, and enacting a pedagogy of questioning as three practices consistent with a RWWM pedagogy. For example, Gutstein (2008) wrote about the importance of building political relationships with students and standing in solidarity with the plight of their students as their own. He has argued that teachers must come to be the persons they aspire their students to be recognizing that each person's journey towards social justice work will inevitably take different shape. For example, in their work with teachers in a Mexican-American and urban context, Gutstein, Lipman, Hernandez, and de los Reyes (1997)

advocated for teachers to embrace an empowering orientation towards children's cultural and community knowledge in direct opposition to the dominant deficit-based model from which many teachers operate. That is, Gutstein, et al. (1997) proposed that teachers stand in solidarity with students, view culture dialectically for both its strengths and limitations, and challenge students academically. In this way, teachers contribute to students' development of positive social and cultural identities. Through an enactment of RWWM, Gutstein has worked with students of color in an urban setting to foster their ability to interrogate and respond to the inequitable conditions of their own lives and social reality (reading and writing the world with mathematics) while supporting their cultural integrity and capacity to act on their world.

2.3.2 Critical Mathematical Agency

Turner (2003, 2012) documented her collaboration with a middle school teacher in implementing critical mathematical investigations. She sought to understand how critical mathematics could potentially promote educational equity *through* mathematics education by fostering students' sense of social agency in a mathematics classroom—a term she called *critical mathematical agency*. She defined *critical mathematical agency* as comprising of two types of agency: critical and mathematical. Turner defined critical agency as students' capacity to “view the world with a critical mindset”, “imagine how the world might become a more socially just, equitable place”, and “engage in action aimed at personal and social transformation” (p. 49). Mathematical agency, she defined as students' capacity to “understand mathematics”, “identify themselves as mathematical thinkers”, and “construct and use mathematics in personally and socially meaningful ways” (p. 49). In bringing the two constructs together, she described critical mathematical agency as enabling “students to draw upon and construct mathematical understanding to investigate and critique situations in their lives and in the world around them, and to act transformatively upon those conditions” (2003,

p. 11).

In this study, sixth grade students proposed and examined several issues related to their own curiosities regarding inequities in their school and in the world. For example, students used mathematics to investigate people-to-space ratios in their hallways and classrooms revealing fire and building code violations. Turner (2003) found students enacted critical mathematical agency in various ways including: re-imagining a more equitable school space, asserting their own intentions by investigating aspects of reality important to them (eg. ratio of bathroom stalls to people), improvising ways to assess the physical space, and engaging in critique of their school space in relation to more affluent and racially-white spaces. In the example of examining the limited space in their over-crowded school, students addressed the school board and convinced them to suspend their original plans of increasing student enrollment, making an already over-crowded space even more over-crowded.

Turner (2003, 2012) documented the relationship between students' critical mathematical agency and engagement with mathematics. Students engaged with the discipline of mathematics critically seeing its power and its limitations; mathematics at times was needed to engage in and resolve an issue while at other times it was secondary. In one case, students' personal intentions (one manifestation of agency) facilitated disciplinary engagement. In other words, because the problem entailed an important personal and social issue for the students, their personal intentions supported their desire to engage in the mathematics. Furthermore, because the problem contained grade-level appropriate mathematics, the problem aligned itself well with the academic goals of the class. In a contrasting case, students' personal intentions highlighted the limitations of mathematics. In other words, the mathematics was only peripherally, at best, useful in helping them resolve the issue they identified as being important.

How can teachers and students negotiate between generative themes (i.e. student-

generated issues of personal and social importance) and disciplinary demands? “While asserting intentions emerged as a powerful entry point for agency, students’ stories also revealed that their efforts to interject their intentions into the curriculum encountered numerous constraints, and varying degrees of support” (p. 274). Turner (2003) underscored this key tension for teachers and researchers to consider. Given the myriad of constraints that teachers face in schools (testing, scripted curriculum, etc.), it is not realistic to think that one can simply follow students’ intentions. Teachers must openly negotiate the content of the curriculum (depth and breadth) with her students while being explicit about the trade-offs, external constraints, and sometime conflicting goals (e.g. critical vs. mathematical).

Turner (2003) also identified challenging mathematics and time as potential issues. At times, the mathematics needed to resolve a social problem was beyond the scope of the class. In other instances, there was insufficient time to develop concepts thoroughly in order to take advantage of an opportunity to effect change. Despite sometimes-conflicting agendas between the district-mandated mathematics and student-generated issues, Turner provided evidence of students’ shift in their views of mathematics as a potential vehicle for engaging in meaningful, relevant investigations and as a tool for exploring issues of fairness and equity.

2.3.3 Political Knowledge and the Politics of Knowledge

Marilyn Frankenstein has had a longer history in the U.S. of teaching math for social justice (Gutstein, 2006; Turner, 2003) than the previous two researchers. She has contended that critical consciousness is a necessary component for confronting social inequality and, like the previous authors, has identified mathematics as an appropriate and necessary tool for understanding it. Her work is fundamentally distinct from the others highlighted in this paper because she teaches consumer mathematics to adults at a community college and not in a K-

12 setting. Frankenstein (2005) has engaged students in *critical mathematics literacy* (a Freireian-based critical literacy in mathematics) and has outlined 4 goals of this work. Her objectives are to facilitate students' understanding of *mathematics, mathematics of political knowledge, politics of mathematical knowledge, and politics of knowledge*. Frankenstein (1987), drawing on Freire, has identified education, learning, and mathematical knowledge in all their forms as being political. For example, the mathematics of political knowledge might involve uncovering disproportionate payment structures between the rich and the poor whereas engaging in the politics of mathematical knowledge might entail looking at how unemployment rates get determined—who gets counted and who gets left out (Frankenstein, 2005). The manner in which students learn is also political (i.e. competitive and individualistic) as well as whose knowledge gets valued.

Frankenstein (1987) has drawn explicitly from Freire's work on consciousness referring to her own struggles to get students to move towards a more critical understanding of society. She discussed her students' somewhat scattered, "nonlinear" display of critical consciousness in which their "journals show how difficult it is for them to maintain a totalizing movement; entries show frequent 'ups' and 'downs' in self-image, and move between critical insight and myth" (1983, p. 335). Student reflections revealed that they gained insight into particular issues (unfairness in tax structures or welfare programs for the rich) yet lacked movement "toward[s] a more overarching class analysis" (p. 183). Frankenstein's theoretical and practical contributions have provided much guidance in the area of critical mathematics (Gutstein, 2006; Turner, 2003).

2.4 Summary

By drawing on a humanistic and humanizing pedagogy, I have attempted to highlight the critical nature of relationships at the core of critical pedagogy. Salazar (2013) has characterized a humanizing pedagogy as "a model that combines the skills of humanistic

educators with the perspective of critical theorists for the purpose of personal and collective critical awareness of change-oriented action.” (p. 136)

These examples in mathematics education show much promise for the potential of critical mathematics pedagogy with a growing repertoire of curricular examples to build on. This is a good place to start as most mathematics teachers have limited, if any, idea of how to even connect the discipline of mathematics to social justice. Gutstein (2006) and Turner (2003) have underscored some key tensions that inevitably arise from engaging this type of work in K-12 settings such as balancing student-generated themes with content standards and negotiating the socio-political content with the mathematics. At the same time, all of the research cited thus far shows great promise for engaging students in rigorous mathematics and building on their sense of social justice.

Turner (2003) and Gutstein (2006) offer encouraging evidence that students can learn rich mathematics and begin to see mathematics as an important tool for uncovering injustices and fighting back. Frankenstein (1995) worked with adults and felt that they experienced a difficult time becoming critically conscious on multiple levels across areas of their lives. Certainly working in K-12 contexts is going to set itself apart from all other contexts.

One contribution that my study will add to the lack of scholarship in critical mathematics education within this context is how students interpret their experiences several years later. Is there a lasting impact, to what degree, and under which conditions? I can easily fathom how the participants probably understand what it means to engage in mathematics for social justice and even provide some examples of their own. My challenge is to unearth and qualify the many dimensions to their interpretations and enduring effects from having engaged in approximately 20 social justice mathematics projects over a 4-year period.

3 RESEARCH METHODOLOGY

In this chapter, I speak more directly to my insider status within the context of this study. Specifically, I lay out my participation in the school context the 3 years prior to the M4SJ class, the focal class of this study. I draw on the fields of narrative analysis and critical ethnography to position the study methodologically within a qualitative research paradigm. I lay out my data collection and analysis procedures as well as methodological issues that arise from my role as researcher in this study.

3.1 Researcher Entry and Positionality

The year prior to the school opening (2004), I joined Rico Gutstein, a design team member of Sojo and mathematics education scholar, in the mathematics planning for Sojo. Not only was I a community resident and former hunger striker, I was also an experienced facilitator for the mathematics program that was to serve as their core mathematics curriculum, the *Interactive Mathematics Program* or IMP. I presenting before the founding principals across the LVLHS campus and advocated for their adoption of IMP at which point several of the school directors, including Sojo's, agreed to purchase and adopt the curriculum.

The Little Village Lawndale High School (LVLHS) campus⁵ opened its doors to the first class of freshmen and the class of 2009 on September 5, 2005. I, along with other hunger strikers, stood in front of the doors on opening day and handed out a letter to all of the students welcoming them to the school on our behalf. As hunger strikers, we did not have any role in the school given that it was to be governed by the district. In the following chapter, I detail the politics involved in negotiating a community-driven process with the school

⁵ The LVLHS campus is comprised of four schools, of which Sojo was one.

district. In this section, I focus on my personal role in the school as part of the mathematics planning team that upon opening the school involved myself, Rico Gutstein, and four new⁶ teachers in the first four years, the years that the students in this study attended the school.

In the first year of the school, I was a frequent visitor to the mathematics classes at Sojo and came to know all 100 or so students by name; the 21 students that participated in the M4SJ class belong to this original class of students. I regularly attended math department meetings as well as classrooms where I mentored and modeled for the novice teachers reform-based teaching methods and implementation of the IMP curriculum. Although the principal hired the math teachers under the pretense that they would teach a reform-based curriculum, it was nevertheless a challenge for some of them, compelling Rico and I to, at times, defend its value.

As part of the mathematics planning team for Sojo, I also worked collaboratively with the two classroom teachers and Rico Gutstein to incorporate social justice projects throughout the first year. This was a new experience for students and teachers alike (myself included) in teaching and learning mathematics. In some ways the mathematics teachers were learning this material along with the students. That is, although they possessed the mathematical content knowledge, it was their first experience using mathematics to explore real world, socio-political content. The opening activity in the first year was in fact a mathematics project in which students explored the inequitable distribution of per capita wealth across continents. This was a decision by the teachers and an indication of their own willingness and enthusiasm to engage social justice projects in math class. Mid-way through the year, we

⁶ Three of the four teachers hired by the principal were new to teaching while the remaining teacher had 1 year of teaching experience at a middle school prior to joining the Sojo staff.

worked collaboratively to design a week-long, mathematics unit that arose from a controversial community issue challenging the enrollment of black students from the neighboring community of North Lawndale. In fact, it was from this particular controversy that the campus decided to include Lawndale as part of the official name of the high school referencing now both communities in the name of the school⁷.

Throughout this first* year, the teachers (with the help of Rico Gutstein and myself) engaged students in 6 social justice projects in which students used mathematics to explore real-world issues ranging from 1 - 10 days. For example, one of the longer projects—*Driving While Black, Driving While Brown*—involved students looking at actual data on discretionary traffic stops to judge for themselves the incidence of racial profiling. Notably, there were at least three social justice projects that emerged from the community context that resulted in some level of mathematical investigation: a political challenge to the school attendance boundaries, crowd estimation discrepancies for the immigration march of 2006, and a petition for additional busing service for African-American students⁸. These issues were raised in several classes, not just the mathematics class. For example, the Language Arts teacher organized a group of students to petition the local transit authority to extend one of their routes to the high school (an additional 4 blocks) in order to accommodate students traveling from the neighboring community. Simultaneously the mathematics class investigated additional costs that would potentially result from the route extension.

⁷ Although official documents including the website use the acronym LVLHS, the official headstone at the entrance of the school complex continues to read Little Village High School.

⁸ The political nature of the first and third situation is provided in more detail in Chapter 4: School and Community Research Context

It is important as well to note that on many days of the year, students experienced school as any other ‘ordinary’ school with its fair share of issues ranging from suspensions to test prep to student resistance to authoritarian rule to student altercations. While most of the founding teachers embraced the notion of teaching for social justice, their training and limited experiences were grounded in traditional, mainstream curriculum and teaching environments.

Over the next couple of years, my visits to the Sojo mathematics classrooms became more infrequent, although my involvement across the campus became more widespread. I provided professional development workshops for the teaching staff at two of the other small schools on campus and in the Spring of 2007, I organized a student delegation to New Orleans in collaboration with teachers from 3 of the four schools (Sojo included) where we took 30+ youth during Spring Break to volunteer in the city’s rebuilding efforts. I also attended a Parent Writing Group frequently with mostly mothers from across the campus that were involved in a writing program designed to elicit personal stories and improve the role of literacy among families. My involvement in these different projects was to insert myself in helping develop a sense of community across the campus. Part of the original design and vision of the small school campus was for there to be a ‘fifth world’, a space in which teachers, parents, students, and community members broke bread figuratively and literally in community. I was overly concerned with helping create this ‘fifth world’ as this was the space where community across the campus would be created. Meanwhile, Rico continued to work with the math department in a comparable capacity as an experienced social justice mathematics educator. That is, he worked with the math department at Sojo to help Black and Brown students see themselves as connected and united in a struggle for justice.

My involvement in various activities across the campus stemmed from my initial role as a hunger striker. I had a strong commitment to building the culture of Sojo and the whole campus given my efforts as a hunger striker and with an understanding that my children and

neighbors' children would attend the campus in the coming years. I have served in the past on the Advisory Local School Council (ALSC)⁹ at Sojo for four terms (or 8 years) of the ALSC's life. As a graduate student on a scholarship, I had the time, the commitment, and the social and cultural capital (Bourdieu, 1986) to navigate these different fronts. Having been a mathematics teacher for 15 years, a facilitator of mathematics and assessment-focused professional development workshops for 10+ years, and experience in two start-up schools, I felt comfortable and confident in what I had to offer the campus principals and teachers. My eldest son has since graduated from Sojo in 2014 and my niece in 2015. At the time of this writing, my ALSC membership ended as had my involvement in the school but this is only temporary. I have two young daughters who I hope to matriculate into Sojo in 9 and 13 years, respectively, precisely because of the school's focus on social justice.

Below I share a piece of personal writing that I wrote in May of 2008, one month short of the school completing its 3rd year. More than anything, it captured what I was feeling after 3 years of intense involvement (and apparent frustration) with not only Sojo but with the campus. In addition, it will help temper any type of romanticism that a reader of this story might want to inject into this story of struggle, persistence, and hope.

We have a beautiful, state of the art building that ended up costing \$70 million. It is without a doubt a marvel and property of the Chicago Public Schools [CPS]. There is an assortment of teaching that goes on throughout the campus from inspiring to just plain old tiring. In many ways, the Little Village Lawndale High School is just an ordinary school. I believe teachers try and have good intentions but like many

⁹ I discuss in more detail the role of the Local School Councils (LSC) in their governance role of Chicago public schools and the modified *Advisory* LSC.

weathered teachers know all too well, trying to fight the system and society's ills vis-à-vis a reading of *Romeo and Juliet* or repeated application of the slope formula ad nauseum doesn't herald much enthusiasm on either end. Police officers and plain clothes detectives in and around the school are commonplace. Students are greeted each morning with metal detectors and security personnel and the no hoody rule is earnestly enforced across the four small schools that sit within the high school campus. At 3:08 when the final bell of the day rings, students are marshaled as quickly and efficiently as possible out the doors. If anything is to go down let it happen off school grounds releasing CPS of any and all liabilities. Don't get me wrong, teachers, support staff, and administrators alike have their hearts in the right places. Many of the teachers work hard on many levels. Disciplinarians work hard at inculcating order and obedience, social workers work hard at healing dejected souls, teachers work hard at knowing every student's name and being well-versed in Shakespeare as well as Maya Angelou, and administrators work hard at maintaining order amongst their staff and student body while keeping CPS bureaucrats off their backs. The system has spoken and school is in session. What happened to the movement, the excitement, the possibilities of change and agency that a community of people once felt and experienced? This is the conflict.

3.2 Qualitative Research

For this qualitative study, I drew primarily on narrative methodology and the interview within a qualitative paradigm to inform my decisions in data collection and data analysis, elaborated in sections 3.3 and 3.4, respectively. In this section I describe various principles from narrative methodology that informed and helped shape this study.

3.2.1 Narrative Methodology

Narrative methodology is an approach that has honored the human experience and the meaning both participants and researchers make of the phenomenon under study. In this way, the subjectivity of telling, listening, and interpreting stories is made transparent. Narrative inquiry has identified the stories people tell about their experiences as the phenomenon under study. Connelly & Clandinin (2006) offered the following definition and rationale for using this type of inquiry:

People shape their daily lives by stories of who they and others are and as they interpret their past in terms of these stories. Story, in the current idiom, is a portal through which a person enters the world and by which their experience of the world is interpreted and made personally meaningful. Viewed this way, narrative is the phenomenon studied in inquiry. Narrative inquiry, the study of experience as story, then is first and foremost a way of thinking about experience. Narrative inquiry as a methodology entails a view of the phenomenon. To use narrative inquiry methodology is to adopt a particular narrative view of experience as phenomena under study. (p. 477)

This notion fits well with my study because I was primarily interested in how students made meaning of their experience in the M4SJ class within their own framing of themselves, their goals, and who they desired to be in the world. In using a semi-structured interview, my goal was to have a conversation with participants and open up a space for reflection and the telling of how they experienced high school, mathematics, and social justice curriculum writ large while positioning these experiences within who they aim to become. In short, I too believe that people lead storied lives and through the telling (and interpreting) of these stories, we find meaning.

There are several design criteria that support my justification in using narrative methodology as the primary analytic tool to study student experiences. The research literature documenting students' experiences in critical classrooms and more so in critical mathematics classrooms is emerging both as the practice and research continue to develop. As such, this study aimed to provide an in-depth account of experiences and perspectives that are simply missing from the literature. In this similar vein, narrative methodology offered me the opportunity to focus on the individual experience with the aim of understanding how students experienced learning mathematics for social justice through their stories (Creswell, 2012). This made narrative methodology an appropriate fit. It is through these stories that I hope to contribute to critical pedagogues' attention to both the challenges and possibilities of engaging young people of color with disciplinary tools to analyze their worlds.

I drew on several tenets of narrative methodology as a tool of inquiry into the interviews I conducted with 13 participants. Clandinin, Pushor, & Orr (2007) identified three dimensions that are critical to a narrative approach: *temporality*, *sociality*, and *place*. By examining these three 'commonplaces', they argued "narrative inquirers are able to study the complexity of the relational composition of people's lived experiences both inside and outside of an inquiry" (Connolly & Clandinin, 2006, p. 3). *Temporality* is the notion that humans and their stories are always in transition and that there is a temporal nature to the stories we tell. All stories are transitional and contain a past, present, and future. They define *sociality* as "the milieu, the conditions [cultural, social, institutional, linguistic narratives] under which people's experiences and events are unfolding" as well as the "inquiry relationship between researchers and participants" (p. 4). And the third dimension or commonplace of *place* is defined as "the specific concrete, physical and topological boundaries of place or sequence of places where the inquiry and events take place" (Connolly & Clandinin, 2006, p. 480).

This study aimed to contextualize students' experiences in the M4SJ class through story. Given my unique role in this context (elaborated throughout in Chapters 1, 3, and 4), I offered a detailed account of not only the class, but the school and community as well. Tending to the issue of time, I drew on students' experiences leading up to, within, and after experiencing learning mathematics for social justice. Through rich, contextual data, I hope to give the reader a deeper and more nuanced understanding of the milieu and setting.

Ultimately, what I have chosen to share both in terms of the contexts and students' stories is prefigured through my own lens and the meaning I draw from my interpretations. Following Mishler's (1999) advice, I made transparent my decisions where appropriate and necessary.

3.2.2 The Qualitative Interview and Students' Stories

By interviewing more than half of the 21 M4SJ class participants (n=13), I sought to "derive interpretations...from respondent talk" in order to "understand the meaning of respondents' experiences and life worlds" (Warren, 2001, p. 83). That is, by interviewing the students, I wanted to understand from the students' perspectives how they experienced these collective experiences—attending a school of social justice and learning mathematics to study social reality. The M4SJ class was not an experience isolated from their engagement with mathematics, their engagement with social justice, nor from their experiences in the world as young students of color trying to find their own niche in their communities and the world. I approached the interviews as an opportunity to hear their stories and elements they deemed important.

Charmaz (2003) has argued that qualitative interviewing and a grounded theory approach to analysis fit well together because both allow for and count on a certain level of flexibility. That is, although I asked students to speak about a particular event (or set of

experiences), I also followed students' it is important to allow for the emergence of themes from their perspective. Both a semi-structured protocol and grounded theory approach to analysis and interpretation allow for this. Moreover, a grounded theory approach to data analysis and interpretation provides me, a novice researcher, with sufficient guidance.

For this reason, I employed a semi-structured protocol (Appendix A) that aligned itself well with my research goals. The semi-structured protocol allowed me to ask the study participants the same set of "core questions" while giving me flexibility to pursue participant-generated themes further (Brenner, 2006). For example, I asked all participants to share and describe to me their high school experiences in an open-ended fashion to try and elicit from their perspectives the features of that experience they found to be salient. I asked students about their mathematics experiences in school (elementary, high school, and college) as well as their future professional goals. My strategy was to find out through the stories they told, how going to a social justice high school and learning mathematics in that context aligned itself with their goals as students and as social actors in the world.

Through the interviews and classroom data, I was given purview into 13 stories and I did not take this lightly. I struggled with engaging the data iteratively both horizontally (across stories) and vertically (within any one given story) for the purposes of trying to answer my research questions. I do not pretend that this was an easy or seamless task. I chose to do both, each to some degree given the particulars of the research questions, the data, and my ideological framing. In this respect, I chose to present my first three analyses chapters 5, 6, and 7 horizontally. One, they presented themselves in this fashion. For example, students' collective experiences spoke to the level of rigor and interdependence in the M4SJ class so naturally this chapter (6) lent itself to a rich description across students. I have chosen to focus the final analysis chapter on three students: Mónica, Calvin, and Marisol. I decided to engage a more narrative approach to sharing students' individual stories because as a

mathematics educator, it was important for me to understand how students reconciled their high school mathematics experiences (IMP and M4SJ) with college math experiences. This focus automatically left many stories out—few students had substantial ‘math stories’ because either (1) they had little to any college math experience at all or (2) their responses were limited. In some cases, they did not respond with thick descriptions while in other cases, I neglected to probe sufficiently. Nevertheless, the three stories—Mónica, Calvin, and Marisol—offer rich mathematical trajectories with respect to students’ varied identities around social justice.

3.3 Class Context and Participant Selection

This study centers around 13 students who attended Sojo for high school and who were also students in the Math for Social Justice (M4SJ) class during their senior year in high school in 2008-2009. The M4SJ class was one of three math electives from which students could select for their required 4th year mathematics course. This was one of two senior courses (the other was a multi-cultural history course) offered as dual-enrollment, dual-credit courses between Sojo and the University of Illinois at Chicago (UIC). The M4SJ class took place at their high school, integrated into their school schedule during their 3rd period that met from 9:48-10:38, four days a week. The class was comprised of 2 African-American males, 4 African-American females, 4 Latino males, and 11 Latina females (primarily Mexican and Mexican-American).

The class was conducted by Eric (Rico) Gutstein, UIC faculty in mathematics education and experienced teacher in both reform and critical mathematics pedagogy. In the spring and summer of 2008, prior to the start of the class, Gutstein worked with a group of graduate students from the University of Wisconsin at Madison and the University of Illinois at Chicago, of which I was a member, to begin the development of the major curricular ideas. Gutstein and the students had already decided upon the

primary themes for the class during their junior year and prior to our curriculum development team formation. The five units that students and teacher set out to study were the following (see Section 4.6.4 for more detailed description of each unit):

1. *Was the 2004 Presidential Election Stolen? Will the 2008 Election Be Stolen?*
2. *Displacement: Gentrification and Deportation.*
3. *The AIDS Pandemic.*
4. *The Criminalization of People/Youth of Color.*

I was a participant-observer from September of 2008 through April 2009 during which I visited the class twice per week during the first few months (September through December) and 3 times per week during the second half (January through mid-April). I took field notes the first couple of months only and had to cut off my participation during April for medical reasons.

My intention was to interview most if not all of the 21 student participants from the M4SJ class. I began by creating a Sojo Facebook group and successfully invited and added 16 of the 21 students through this electronic medium. I was able to locate and add four of the remaining 5 students to my Facebook friends list with this being the primary way I communicated with students, invited and coordinated our interviews. This proved to be a mostly a successful avenue for communication with some exceptions. One African-American student and 2 of the Latin@ students never responded to any of my repeated attempts to communicate with them through this forum. Additionally, while I did have several hopeful exchanges with 2 of the African-American students (1 male and 1 female), our interview never materialized resulting in several final unanswered attempts. In the end, I was able to interview 15 of the class participants but due to audio problems, I was only able to hear and transcribe 12 of the 15 interviews. I was able to re-interview one of the participants whose audio was incomprehensible bringing the number of interviews back up to 13.

The interviews happened over the course of 2 years and 2 months with the first interview occurring at my house with Gema on 7/16/2011 and the final, 15th interview at a local Target with Renee on 9/28/2013. In arranging our meeting location, I always offered them the choice of different places, which resulted in the interviews taking places either at my house or theirs or at a café (Target or Starbucks). I have included in Table 1, the participants name (pseudonym) along with the date and location of the interview. The interviews lasted from 45-60 minutes.

While I attempted to interview all, I ended up interviewing 3 Latino males, 10 Latina females, and 2 African-American females. Because of the incomprehensible audio, I was unable to transcribe the interview with Julie, one of the African-American females that I did interview. I had her video on both an analog and digital recording device. The former was on the wrong setting making her speech too fast to discern and the latter was on a computer laptop that crashed and unable to be recovered. Additionally, one of the Latino male student's interview is on audio tape but his speech was too muddled to discern and transcribe. Hence, this study drew on 13 interview participants of which only one, Jenny, is African-American. Unfortunately, and much to my dismay, I was unable to interview either of the two Black males from the class although I reached out to both of them repeatedly with one interview scheduled that never materialized due to a scheduling conflict on his behalf. Subsequent attempts to reschedule were unsuccessful.

Students different status' were mixed and varied. For example, two of the Latin@ students were undocumented (Mexican) but married at the time of the interview and going through the process of legal status adjustment. Two Latina students are mixed ethnicity (Mexican-Guatemalen and Mexican-Nicaraguan), one Latina is Puerto-Rican, and the remaining student interviewees are Mexican. Additionally, five of the 13 interviewees whose data is included in this study had at least one young child at the time of the interview.

In Table 1, I present a brief description of each of the interview participants focusing on their mathematics and social justice orientations broadly based on both their class participation and interview accounts. For each student, I attached a descriptor based on my interpretation of how to best identify him or her for the sake of readability. For example, Ann initially chose the arts-focused school and shared with me how she came from a family full of artists whose members engaged in some type of art form (graffiti, drawing, etc). In high school, she interned in art galleries and her dream was to open up a free community arts center for youth of color. Hence, on occasion, I referred to her as Ann the artist. For some, the descriptors I chose are their current employment positions given that they went to school to be, for example, a math teacher. While their employment does not define who they are, for many it did play a big role in how they described themselves and how they wanted to either work in the community or in a particular field (eg. culinary). Contrastingly, Antoine expressed to me that he was embittered by the way in which schools (colleges and universities) were run like businesses and instead was opting to stay in his job at an insurance company. Although he was at the time of the interview a customer service representative and thinking that he would try to get more certifications within that industry, he was tied to the industry by financial necessity as opposed to political or moral conviction. His real aspiration was to build credibility as an honest hard-working man both for his kids and in preparation to launch a political campaign down the line. For this reason, I chose the descriptor of *aldermanic hopeful* as opposed to *customer service representative*. The former is a more accurate descriptor of who and how he wants to be in the world versus what he does to make a living for himself and his family. I offer these descriptors as a way to help the reader keep track of the various subjects in this study across analytic dimensions.

One major purpose for attaching such descriptors to each student was to aid in bringing out students' ideologies and stories. These descriptors were not meant to be fixed or

static, simply my impression of their goals and dominant orientations and my attempt to illuminate the students' dispositions towards knowledge, mathematics, and social justice within their own framing. In this way, students were more than just informants for the purpose of this study. I used these descriptors sparingly and only when I believed their identities as indexed by these descriptors offered the reader important contextual information about the study participant with respect to their experiences at Sojo or in the M4SJ class. Moreover, I use the descriptors strategically if I thought it offered the reader insight into students' individual reflections and/or identities.

TABLE 1: Participant Descriptions

Pseudonym -descriptor	Date of Interview	Location	Mathematics and Social Justice Orientations
Ann – the Artist	11/27/11	Researcher Home	Ann was consistently engaged in the M4SJ class and had strong mathematical foundations. She joined the crew ¹⁰ after the 1 st quarter in the class. She displayed a strong commitment to learning when tied to social justice. She hoped to one day open up a free Community Arts Center for Black and Latino youth. At the time of the interview, she was double majoring in business administration and graphic design (bachelor's and master's program combined).
Antoine – Alderman c Hopeful	2/7/13	Researcher Home	Antoine also joined the crew after the 1 st quarter and was consistent and serious about his learning in the M4SJ class. Antoine gave several presentations on the math they were doing in class. He kept up with local and state politics, and hoped to be able to make a change in his community by being an alderman that worked <i>for</i> the people. He was a co-parent of two young children.
Antoinette – community protector	5/10/12	Participant Home	Antoinette was a member of the crew from beginning 11 th grade and deeply rooted in her community and culture. She struggled in the class due to conceptual gaps in her mathematics foundations. She held a strong interest in social justice issues and was

¹⁰ The crew represents the math research group made up of students who studied and reflected on the social justice math projects and presented at various regional/national education conferences. A more complete description appears in Section 4.6.2.

			committed to racial solidarity. She always wanted to be cop in the community that actually served and protected the people and critical of current police enforcement patterns. At the time of this writing, she had become a medical assistant and was raising her young daughter.
Calvin – Science Major	2/17/13	Researcher Home	He was consistently engaged in the M4SJ and the only 12 th grader enrolled in 2 math courses. Calvin’s dream was to be a scientist one day working on cutting-edge research. He went through two biology textbooks on his own and visited the Fermi-Lab website often. He admitted that the social justice aspect of Sojo carried little interest.
Ellen – Law Major	4/4/12	Researcher Home	Ellen persevered through the M4SJ in spite of weak mathematical foundations. She consistently engaged and advocated for her own learning. She claimed to only remember math as it related to social justice and had no recollection of IMP. She really wanted to help people and fascinated by laws. At the time of this writing she and her partner had just had their second child.
Gema – Education Major	7/16/11	Researcher Home	Gema was consistent in her engagement with the M4SJ class and typically contributed to class discussions. She enjoyed learning in IMP and M4SJ. At the time of the interview, she wanted to be a pediatrician but has since enrolled in a university to become a high school social studies teacher. At the time of the interview, she and her partner had one toddler son and she was on schedule to student teach in Fall 2016.
Jenny – English Teacher	9/25/13	Starbucks Café	Jenny disliked and struggled in math but made significant strides in the class given her strong work ethic. While she thought it was a useful discipline, the data showed strong resistance to engaging with it in a deep, conceptual way. Jenny displayed a strong commitment to her community and to being a role model as a Black female educator. She persisted to meet all of the requirements to be a teacher and in Spring of 2016 received her Master’s in English Secondary Ed and teaching certificate.
Marisol – Pharma Advertiser	06/01/13	Participant Home	Marisol was mostly an active participant in the M4SJ and appreciated learning about real topics affecting minority communities. She struggled in college-level mathematics but made it through 9+ credit hours of college-level mathematics. Marisol received her degree in Advertising (BS) and International Marketing Communications (MS) and at the time of

			this writing had just begun working for a pharmaceutical marketing company.
Minerva – Veterinarian turned Interactive Designer	09/25/13	Starbucks Café	Minerva appreciated learning about social justice but did not think too many people were concerned with it <i>anymore</i> . She was arguably one of the stronger math students in the class but lacked confidence. She worked well independently and in groups but was often quiet in class. She thought she wanted to be a veterinarian but changed her mind after receiving her bachelor's in science and in Spring of 2016 received her 2 nd bachelor's degree in Interactive Design.
Mónica – Middle School Math Teacher	5/21/12	Target Café	Mónica was often quiet in class unless prodded by others but like Minerva was also one of the stronger mathematics students. She always enjoyed mathematics and overstated the importance of wanting to work in her community. At the time of this writing, she was beginning her 4 th year as a middle school math teacher in Little Village.
Renee – Nursing Major	9/28/13	Target Café	Renee was deeply rooted in her culture and community and displayed a critical mind-set. She was part of the crew but often distracted in the M4SJ class despite her strong orientation towards mathematics and social justice. She struggled with getting through her first couple of years at a selective university and at time of this writing was attending a community college to work on general education requirements.
Roxanne – Kitchen Manager	9/15/11	Participant Dormitory	Roxanne was consistently and actively engaged in the M4SJ class. Her passion was to own her own restaurant one day. She started off in hospitality and management on a scholarship and was at the time of this writing, the kitchen manager at a new trendy Chicago restaurant. She loved her job and was learning a lot about restaurant management.
Vanessa – Boundary Crosser	5/10/12	Researcher Home	Vanessa was one of the most experienced crew members and consistently engaged in the M4SJ class. She was working her way through nursing school. She was the oldest of 6 siblings, the mother of one, and stayed close to her family and her community. She believed to have found her niche in healthcare and was confident that she would accomplish her goals.

3.4 Data Sources

The following is a list of the data sources that I used for this study. In the section to follow, I discuss in greater depth how I drew upon this data to inform my analysis and why I considered the interviews as primary data.

- Teacher Journal Notes denoted as TJ (n = 83). In these journal notes, the teacher typically reflected on student engagement and understanding of the material, both mathematical and socio-political. His reflections often tended to the degree with which students took responsibility and interest in their learning. In addition, his reflections were mindful of student connections between the mathematics and the socio-political implications.
- Co-Researcher Field Notes denoted as CRFN in the dissertation (n = 67). The co-researcher took notes paying attention to the teacher moves and intentions (based on personal conversations and observational judgments), the ebb and flow between the mathematical and socio-political analytic demands on students and as afforded by the thematic context, and the type/quality of interactions students had with each other and the teacher. I drew on the co-researcher field notes to gain insight into study participants' engagement with the class material and with the teacher and peers.
- Student mid-year (December 2008) and end-of-year surveys (June 2009) for all study participants with two students' mid-year surveys missing and one end-of-year survey missing (n = 23). The surveys asked students a range of questions (13 questions on each survey) to reflect primarily on learning mathematics, learning about the world, changing of views, and aspects of the class they liked and disliked.

- Student journals denoted as SJ in the dissertation (n=143) – I have included a sample journal in Appendix B. The journals responded to teacher prompts that typically had two parts regarding social justice contexts (eg. Reading an article on foreclosures) and their reflections on learning in the class. A few journals dealt with one-time miscellaneous topics such as student input on grading procedures, thoughts about college, and family (im)migration stories.
- Miscellaneous Research Data – this data set includes shared documents among the teacher (Gutstein), myself, and the co-researcher such as; the class syllabi, unit descriptions, various student written reflections, one student portfolio reflection, video transcripts of three classes, and one conference presentation transcript.

3.5 Data Analysis and Interpretation

Following transcription of each interview, I read the interview transcript breaking it up into mini-events consistent with a narrative methodology. To each transcript, I applied what I refer to as an *itemization* of their story. While I recognize that on some level, my process of *itemizing* is in its essence a coding process, I found coding the data to be somewhat meaningless in that the codes I was generating were either too close to the data or too general to account for any thoughtful analysis. After much deliberation and coding trials, I found *itemizing* to be less restrictive and at the appropriate level of abstraction consistent with a narrative framing of the data. I will provide an example for clarity. Below is a sample of a set of three itemizations I created from Antoine's interview:

- I do what's right despite what company says – they contradict themselves - sometimes advise people to go elsewhere if it's cheaper.
- I do mental math to strengthen arithmetic skills (got this from Rico)
- Improving my math skills helps me do basic calculations for clients

In this way, I was able to chunk the data allowing me to keep enough pieces of the data together to keep a storyline intact. In my many passes of coding, I was generating too many codes and unable to cluster codes together because I needed the feel of a story. In this way, I was able to cluster the different *items* together in a connected way. The three items above did not appear consecutively in the interview but I was able to see the relationship between them more readily. Following this *itemization* process, I re-ordered the *items* by themes as in the example above. My analysis of this cluster of items was that Antoine as an insurance agent saw a relationship between his mathematical skills and his ability to help his customers assess their insurance costs despite what the company might desire.

I wanted to understand the meaning that students drew from their experiences at Sojo and the M4SJ class, not as discrete moments or events in their lives, but in relation to one another and in relation to who the students wanted to become in and with the world. For example, returning to Antoine's story, I clustered the bulleted items above under the theme of *internalized role of mathematics for justice*. For Antoine the two additional themes that emerged from his interview story were *Strong Social Justice Identity (goal of being an alderman, helping his clients despite company policies)* and *Struggle to manage life (children, bills, limited support network) so school got cut out*. I did this for each interview and upon identifying 3-4 themes that emerged from each interview, I wrote each students' story in narrative form. Each student narrative ranged from 8-14 pages in length. This process allowed me to get close and personal with the data giving me further insight into the various events, dispositions, and reflections that gave shape, meaning, and coherence to each student's story. I then analyzed the stories horizontally (Hunter, 2009) to identify larger themes that cut across the students' stories such as *rigor*, *teacher care*, and *purposeful mathematics*.

It was important to allow students' stories to emerge and drive my analysis, which is the reason for going through the interviews prior to analyzing the remaining class data such as student journals, surveys, teacher/co-researcher field notes. Consistent with my methodological framing to choose students' narratives as my unit of analysis, I began the 2nd phase of analysis of going through the student journals and following a similar process of itemization. The student journals represented their reflections on their experience in the M4SJ class. I analyzed the journals *by* student and *across* students for the themes identified in the first phase of my analysis of student stories. In this way, the themes that emerged from the interviews and associated stories were often reified or qualified in some way. For example, staying with Antoine, his journals reified his strong social justice identity that I got from the interview. It became clear that he entered the class anxious to learn about the world but initially downplaying the mathematics. However, significantly mid-way through the journals and the school year, his reflections start to demonstrate a shift in the importance that he assigned to the mathematics. In this way, the journals offered me a temporal view of students' reflections and shifts in thinking across the year. Analyzed against their interviews, the students' journals began to offer a "thicker" description (Geertz, 1973) of students' development and ideological framing. This was at times limited because most students did not complete all of the journals and at times, gaps in journals that encompassed months. On average, students completed 11 of the 16 journals.

As an extension of this phase and connecting it to my 2nd research question (what meaning did students make of the M4SJ with respect to their socio-political and mathematical orientations), I organized the student surveys (mid-year and end-of-year) by orientation. I analyzed each set (socio-political and mathematical) for emerging themes. From this stage, for example, there was a strong sense of *social agency* that emerged.

In the 3rd phase of my analysis, I looked to the teacher and co-researcher field notes as another level to students' stories—the ways in which they were positioned in the class. I did a search by student (ex. Antoine) and noted the teacher and co-researcher's descriptions, comments, and reflections of each student across the year. Similar to the student journals, the teacher and co-researcher accounts strengthened aspects to students' stories while adding contours and meaning to students' self-reported accounts; sometimes even contradicting student's accounts. For example, Calvin shared with me in the interview that he felt bad because he thought he did not do well in the class whereas the field notes by both the co-researcher and teacher told the story of an engaged, inquisitive, and consistent contributor to the class learning. For Antoine, the field notes confirmed his development and growing interest in using mathematics to read the world.

The last phase of analysis entailed going back to the data iteratively *by student* as a final pass to interpret and further elucidate student stories. Dovetailing off the 3rd phase (field notes), I created a running narrative of each student by reviewing the field notes data, followed by student journals and surveys, and finally a last pass at the student interviews. Finally, returning to my research questions, these narratives informed how students' experienced high school (research question #1) and the meaning they made from engaging the discipline of mathematics to explore issues of social justice (research question #2).

3.6 Methodological Issues

In this study, several methodological issues inevitably influenced the data and data analysis/representation. Below I address potential issues regarding my role as researcher and interviewer.

1. **Researcher Bias:** This study is part of a larger, collaborative research project that began in 2005 when the principal investigator (Gutstein) and I first met this group of

students. Students identified me as one of the original hunger strikers from Little Village and I believe this proved to be both a blessing and a curse. In particular, this may have influenced my interaction with Black students and/or my inability to secure interviews with more of the African-American class participants. There is no way to know *how* my race or ethnicity played a role but I was conscious of this. I genuinely tried always to take an explicit stance towards racial and ethnic solidarity in the school primarily because of my moral convictions and commitment to Black and Brown unity. As a hunger striker in Little Village, I felt it was dually my obligation to work towards racial solidarity. While I am confident in my ability to build rapport and trust with young people, I recognize and acknowledge that my role as hunger striker related to me from both communities.

2. Large Amount of Data: As part of the larger project, I had access to an incredible amount of data, all of which I did not use in my study. This was a challenge to organize, selectively analyze, and synthesize. My research questions helped guide me through the research process although even with those questions, I could have told different stories and approached the data representation in an infinite number of ways. I address this by trying to be transparent in my decisions and my ideological framing.
3. Teacher-chair conflict: I personally did not see this as a conflict mostly because my chair, Rico Gutstein, played a minimal role in the decisions I made in carrying out this research. I carried out the interviews and their subsequent analysis independently. While he did give me substantial feedback on my writing, I suspect that the ways in which a chair might influence the analytic process can and does come up in any advisor-advisee relationship. In selecting and representing his teaching in the data, I did not feel any pressure to select or delete any particular piece of datum. I tried to tell the stories and report my findings based on multiple viewpoints drawing on student

journals, teacher journals, and the co-researcher's field notes. I looked to the various sources of data to paint a more complete picture whether it corroborated or complicated the findings.

4. **Role as Interviewer:** Much of the research on interviewing has indicated that like any other event it can be a performance and a co-construction between interviewer and interviewee (Wortham, 2000). Students may say or not say certain things given my insider status, my relationship with their previous teacher and respected friend (Rico), and their sometimes uneasy and compunctious relationship with mathematics. These factors inevitably influenced how participants interacted with me and what they chose to tell me. I strived to be conscientious of students' comfort levels and at times this led to little data for the study while at other times it led to students opening up. I employed member check by sharing stories with the three students in the final chapter to minimize misrepresentations. In addition, I often checked with students through Facebook if I was in doubt of an assertion. They were all gracious in their willingness to provide me feedback.

3.7 Summary

In this chapter, I laid out my methodology for approaching my research questions. I began by sharing my unique entry into the research site that materialized over several years prior to the focal class under study. I drew on a narrative methodology to justify my decision for wanting to study students' experiences beyond the class, both prior and after. By focusing on multiple data sources and post-class experiences, I was able to address the larger meaning that students made from both attending a school focused on social justice and engaging in a full-year study of generative themes through a mathematics framing. I described how I recruited students and offered brief descriptions of each one in a first attempt to begin to tell their stories. I reviewed my analytic process and conveyed what I thought to be major

methodological issues. In the next chapter, I lay out a description of the school and community research context pivotal to students' experiences and reactions as part of the first graduating class.

4 SCHOOL AND COMMUNITY RESEARCH CONTEXT

Little Village and North Lawndale are two neighboring communities, one primarily Mexican immigrant and the other primarily African-American, separated by a viaduct along 21st Street. Both communities share their own distinctive cultural and socio-political history although at one time they were considered one community, the Greater Lawndale community.¹¹ I begin with a brief introduction of each community followed by a timeline detailing the planning stages that led to the two communities coming together in partnership to create and develop the vision for the LVLHS multiplex campus. My aim is two-fold. I hope to provide the reader with a sense of the excitement and hope that a new state-of-the-art, community-driven high school brought to the neighborhoods of Little Village and North Lawndale while also providing the racial context that involved bringing together Latinos and African-Americans under one schoolhouse across historically racially-segregated communities.

4.1 Little Village

A working class immigrant community, Little Village was home to over 77,000¹² residents in 2005 and one of the most populated neighborhoods in Chicago. It is considered

¹¹ Stovall (2016) lays out a critical racialized account of how the Greater Lawndale became subdivided into North and South Lawndale.

¹² While census data for 2010 puts the population of Little Village at a little over 70,000, many residents believe these estimates inadequately account for the undocumented population in Little Village.

the Mexican Capital of the Midwest as it is home to the largest concentration of Mexicans¹³ outside of Los Angeles, CA (Cortez, 2008). Since the 1970's, Little Village has served as a major port of entry for Mexican immigrants and "has been strengthened by the economic power, traditions, determination and hope that they bring" (LVCDC, 2005). Little Village and 26th street, its main commercial corridor, is adorned with youth-created murals and populated by over 1000 businesses including Mexican-owned supermarkets, currency exchanges and cellphone retailers, *panaderias* and *tamaleros*, dollar stores and quinceñera dress shops, among others. *La veinte-y-seis* (the twenty-six) draws thousands of visitors both locally and nationally as it has become a center of commerce, art, and culture within the Mexican community writ-large. Every year, thousands of Latinos gather along 26th street to attend the annual Mexican Independence Day parade lined with cultural dancers, local school marching bands, Mariachi and banda players, and politicians and corporate sponsors alike trying to boost their image and inroads with the Latino community.

Despite the economic vibrancy and strong cultural significance, Little Village has its share of challenges in the realm of educational resources and human services. The community has a young population with 24% under the age of 15 and 55% aged 30 years and younger. Elementary schools are overpopulated with close to 55% of the adult population having experienced less than a high school education. More than 30% of high-school aged youth (16-19) are either not enrolled in school or have not graduated from high school. In addition to low academic outcomes, Little Village has the 2nd lowest open space to resident ratio among Chicago neighborhoods and the highest rate of teen pregnancy in Chicago.

¹³ Little Village's Latino population is largely Mexican although there are families from all over Latin America that represent a small minority. For this reason, I use the term Mexican because of the strong presence of families, cultural traditions, and commerce associated with Mexico.

According to the Quality of Life Plan (2005, 2013) developed by the community's lead non-for-profit organization, Little Village Community Development Corporation (LVCDC), the main areas in need of further attention, resources, and development include improved educational opportunities and outcomes, violence prevention, access to quality healthcare and nutrition, immigrant rights and advocacy and affordable and mixed-income housing.

4.2 North Lawndale

Passing through North Lawndale, one is surrounded by visual clues to our community's history. Beautiful greystone residences, wide boulevards, long industrial blocks and the ever-visible Chicago skyline speak to the neighborhood's history as a thriving manufacturing and residential center less than five miles from downtown. Clues to another chapter in our history are also apparent: run-down infrastructure, vacant lots and boarded buildings. (LCDC, 2005)

North Lawndale was once an economically thriving community, home to manufacturing giant Sears Roebuck & Co. and others who employed thousands of community residents. Once considered a manufacturing hub, North Lawndale was a middle class community, primarily Jewish Eastern European attracting many black families from the southern states in the 1940's. Between 1950 and 1960, North Lawndale experienced a dramatic demographic shift from Jewish Eastern European to African American followed by economic restructuring and subsequent loss of manufacturing jobs effectively causing rapid economic and social decline in North Lawndale. With major population decline and high unemployment rates, North Lawndale's deteriorating conditions drew the attention of Martin Luther King Jr, who chose North Lawndale for his headquarters in order to draw national attention to the slum condition in 1966. Two decades later Jonathan Kozol (1991) dedicated a chapter in his book, *Savage Inequalities*, exposing the alarming deteriorating conditions of schools and inferior educational outcomes for young people in this community.

Over the last several decades, there have been concerted efforts to improve the social conditions of the neighborhood. Many of these efforts have been community-led efforts dedicated to improving housing conditions and options, increasing access to quality healthcare, and providing educational resources for youth. Across the first millennial decade, North Lawndale saw a drop in poverty (-5.7%) and extreme poverty (-17.5%) levels with a rise in its median income from 18,000 in 2000 to 23,066 in 2013 but still far below the city's median income of 47,270. Despite many signs of community investment and redevelopment, the “relatively low population density and high poverty and unemployment rates (40 percent and 27 percent, respectively) make it difficult to attract new retail businesses” and “underperforming schools and negative perceptions of community safety remain obstacles to attracting working- and middle-class families” (LCDC, 2005, p. 10)

In light of the substantial challenges, Lawndale Christian Development Corporation (LCDC) worked with over 350 community residents to develop the North Lawndale Quality of Plan (ibid). This plan encompassed 10 major strategies for investing in and rebuilding their community including developing affordable housing, increasing educational and employment-related opportunities for youth and those re-entering the community and labor market from the prison system, violence prevention, and preserving the “historic housing stock through the North Lawndale Greystone Initiative” (p. 4)

4.3 Little Village and North Lawndale

While the two communities have been historically segregated with little crossover (this is changing), there was a brief moment in recent history (prior to the school construction) in which Latino and African-American political leaders from both communities aligned their forces to help elect Chicago's first democratically-elected Black mayor, Harold Washington, in 1983.

Labor organizers from the 22nd ward under the leadership of Rudy Lozano, helped secure a victory for Washington by mobilizing Latino/a voters throughout Chicago. In other areas of the city, Washington was adamant about the inclusion of Latino/as in government, employment, and education. (Stovall, 2009)

With this connection being lost on many residents since the passing of Washington, Little Village and North Lawndale remain separated. Both communities have a young population signaling educational opportunities as a vital component of any organized effort aimed at improving the communities. While North Lawndale has better graduation rates, Little Village has lower incidence of poverty. North Lawndale is considered a food desert whereas Little Village has hundreds of fresh and fast food options. Housing is less affordable for North Lawndale residents yet the property value for both communities is going nowhere given gang activity, underperforming schools, and large number of foreclosures. I share comparisons to offer nuances among the communities that characterize each in distinctive ways.

4.4 Planning the Little Village Lawndale High School

In the introductory chapter of my dissertation, I briefly lay out my participation in a 19-day hunger strike that drew unprecedented community support and media attention to the district's efforts to defraud Little Village of a much-needed high school. The hunger strike ended with no initial commitment from the district leaders to fund the planning of the school but with the change in leadership immediately following the hunger striker, our group did get a commitment to plan the school, subsequently directing monies to the lead organization supporting the hunger strike, LVCDC. Gabriel Cortez (2008) has documented the resulting power struggle in his unpublished dissertation thesis. I raise this issue to speak truth to my experience being on one end of that power struggle and to bring attention to the political

complexity involved in building a school literally from the ground up from a community perspective.

Upon entering the planning phase, three committees were formed: Building Design, Community Programming, and Curriculum Development. At this point, only about half of the hunger strikers remained involved by joining the different committees. The Design team worked with the architect to plan the design of the physical structure. The architect was inspired by the community struggle and designed the building with indigenous elements and values in mind. For example, the architects built a cone structure in the middle of the school that serves as a Mayan sun dial year round and an eclipse during the days of the hunger strike (May 13th – June 2nd). Additionally, the four schools on the campus each host a particular wall color (red, green, blue, and purple) that correspond to the four elements of fire, earth, water, and wind, respectively. Appropriately, the School of Social Justice (Sojo) is red representing fire and passion for social change. At the onset, the school was designed to be a pillar in the community hence the Communities Program committee worked to survey community needs and resources that would serve not only the youth through after-school programming but also the community at large with GED and English classes, for example. I joined the Committee on Curriculum Development where we discussed the instructional needs of the community from bilingual education to rigorous curricula.

It is important to note that the entire planning phase for constructing the high school was a constant negotiation process among hunger strikers, community members at large, and the lead organization, Little Village Community Development Corporation (LVCDC).

Gabriel Cortez (2008) who documented this process deemed:

The most striking challenge that took place during this process was not the construction of the school itself, but the effort to maintain a social movement and coordinate a decision process that encourages democratic principles. The process

became tangled in the interests of groups, outside the local community, who influenced the development with policies and financial support. These factors stained democratic principles favored by community members. LVCDC took the initiative to facilitate between the community and the CPS. Their involvement has been criticized by community activists, but their goal to open a community high school with innovative programming had been achieved amidst the obstacles presented by the city and CPS. (p. 116-117)

I share Cortez' assessment because it is both concise and accurate from my experience and perspective. It underscored some of the key political factors in play prior to the involvement of the neighboring community of North Lawndale.

It is true that the fight for the high school took place in Little Village. With over 4,000 high school-aged youth in the community at large and only one high school with an enrollment capacity of around 2000, the drawn-out embattled victory was long overdue. During the planning process and as the geographic attendance boundaries were being configured, the district was under a federal mandate to desegregate their schools. With too few white students in the district to desegregate, the Chicago Public Schools (CPS) officials required that the new high school enroll and maintain a 70% Latino and 30% Black student populace (Stovall, 2016). In this way, CPS could argue that they were in compliance with the federal mandate given the particular demographics of the district (too few whites) essentially redefining integration to connote mixing of African-Americans with Latin@s. It is within this context that North Lawndale community leaders were sought out to join the planning process

of the school through the Transition Advisory Council (TAC)¹⁴. The TAC was responsible for including a broad range of stakeholders from each community to govern such matters such as the principal hiring process, student recruitment, curricular frameworks and driving principles for each of the small schools on the campus, and other key decisions.

Stovall (2007) documented his participation on the Sojo Design Team¹⁵ as an African-American educator during the particular development that would incorporate the North Lawndale community.

It would be incorrect to state that there are fuming tensions between the communities of Little Village and North Lawndale. However, due to the segregation of many Chicago neighborhoods, the relations between the neighborhoods deserve some discussion; there is potential for tensions to escalate as Mexican Americans and African Americans will be in need of critical dialogue during the next few years at the high school. Students, often with little knowledge of each other's culture, are frequently skeptical of engaging each other inside classroom space and school grounds. (p. 136)

The two communities did share a brief history of aligning political forces, Black and Latin@, during the successful campaign to elect Chicago's first African-American mayor, Harold Washington. Nevertheless, the inclusion of North Lawndale into the newly

¹⁴ Prior to the TAC and after the commitment by CPS to build the high school, the lead community-based organization, LVCDC, created three committees as they entered the planning phase—Curriculum Development, Facilities Design, and Curriculum Programming. The TAC then became the body through which community stakeholders became involved in the process and recommendations were made to CPS officials.

¹⁵ Each of the four themed schools had a design team responsible for preparing the schools' proposal including curricular orientation and goals, guiding principles,

constructed school raised concern for both communities as they had limited interaction and opportunity to form relationships, explore cultural similarities and differences, and build political solidarity. The core principles that guided the hunger strike became the same core values that many involved in the planning of the high school tried to emulate—democracy, self-determination, justice, transparency, and accountability. Stovall (2007) was correct in highlighting the values of the hunger strike as critical in merging the efforts of two historically segregated communities under the auspices of creating a quality education.

Many of us who participated in the hunger strike and who participated in the planning of the high school welcomed the integration of Black students and the inclusion of North Lawndale.¹⁶ Once the boundaries were determined to include North Lawndale, the two primary organizations sought out for membership on the TAC were the Lawndale Christian Community Development Corporation and the Crib Collective, a youth-run development organization aimed at engaging and building solidarity among youth across both communities through the arts.

From this point onward, the TAC negotiated the process with CPS through a third party, Chicago High School Redesign Initiative (CHSRI) to create a request for proposals uniquely catered to drawing proposals for small schools to be placed at the campus. At the request of the project manager coordinating the school development process from the community end, CHSRI agreed to allow language in the proposals requesting that prospective

¹⁶ I do not claim to speak for all but know first-hand that many of us who participated in the hunger strike and/or the planning phases are staunch advocates for racial unity including Jesus ‘Chuy’ Garcia whose non-for-profit organization led these efforts. Nonetheless, I know that there exist prejudicial sentiments between Mexicans and African-Americans. If they existed among other members of the hunger strike or planning members, I never heard them explicitly or covertly expressed.

school leaders incorporate into the design proposals the various principals from the hunger strike (Stovall, 2016). Those submitting proposals were asked to present at an open forum for community residents to attend and provide input into the proposals. In the end, the TAC settled on four themed-schools (outlined briefly in next section) that composed the multi-school campus.

4.5 The First 3 Years (2005-2008)

The high school opened its doors to 100 or so¹⁷ freshmen on September 6, 2005. As one might imagine, after countless meetings, discussions and negotiations, planning and research, committees and design proposals and much more, the schools opened with great anticipation of what the schools could and would be. While there was much excitement and reason to celebrate, there was also much concern—concern over how the communities and parents would remain involved in the formation of the school in its first years, concern that the new high school would become embroiled in political chess, and concern that Black and Brown students might not get along. The schools on the Little Village Lawndale High School campus would not have local school councils referred to as LSC’s—the governing body made up of majority parents—and only after the first two years would they then have *advisory* (legally non-binding) local school councils¹⁸. This begged the question of who

¹⁷ The goal was for each school on the campus to enroll 100 freshmen but with no shows and general student mobility, the school may or may not have had exactly 100 freshmen matriculated at any given moment.

¹⁸ In an effort to decentralize power, Chicago School Reform efforts in 1988 instituted local control through local school councils (LSC) that have the responsibility for monitoring various aspects of the school including hiring/firing principal and overseeing budgets. LSC’s are majority parents from the school. Advisory LSC’s were instituted in the late 1990’s for small schools and although they have a similar function, the main difference is that being Advisory makes their decisions non-legally binding.

would have real control over the hard fought school. I will not fully engage all of the different political and social factors at play but rather the purpose here is to offer the reader a brief glimpse of both the degree of enthusiasm and pressure on the founding principals and founding teachers to live up to the values of the hunger strike. The communities' dream to make this high school a pillar of educational excellence could not be lost on those directly involved in realizing the schools' potential.

The students interviewed for this study were part of the first graduating class of the Greater Lawndale Little Village School of Social Justice (GLLVSSJ)¹⁹ or Sojo for short. My aim here is to give some of the background context to the school in the first 4 years from my experience and available data I could gather to offer the reader a solid framework from which to interpret students' characterization (Chapter 5). I will focus my own characterization of the school in these first years based on how the school as part of a 4-school campus functioned, highlights of Sojo's successes, and racial tensions in the community coupled with the school's attempt to address them.

The Little Village Lawndale High School Campus had four distinctively themed schools; Multicultural Arts School, Greater Lawndale Little Village School of Social Justice (focus of this study), World Languages Academy, and Infinity (STEM school). The process for enrolling in the school was to rank the schools from top to last choice (1-4). Students would go to their 1st choice but once any one school filled to capacity, then the remaining students would be distributed among the other schools.

¹⁹ Little Village is officially South Lawndale and both communities make up the larger Lawndale community sharing one zip code. Hence, to be inclusive of North Lawndale, the design team named the school recognizing the greater (North and South) Lawndale community.

The 2-story building has four parallel wings—one for each school denoted by its own color representing one of the four elements—connected by a front and back corridor. Each school has its own principal, teaching faculty and staff, and set of offices and classrooms. The building has common areas that all four schools share and reserve for their school's use—the cafeteria, swimming pool, two gyms, distance learning laboratory, clinic, auditorium, art and music classrooms, and library. Many of the walls, including at the indoor entrance, are adorned with colorful mosaics incorporating the values of the hunger strike and the joining of two communities with a common purpose of education and social change. The four principals met regularly to divvy up responsibilities (security, maintenance, etc) and discuss and resolve issues concerning any one school or the whole campus. The two main structured opportunities students had to interact with their counterparts from the other schools was if they joined a sports team or after school program although the students came from common feeder schools and often had neighborhood friends and family that attended one of the other schools.

The school as part of the larger campus celebrated many activities including competitive girls' and boys' sports teams, the opening of an onsite health clinic with services to students and their families, and plenty of conventional high school activities such as pep rallies, homecoming, and spirit week. Various monies secured by the leading agencies enabled a fair amount of wrap around services including college-going supports, evening resources for the community (eg. GED classes), and parent leadership groups.

Specific to Sojo, there were many things to celebrate including achieving over 95% attendance in the 1st year (www.lvlhs.org). Sojo principal, Ricardo Nuñez, established a partnership with Roosevelt University (RU) whose mission was also social justice. This partnership facilitated access to the university for trips and summer bridge camp and eventually led to a full scholarship offer. Upon seeing the first class of ninth graders present

on a migration project at the end of the year, the University's president was so impressed that he spontaneously offered the first two classes a full needs-based scholarship to any student admitted into Roosevelt University of which many students have since taken advantage. Sojo students and faculty had great attendance to the large Immigration rally of 2006 but notably only 5 Sojo Black students attended, the other 20 or so staying behind. I describe below, the growing racial tensions in the community and Sojo's efforts to address the issue.

In the first couple of years, the Black students were often harassed in the community by the local Latino gang that often stood just two blocks east of the school along 31st street. Black students had to walk down this street to catch the bus that would take them home to their community of North Lawndale. The local gang would also harass some of the Mexican youth if they could trace their route to the east side of Little Village that was the home turf to their arch rival gang. However, the Mexican-on-Mexican gang-related harassment often went unnoticed and/or unexamined.²⁰ This was not the case with Black students who were clear racial targets for the local gang.

These tensions spilled over into the high school creating on some level a Mexican versus Black mentality. Not only did Black students have to travel through and attend school in the primarily Mexican neighborhood, but Mexican culture was normalized in the school. Sojo staff worked diligently to create a space within the school that welcomed black students and actively spoke of the neighborhood tension engaging multiple voices towards racial unity (eg. students, teachers, hunger strikers, principal, and others). For example, two of the teachers on Sojo's original staff were community residents of North Lawndale and took part

²⁰ To my knowledge, students across the campus experienced this type of harassment and I was never aware of it being addressed publicly in the way that Latino-on-Black harassment was addressed.

with students in helping organize and advocate for extended (geographic) bus service so that African-Americans would have the option of boarding the bus at the school and not ½ a mile down 31st as was the case initially. A coalition of African-American and Latino students supported by the staff organized and led this effort. Nonetheless, the harassment of Blacks by the local gang contributed to the racial tension across the campus and at Sojo.

To make matters worse, in the first year of the school, amidst racial tensions along 31st street, a local politician initiated a referendum calling into question the school's attendance boundaries. State Senator Martin Sandoval contested the school's boundaries that cut the attendance area to the east (effectively cutting off more than half of the Little Village community) so that it could extend further north to include a portion of North Lawndale. Senator Sandoval along with some Latin@ parents had a press conference to initiate a referendum on whether the attendance boundaries should be extended to include all of Little Village. This politically and racially motivated charge further called into question whether the LVLHS was in fact a Mexican-only space and to what extent Black families were welcomed on the campus.

The school leaders, students (Black and Latino) along with several hunger strikers, myself included, took a strong and explicit stance against the referendum. The principal also sent a letter out to all families denouncing the Senator's intentions to use race as a divisive tactic for his own political gain. He affirmed the following for parents:

We believe in a school that can provide a safe, nurturing, and hopeful place for students from Little Village and North Lawndale. A place where these same students value, celebrate and affirm their cultural differences and similarities. A place where seeds of change will blossom and put an end to divisive political agendas.

The district also stood by its decision to set the boundaries such that the federal mandate to 'integrate' would not be jeopardized. Despite the school narrative inside of Sojo

rejecting the state senator's challenge, a challenge that was never taken up by the district, African-American students voiced their concerns over whether or not that had a legitimate place in the school. Some Black students chose to leave while others found allies among their peers and adults in the school.

Over the next couple of years, racial incidents continued to happen to some extent on campus and more so in the community (often spilling over into the school from the community) but the Sojo leadership and staff made a visible attempt to create a space for Black and Latino students. Partially this was done through the curriculum and partially this was done through school- and campus-wide events. For example, the Sojo art teacher worked with 60 students, teachers, parents, and siblings to “display guardian images from around the world” deeming the high school as a safe passage. In the 2nd year of the school with twice as many students on the campus, student-leaders and staff across all schools organized a solidarity march through both communities. Staff across the campus organized the march in response to the continuing harassment towards the Black youth. The rally was an explicit cry for racial unity across communities with students chanting in Spanish and English “African-Americans and Mexicans struggling hand in hand” and “Black Lawndale! Brown Lawndale! One Lawndale!” (<http://www.newcommunities.org/news/articleDetail.asp?objectID=692>) Over 500 residents from both communities attended the rally that began on the school grounds. Students, teachers, and parents leading the march from Little Village to a church in North Lawndale for all to break bread together. While the event was momentous and inspiring, some recognized that the solidarity in words and deeds needed to continue beyond the march. In months following the march, for example, teachers and students from across the campus organized a youth delegation to New Orleans to help in the city's rebuilding efforts post-Katrina with the additional goal of creating racial unity and community across the four schools.

Sojo's motto that is often chanted in assemblies and graduations is "Born out of Struggle...and the struggle continues!" This slogan concisely and appropriately captures the story of the LVLHS saga. In the above description, I tried to capture some of the major events that took place and that help give the reader a reasonable sense of the context in order to enhance their read of the students' experiences.

4.6 Using Mathematics to Study our World

In Chapter 3, I outlined the ways in which Rico and I worked closely with the Sojo Mathematics Department to help them incorporate social justice projects and implement a reform- and standards-based integrated curriculum (IMP). In this section, I provide more detail on the types of learning experiences the study participants encountered in their time leading up to the M4SJ class, particularly in the realm of using mathematics to study socio-political issues. Over the course of 3 years, students engaged in well over a dozen social justice projects ranging in length. I outline and describe just a few of these projects:

World Wealth Distribution: In this activity, students investigated continental population and wealth to determine the per capita wealth across the world's continents. After determining the per capita wealth, students then simulated the wealth by arranging themselves proportionally into 'continents' and apportioning the relative amount of wealth to each continent using cookies. The two 9th grade math teachers opened up the school year with this problem.

Driving While Black, Driving While Brown: In this week-long project, students analyzed traffic stop data published by the ACLU to determine if the rate at which people of color were stopped for discretionary purposes was proportional to the racial demographics of the locale.

The Boundary Project: Rico, the two 9th grade math teachers, and I created this project in the Winter of students' freshman year. It was in response to a local politician contesting the enrollment of Black students over Mexican students. Students analyzed school and community demographics against the geographic attendance boundaries as drawn out by the district. Students manipulated the boundaries to try and determine a 'fair solution' for Black and Brown students ultimately determining that one high school could not solely address the issue. (Gutstein, 2007)

*Jena 6*²¹: This unit was created by Rico Gutstein and Joyce Sia (Sojo Mathematics Teacher) in which the central task was to "find the probability of randomly selecting an all-white jury in Jena, which is 85.6% white (1,844 people > 18) and 14.4% people of color (310 people >18)." In response to a racially-charged trial that took place in Jena, LA in 2006, students learned about and used probability concepts to determine the (un)likelihood that the first defendant, a young Black man, should have been tried and convicted by an all-white jury; the precise outcome of the trial. This unit took place over eight class periods with the entire junior class (Gutstein & Sia, 2007).

4.6.1 Creation of the M4SJ class

In the Spring of 2008, the Sojo administration agreed to institute two college-bridge, dual credit²² courses for students in their senior year (2008-2009), one of which would be a

²¹ This unit was revisited as part of developing the necessary mathematical concepts of the Elections Unit.

²² Students who passed the course would receive both high school and college credit. Due to concurrent enrollment in UIC, students had to have a 3.0 G.P.A. requiring some students to petition to be allowed to take the course.

mathematics course taught by Rico Gutstein. Sojo required students to take 4 years of mathematics (the district mandated 3 years) in order to graduate and in their junior year they were given three options for a 4th year mathematics course; pre-calculus, IMP 4²³, or the M4SJ class. Twenty-one students selected the M4SJ class, 13 of which participated in this study.

The purpose of this class was in essence to *flip the script*. In other words, instead of the content of the mathematics determining the real-world context of the problem situations, the socio-political context of students' lives determined the mathematics. Rico and Sojo teachers were fully cognizant of the need to prepare students for both gate-keeping standardized tests (college-entrance) and access to advanced college-level math courses (college-placement exams). It was for this reason that Rico and I supported the teachers to the degree that we did in teaching IMP. We both acknowledged and often reminded them that the 4-year program was developed and field-tested with intense scrutiny with regard to the mathematics students could potentially develop. I am not suggesting that these goals were thrown out the window for the 4th year but rather with the primary college-entrance exam behind them²⁴, this was an opportunity to accomplish two things. First, it was an opportunity to build on the theme of the school (Social Justice), genuinely incorporating and foregrounding students' lived realities as the primary motivation to learn mathematics. This goal was premised on the notion that students' commitment to social justice and their communities' livelihood would lead them to be more fully engaged in the purpose of learning

²³ IMP 4 consisted of units from both Years 3 and 4 of the IMP program.

²⁴ The ACT, the state-sanctioned college entrance exam, has in recent history been administered to 11th graders across the district although many college-going students often re-take the exam through the beginning of their 12th grade.

mathematics. The second goal (equal in intensity and importance to the first) was to build and support students' capacity to use mathematics as a tool for analyzing, critiquing, and transforming unjust relations in their world, both locally and globally. In short, the M4SJ class was designed for students to learn rich mathematics and use it as a lens to study and act against social and political injustices that affected them their communities.

In the Spring of 2008, Rico met with 9 graduate students (including myself) several times from both UIC and University of Wisconsin-Madison to help research and outline potential units for the class. These discussions centered around what Rico (and myself) knew of the students (focus groups were conducted during their 10th grade as well as ongoing conversations and attention to issues that mattered to students), their interests, and their communities²⁵. Rico also met with the students who had selected the M4SJ class as their 4th year math course during their junior year to solidify the five agreed upon units for the class: Elections, Displacement, HIV-AIDS, Criminalization of Youth, and Sexism. Students suggested three of the units—Displacement, HIV-AIDS, and Criminalization—while accepting Rico's suggestions of the remaining two—Elections and Sexism (Balasubramanian, 2012).

4.6.2 Creation of the Crew

Taking to heart, the task of working *with* students in creating social justice curriculum based on the lived realities of young people, Rico recruited students to participate in what

²⁵ Mr. Al had a formidable sense of topics that interested students prior to officially meeting with them. We had run focus groups in their sophomore year to get a sense of what motivated and interested students not to mention Mr. Al had been working with this particular class of students (2009 graduates) since the first day of their 9th grade year.

became known as the *Crew*. The crew met with Rico regularly over 3 years (10th to 12th grade) to provide input into and reflect on learning mathematics for social justice. The membership was modest (4-9 students) with the majority female and 30-50% African-American membership at any given point. A significant part of the crew work was to prepare and present at various local and national conferences on the social justice projects they were doing in math class. Vanessa, one of the more experienced members, had presented to over 14 conferences in her time with the group. Vanessa recruited two of her friends (Renee and Antoinette) to join the group, and all three were interviewed as part of this study. In addition, I interviewed Antoine and Ann who asked to join the crew several months into the M4SJ class (TJ, 11/04/08). I did not ask students, much to my regret, about their participation in the crew; however, most of them referenced their role in the group at some point during the interviews. It also bears noting that in the M4SJ class, 9 of the 21 class participants had been part of the crew at one point or another, 5 of whom are represented in this study.

4.6.3 Pedagogical Context

In this section, I briefly describe the pedagogical framing of the M4SJ class in particular. I then follow with a description of the four curricular units/topics that students in the M4SJ studied in order to contextualize my findings heretofore.

Balasubramanian (2012), a participant-observer who based her dissertation on her analysis of this class, described the class dynamics as a co-construction by the teacher and students. She attributed this co-construction of the space to four main features: proclaiming competence, making collective decisions, developing political relationships, and bringing the world and self into the classroom. Further elaborating on the first of these features, proclaiming competence referred to the myriad of ways Rico encouraged students to be active participants in the class. He did such things as inviting students to challenge and

critique him and/or the content of the class. He frequently recognized students for their contributions in all forms, set up structures, and implemented teacher moves that required students to look to each other as intellectual resources (TJ and CRFN). Rico opened up the classroom for collective decision making from daily decisions like moving on with the material (or not) to seeking student input on which units to complete (and forego) given time constraints on the class. Given that the class curriculum and pedagogy was designed to interweave mathematical with sociopolitical learning, many discussions occurred during class time and drew on students' intimate knowledge of their communities. Political as well as caring relationships were central to the pedagogy in which the teacher built on relationships he had developed with many students over the previous 3 years including his work with about 1/3 of the students in the work of the crew (Gutstein, 2013a). A primary goal of the class was to engage students in socio-political and mathematical learning that synthesized the three C's of Community, Classical, and Critical knowledges as described in the conceptual framing of this dissertation (Chapter 2). In this sense, Rico's primary goal for the class was for students to incorporate their knowledge of their families and communities into a critical reading of the world using mathematics to inform their analysis and ultimately actions they would take in writing the world with mathematics. The class organized two community presentations (one in each neighborhood) in which students presented their learning from the class represented in an 81-slide power point presentation.

Pedagogically, Rico employed and drew on many reform-based strategies and curricula. Rico had extensive experience with teaching the Mathematics in Context (MiC) curriculum that modeled and connected the mathematics learning to realistic problem contexts. Rico also used and adapted curriculum materials from *IMP Yr. 4* (Fendel, Resek, Alper, and Frasier, 1998) and *Modeling Our World* (Garfunkel, Godbold, & Pollack, 2000) to supplement and help structure the mathematics within each unit. In the class, Rico focused on

students taking ownership over their learning and making sense of the mathematics. He did this in the class by being explicit with students about their role in grappling with material as well as their right to ask for clarification (TJ, 9/23/08). He employed the strategy of revoicing often in shifting students' responses and questions from him to their peers (Balasubramanian, 2012). Students came to know and expect Rico to ask them to explain, justify, and reason through their thinking for their own learning purposes but also for others to understand and learn as well. Rico valued days in which students took the lead in facilitating the learning allowing him to take a backseat role and he was critical of his teaching on days in which the class felt too teacher-centered (TJ). He tended to students' mathematical understanding as well as their ability to make connections between the mathematics they were learning and the socio-political implications for their communities understanding these two constructs in this class as being dialectically related. That is, the mathematics learning contributed to students' understanding of the political context and the reverse; the political context contributed to their mathematics learning and engagement. Finally, Rico was mindful of having students carry their share (majority) of the cognitive load and students corroborated this (Chapter 6: Rigor and Interdependence).

4.6.4 Curricular Context

Elections Unit: This unit lasted for 11 weeks from September to mid-November of 2008. The driving question of this unit was largely based on the mathematical arguments put forth in the book *Was the 2004 presidential election stolen?* (Freeman & Bleifuss, 2006) detailing a statistical analysis of the election data therein casting doubt on the legitimacy of the 2004 election outcome. Rico brought in newspaper and magazine articles as well as documentaries to highlight accounts of voter disenfranchisement (Balasubramanian, 2012). Students used mathematics to unpack the arguments put forth in Freeman & Bleifuss (2006)

and in a collective effort to try to prevent a similar oversight, the class wrote and submitted an Opinion Editorial to the online news forum Huffington Post. The mathematical ideas, representations, models and concepts in this unit were quite complex. Some of the big ideas included (but not limited to) combinatorics, binomial formula, probability simulation, sample variation, and confidence intervals.

The Displacement Unit: This unit took place over 13 weeks from mid-November of 2008 to the end of February 2009. In this unit, the socio-political goals were for students to see that there existed external, capitalistic forces that drove people out of their communities. In the Mexican community, such forces triggered migrations to and from Mexico to U.S. (and Chicago) due to International Free Trade Agreements (NAFTA) forcing Mexican nationals to relocate to the U.S. in search of livable employment options. In reverse, Mexicans from the U.S. were under constant threat of deportation to Mexico. In the Black community, given the prime location of their neighborhood were in the process of being gentrified with new development on the rise and multi-unit rental properties being converted to high priced condominiums beyond the economic reach of most of the long-standing residents of the community. Both communities had seen an upsurge in foreclosure over the previous 3 years in which the class took place, in large part due to predatory lending practices. In this way, socio-politically, students were exposed to the phenomena of displacement as a structural capitalist arrangement impacting both communities in both similar and distinct ways.

Mathematically students worked on predicting housing prices based on previous years' data using invented strategies and linear and quadratic regression, comparing price predictions with actual prices, recognizing the limits of mathematical modeling, creating discrete dynamical systems to calculate payment on housing loans and mortgages, predatory loans, calculating the price of "affordable" housing, interpreting graphs and data

related to median housing income, median housing values, corn subsidies to farmers, and population change over time linear and quadratic regression.

AIDS Pandemic: This unit lasted for 7 weeks from the beginning of March until mid-April. The goal was for students to model the spread of disease using Discrete Dynamical Systems (DDS), a mathematical model students used in the previous unit on Displacement. Students watched and read from multiple data sources including a video, chapter on AIDS myths, and epidemiology data for Chicago.

Mathematically, some of the key ideas and concepts discussed were as follows: creating a discrete dynamical system (DDS) with one and two variables, finding equilibrium values (algebraically and graphically), simulating disease spread algebraically, and regression (linear and cubic). The contexts used included the following: a farm of trees being cut and replanted, Chicago-Milwaukee car rental system, human body blood-liver system, spread of diseases (HIV-AIDS), and HIV-AIDS infection and spread in Chicago and United States.

Criminalization of Youth Unit: This unit lasted for two weeks beginning on 4/27/09 and was self-directed in a sense. Rico gave students data on the subject and asked students to, in essence, apply their own critical read of the world by directing their own learning, posing their own questions, and using mathematics to investigate the topic. The mathematics was primarily reading statistical data and looking at, for example, disproportionate sentencing based on possession of different drugs (eg. Crack vs. Cocaine). (Balasubramanian, 2012) Students wrote about what they were learning and noted questions for further investigation the data posed for them.

5 STUDENTS' EXPERIENCES WITH CRITICAL CARE

I've never met so many teachers that
care about so many students 'cause
usually they don't care.²⁶

Jenny²⁷, African-American Female

Jenny's characterization of the teachers at Sojo aptly represents how the students described their teachers. While I never specifically asked students to describe their teachers, in asking them to describe their high school and high school experience, most of the interviewees pointed to this feature, that of having caring teachers, as integral to their positive and memorable high school experiences. The salience of students being taught by caring teachers should not be understated particularly in light of the notion that an absence of care in schools is the "root cause for why [minority children] disengage (psychically or physically) from the school" (Stanton-Salazar, 1997, p. 17). Jenny's quote points to a depiction of teachers who care in an institutional setting in which too often caring is not the norm. "Usually they don't care" speaks not only to her experiences and knowledge of schools in her community but to that of many marginalized communities (Valenzuela, 1999; Antrop-Gonzalez & De Jesus, 2006; Rolon-Dow, 2005).

Caring goes beyond solely making sure students are making academic progress to considering (and addressing) the multiple ways in which students experience the world in relation to their relative status'—economic, racial, (dis)ability, sexual orientation, religious, and otherwise. According to Pimental (2011),

²⁶ All of the quotes in this chapter come directly from the student interviews unless otherwise noted.

²⁷ All student names are pseudonyms to protect their identities and preserve confidentiality.

Critical approaches to caring, in contrast to colorblind and/or aesthetic approaches to caring, are grounded in a political, color-conscious, and culturally relevant perspective that is concerned about the well-being and education of the whole child—not just school-sanctioned criteria for academic achievement. (p.3)

Hence, it is within this color(ful) (Rolon-Dow, 2005) framing that I interpret student remarks about teacher caring. Along these lines of a critical approach to caring, I draw from students' perspectives how teachers cared for them by also taking into account their lives beyond the classroom or school walls in addition to helping prepare them academically (Antrop-Gonzalez & de Jesus, 2006). That is to say that the ways in which teachers used the curriculum as a life-line to students' lived realities was a second meaningful experience for students interviewed for this study. Therefore, it is my contention that the ways in which teachers brought in students' voices and experiences into the classroom vis-à-vis the curriculum was also an act of critical care. In the sections to follow, I share students' reflections on the various ways in which they believed teachers demonstrated care for them within academic, social, and political aspects of their educational experiences at Sojo.

5.1 *Enacting Critical Care*

From my experience, there was a lot of talk and genuine interest aimed at building community within the school and building relationships with families. For example, in the summer of 2005, prior to the first day of school, the Sojo staff went to students' homes to individually introduce themselves and welcome them to the school. Ann the artist recalled her own initial disappointment upon getting visited by the new math teacher and founding principal of Sojo. She was passionate about art as a young teen and became "pouty" at the news of being placed at Sojo instead of MAS, the arts-themed school. Nonetheless, she

concomitantly shared that her ultimately positive and empowering experiences at Sojo were largely due to the teachers' personal investment in both the students and the curriculum.

Building relationships and engaging students in rigorous and critical study of the world were of utmost importance given the school's focus on social justice. This is evident based on several of the founding teachers' philosophies (Morales-Doyle, 2015), the school mission and vision, and actions taken by both staff and administration. I attended a social justice retreat with the founding staff prior to the start of the first year where relationships among adults were forged and ideas related to the social justice mission fomented. Certain actions were taken to create a space where young people could thrive. For example, Ricardo Nuñez, the founding principal, was decisive in hiring both new and veteran staff to try and strike a balance between hiring experienced teachers who could potentially mentor newer teachers. The assumption was that novice teachers would bring newer ideas and fresh energy while the veteran teachers would bring established routines and strategies (Stovall, 2016). Principal Nuñez also instituted a weekly non-graded Colloquium class as a space where students would engage in culturally-relevant activities and socio-political learning wherein they might explore and/or find their passion (eg. Hip-Hop, Community Organizing). Hence, it made sense that students found themselves in classrooms with caring teachers and, indeed, the students interviewed for this study expressed this as a notable strength of the school.

Certainly, some of the students' reflections on having caring teachers were embedded within the confines of conventional, academic success. In other words, they described their teachers as caring about how they did in classes, how well they learned the material, and how well they would be prepared for future academic pursuits. I include below a few of the students' quotes related to their academic success:

Ellen: I think this high school, I really liked it because most of my friends would say that their teachers wouldn't push them as they would in Little Village. Right

here if we wouldn't make the homework or if we had trouble with something the teachers would push us to do better and stuff.

Calvin: Everyone all the teachers were very good and very interested in students wanting to do good and do better. I really liked it.

Minerva: They got staff members who really cared about us so I think that was the 1st thing they did really well and I think everything stems off of there, honestly.

In all three cases above, the students were responding to my open inquiry regarding the particular strengths of Sojo. Ellen compared her experiences to other schools (which several students did) noting that the degree with which Sojo teachers pushed and motivated them was not the norm for her peers attending other schools—much like Jenny's quote that opened up this chapter. Calvin, the scientist, originally wanted to attend the STEM school on campus but was glad to have ended up at Sojo precisely because of this experience of having teachers who cared. In this way, he elevated the humanizing element of teacher care over his strong identification with math and science. Similarly, for Minerva, teachers' caring pedagogy was the center of what any school could do well. It is with these humanizing relationships at the core that contributed to an environment in which Minerva said, "it was okay to speak your mind...be who you wanted to be...to flourish and have your confidence."

According to many of the interview participants, the teachers at Sojo cared for their students and appeared to be effective at forming encouraging relationships with them. Gema believed that the level of personal involvement on behalf of her teachers opened up the door for her to connect with them.

They would [know] each person individually and everything and they would know our weaknesses and strengths and I think that helped me a lot cause I knew the teachers and I was able to connect with them.

Teachers' investment in her as a learner and person resulted in her connecting with them. In the case of Roxanne, she acknowledged teachers for believing in her and helping her develop a post-secondary plan.

It [attending Sojo] definitely helped me make a plan, like a goal because I always knew what I wanted to do but I never really planned it out—really had an actual goal to achieve or anything like that, you know. They encouraged me to actually do something with myself cause I've always known I wanted to go to school and things like that but it actually gave me you know, I guess you could say, hope that I could finish and things like that.

The interview data suggest that teachers cared about their students and took time to know them on a personal level. According to some students, teachers helped them exceed academically by offering academic supports (eg. tutoring), by getting to know students' personal attributes and academic struggles, and by helping them think about and prepare for college. Students acknowledged that the ways in which teachers extended themselves through genuine concern and investment of their personal time was unique. It was this humanizing element, in part, that made students' experiences at Sojo meaningful.

Like in many neighborhood schools, students had family members that went on to attend the school after them. This was the case for several of the students interviewed. Gema, Vanessa, and Roxanne all had siblings who were attending or had attended Sojo and Jenny had a cousin that was attending the school. Gema and Roxanne believed that the school was progressively going downhill precisely because of the *lack* of personal relationships being formed at Sojo based on their read of their siblings' experiences. Gema felt that her brother, for example, was not receiving the same level of personal attention that her peers had enjoyed. She recounted her brother's description of feeling as if "everyone's out for themselves." Roxanne similarly lamented the fact that she thought her siblings (2 of them)

were not getting the same level of personalized attention as she had. While these comments represent their perceptions, the larger point here is the significance to which they assigned the critical role of personalized relationships.

Vanessa's comments were qualitatively different in that while one sister was at the time a freshman doing well, her other sister (Latin@) had left soon after starting her freshman year due to gang harassment.²⁸ Notwithstanding, the girls' reflections on the *lack* of care in their siblings experiences further point to the salience of strong and caring adult-to-student relationships.

5.2 From Personal Relationships to Racial Solidarity

Some students attributed their positive high school experience to teachers who cared about them and who developed relationships that were personal, encouraging, and authentic. Beyond helping students achieve academic success, students also pointed to a more critical form of care in which the school staff and administration showed they cared about students' lives and helping shape who students became in a world that systematically marginalized both communities while also pitting Latin@s and African-Americans against each other.

Marisol and Mónica recalled a school-wide event organized to deal with the ongoing assaults on African-American students as they travelled to and from school. During their sophomore year, as the racial tension in the community was continuing to peak, the administration organized several dialogues on race/ethnicity (Stovall, 2016). Both Marisol and Mónica recalled one particular dialogue where staff split students up by race/ethnicity

²⁸ Vanessa is Mexican living in and travelling from the opposing side of gang boundaries and spoke of also being harassed by both males and females. She was able to negotiate this tension whereas other siblings could/would not do so effectively causing them to leave Sojo.

and asked them to share stereotypes held about the ‘other’ group. The idea here was that students would be more candid about the stereotypes they truly held without the ‘other’ present. The following excerpt is Ricardo Nuñez’ (the principal at the time) account of this particular event via electronic communication (3/22/2016):

It was a culmination of violent events that some of our kids from NL [North Lawndale] encountered on walking to 31st and Komensky to catch the bus. We had an African American principal intern who wanted to gather just the African American students to [let] them vent and process the issues. We hoped to create a safe space for our kids to be. It didn't go well. Many issues were raised that we could not control or impact and things became more tense. We realized that we needed to teach, model, and help kids talk about issues of race. We the adults needed to be more intentional. This very much informed the issue of unity and shared struggle as answers to some of the issues. It also fueled kids advocating for Bus service to the school. That work with kids was incredibly sacred and incredibly difficult.

Here principal Nuñez highlighted what I too remember to be, at times, intense racial tension on campus that often spilled over from the community while at the same time surfacing real issues. There is no blueprint for social justice education nor for creating solidarity across hyper-segregated communities so I can appreciate his transparency. Notably, he said that this work required intentionality on behalf of the adults to model (and I would say learn as well) how to engage productively around issues of race and ethnicity. This tension “informed” his position on trying to bridge lines and relationships of solidarity between and within communities around the notion of a common struggle. This framing was one that the M4SJ class would take on as well.

Significantly, both Marisol and Mónica noted that while issues of race were not normally discussed in other schools, at Sojo they actually tried to address the tension. Mónica

saw it as a short-term fix within the school that did not have lasting impact in the community. According to her, this was an issue bound by both race and by gang territory.

Marisol, on the other hand, viewed the race talks as a symbolic sign of sensitivity and family—an instantiation of care.

And I feel Social Justice, I remember we were divided between our races and we had the opportunity to talk about how we felt and then come together and give our opinion as well as how we felt, what we thought. And I feel high schools don't do that so Sojo *cared* and they tried to make those differences better by telling students, 'we're the same person, whether you're black, brown, white, red. You're still a person. You still have feelings.' So I felt that Sojo tried to do that which was great because a lot of high schools don't take the time to do that. (Emphasis added)

In this quote, Marisol differentiated between how Sojo *cared* enough to make students' lived reality a part of the curriculum and how most high schools would not and did not do this. For her, it was significant that the staff attempted to address black and brown perceptions of the 'other' even if, as Mónica believed, it was only for the moment. Both students, nonetheless, appreciated that Sojo staff attempted to confront issues of race directly recognizing that, in their experiences, these issues were not typically addressed in schools.

Students had different experiences, naturally, and took part in racial building in different ways, some distant and some more intimately. Antoinette, the community protector and a Latin@, for example, took to heart the idea of racial solidarity. She saw their school and class of students as unified around a common purpose—that of building solidarity across racial and ethnic lines. From her perspective there were bound to be racial issues because as she shared,

African-Americans didn't go to school with Latin@s and Latin@s were not used to going to school with African-Americans so of course there was gonna be problems

freshman year. And of course we got to know each other and started realizing that we were going through the same things. We were the same people, just different color. Then that's when it started getting a little less and you seen like me and Vanessa hanging out with Aurora [African-American] and going out bowling and stuff like that.

For Antoinette it was *natural* for there to be conflict. In fact, many of the individuals and organizations involved in the start-up process of the entire campus knew this to be the case as well (Stovall, 2016). Not that it was a natural thing, but that there was going to be racial conflict. The two communities had a history of conflict at the other high school that drew from both communities. Antoinette commented, "of course" there would be problems but at the same time "of course we got to know each other" by seeing their own struggles across the tracks, literally and figuratively.

There were many factors and events like the race talks and students' willingness to form friendships across communities that helped facilitate black and brown solidarity. Antoinette referred above to one, among several friendships, that she and Vanessa (two Latin@s) formed with African American students such as Aurora that extended beyond school-based relationships. Antoinette attributed some of this awareness and commitment to Mr. Nuñez' moral authority (Noguera, 1995) on the subject.

It was actually Mr. Nuñez. He used to give us these like speeches and stuff and talk about it and you know try to make us realize that it wasn't really worth us fighting when the people we were supposed to fight against we were not even noticing. So I think Mr. Nuñez did a great job. He did...He was a great principal. He did a lot of stuff. He cared for his students and...I think he did a great job bringing it up.

Here again, as in Marisol's stance, Antoinette identified the principal as *caring* for his students by raising these issues and taking an explicit stance on racial/ethnic solidarity.

Hence, for some of the student interviewees, they viewed particular actions and stances taken by the staff and administration as manifestations of care that attempted to address their racialized experiences. They expressed these efforts as unique to Sojo and atypical of other schools based on their own experiences and understanding of how other schools functioned.

5.3 *The Curriculum*

The 2nd prominent feature of students' characterization of Sojo (and critical care) was the infusion of social justice contexts and projects. Designing, adapting and implementing curriculum that was relevant to students' lives was part of the school's mission although given teachers' varied backgrounds, experiences, and political ideologies, they upheld this pedagogical value to "varying levels of commitment and understanding." (Morales-Doyle, 2015). Social justice was certainly a unique school focus but the way students talked about the curricular focus was both a testament to teacher's pedagogical stances and the meaning it held for students. For example, Gema noted:

And I believe it was different from other schools because I mean we mostly focused on injustices that were happening around that affected us minorities....It was a good experience because, I mean, growing up I really looked forward looking at many injustices because living in Little Village you don't really live out the box. You mainly stay in—you're ignorant...and I think the high school actually helped me...realize stuff about the world.

For Gema, she felt that staying within her community kept her sheltered from the rest of the world and, in particular, kept her ignorant of many injustices that occurred in the world. Her experiences in learning about issues of injustice in high school opened up her understanding of the world. She indicated above that she looked forward "at many" injustices which I interpret to mean that she looked forward to becoming more aware of the injustices that

occurred in the world—not the injustices themselves. She identified this newfound understanding of the world as having helped her “realize stuff about the world” as a positive attribute and not fatalistic as some might assume.

For most of the students²⁹ interviewed, they indicated that this aspect of integrating the curriculum with issues of social justice was particularly meaningful for them. Gema indicated above that the focus on social injustice made her more aware of the world seeing this as an additive feature to her experience and distinct from other schools. This was an emergent theme that surfaced from the student interviews—the notion that making the curriculum relevant to their lives was more relatable, easier with which to engage, and hence, more meaningful. Moreover, within a critical framing of care, this experience of engaging with social justice content was a significant expression of how their teachers cared for them.

The ways in which students described the justice-oriented curriculum and how they interpreted their experiences around learning and engaging with the material was different among students in nuanced yet significant and illuminating ways. For example, Minerva described her general experience at Sojo as positive and enlightening but she spoke of social justice as more of a novelty.

I think it was pretty great. I learned a lot from a lot of different teachers. I met a lot of different people with different opinions. And...you got to learn about things from different aspects, which is really cool. And especially social justice. It was such a unique perspective on things. I don't think many people are too concerned about it

²⁹Calvin was the only student that specifically told me that the “whole social justice” aspect of the school did not capture his interest. Despite this admission, there was evidence from the M4SJ class (and a few other comments he made) that learning about socio-political issues relevant to them was meaningful in terms of making the learning interesting and more relatable.

these days. And so I think it was pretty cool that I got exposed to that at such a young age and so it just made me more aware of the world.

She appreciated the fact that she was exposed to social justice at a young age and exposed to different teachers and perspectives. This was “really cool” but she did not “think many people [were] concerned about it these days.” Moreover, the social justice curriculum and social justice orientations of other people offered her *different* perspectives and *different* opinions. Perhaps her repeated use of the word different indicated that such perspectives were different from her own or at least not ones she readily adopted—not necessarily that she was in opposition to them.

Minerva, the veterinarian turned interactive designer, displayed a strong academic orientation and, therefore, much of our interview conversation revolved around her academic experiences in high school, college, and her strong interest in science. Towards the end of the interview, I returned to this topic of social justice and asked her if she regularly thought about issues of justice.

I’m not crazy about it where I like, go to like rallies and stuff. But it does cross my mind like whenever I watch the news and stuff. I’m just like, well, you know, I think about what I learned in high school and the things that we talked about. And it does make me see things from like a more just point of view. So it does cross my mind every once in a while.

In this reflection, Minerva confined social justice to large-scale protest, the news and her high school experiences. While she acknowledged that her high school experiences contributed to her seeing things from “a more just point of view,” this comment taken together with the previous one regarding people not being too concerned about issues of social justice indicated to me that Minerva did not concern herself too frequently with issues of social justice. Unlike other students interviewed, social justice was not central to her identity. She got into Sojo by

default meaning that she did not rank it as a top choice but rather by applying to the campus, as she said, “it chose me...in the lottery.”³⁰

Despite Minerva’s seemingly weak identification with social justice, in describing her experiences in Mr. Dario’s chemistry class, a popular class among the students I interviewed, Minerva spoke specifically about ways in which his pedagogical practices demonstrated he “cared”.

He [Mr. Dario] really took the time to... ‘I have office hours,’ he would tell us—make it really clear he was there for us. And the way he explained everything, he related it to us. He made it applicable to our lives and that really stood out a lot. You could tell he really cared.

Hence, beyond being there to help students access the material through tutoring, for Minerva it was also about connecting the curriculum to their lives. Minerva was an avid fan of science, enrolled in AP Chemistry as a senior, and chose her university of attendance based on the institution’s newly built science laboratories. In spite of enjoying science to a large degree (an interest she shared from elementary school), it was significant that Mr. Dario taught the discipline in a way that was “applicable to their lives”. In this way, Mr. Dario showed how much he really cared.

I turn my focus to Calvin, a student much like Minerva in that he too enjoyed science and recalled Mr. Dario’s chemistry class as one that stood out. Calvin’s description below points to some of the nuanced ways in which his science orientation interacted with Mr. Dario’s critical and culturally-relevant pedagogical stances.

³⁰Minerva attended a private, Catholic elementary school in Little Village. While the process for the public feeder schools entailed students ranking their choices for the schools on campus, I am inferring from Minerva’s interview that she did not rank schools and was put in some type of lottery process for selection.

He didn't make it boring and just throwing facts at you. He tried to connect it with the world....he always played music in the beginning of classes that related to science in a way or social justice. So it was pretty good. That's one [class] that stood out for me...I started to like [science] during high school and I love it now. That's what I want to go into now....because it was that experience...and me on my own looking at science stuff and getting more interested.

This is a significant reflection in at least two ways. First, in the interview Calvin claimed to have paid little attention to the social justice aspect of the school (which he equated to protest) as it did not interest him much. Yet, here he found it interesting to have experienced learning science that was connected to the world and social justice. Secondly, this experience helped peak his interest in science that he then followed up with on his own (explored further in Chapter 8).

Like Minerva, Calvin seemed to associate social justice primarily with rallies and protest. When probed further about his experiences at Sojo despite not being interested in social justice, Calvin stated that it was the teacher's passion and commitment to making classes interesting and fun that made his experience so memorable and positive. He specifically connected their passion and dedication to a form of care.

I liked the teachers that were passionate about what they did. They cared about their students and they tried to make classes fun as possible and interesting. Like the whole social justice thing didn't really interest me.

Hence, for Calvin, the teacher's commitment and passion to their subject demonstrated a strong instantiation of care. Mr. Dario was certainly committed to teaching science through a critical and agentic lens (Morales-Doyle, 2015). But Calvin made the distinction between passion and making the classes interesting as separate from social justice. For him, and arguably for Minerva, Mr. Dario cared enough about students to make the learning interesting

(i.e. connected to the real-world). It is not clear and there is no way to know if Calvin and Minerva would have been as engaged if Mr. Dario's curriculum was connected yet "ostensibly apolitical" (Gutstein, 2006). It is also possible that for Calvin and Minerva, by equating social justice primarily with "romanticized...images of large-scale protest and resistance" (Turner, 2003, p. 24), they did not qualify learning about coal-powered plants in their community (environmental racism) as a form of social justice. Notwithstanding, both students' notions of learning science in a connected and personalized way was significant for them. For Minerva, these issues and justice contexts made her more aware of the world giving her a more just (or different) view of certain things whereas for Calvin the real world contexts, in part, made the learning more interesting and connected. In Chapter 8, I elaborate on a similar disposition held by Calvin in the M4SJ class.

Distinct from Minerva's and Calvin's weaker justice orientations, Antoinette was one of the students interviewed who connected strongly with the social justice aspect of the school in terms of the curriculum content and her participation in activities and events encouraged and facilitated by the administration and staff. Sojo was her first choice as an incoming freshman to the campus and she shared below the ways in which the school met her expectations.

It actually did [meet my expectations]. We participated in the immigration march...2 years in a row....We used to debate on topics regarding racism, regarding gays and lesbians, regarding the way language is used here—English and Spanish. Stuff that really, really interested me.

Antoinette acknowledged that these things *still* interested her. She felt that the school's approach to infusing social justice topics into the standard high school curriculum was interesting and effective at preparing her academically.

They actually did [prepare me academically]. I'm talking about in all subjects not

only math but in reading and social studies and whatever classes we had. They actually did but they kind of did it in a different way that I think was in a way better for us cause it actually got us interested in the topics. They did it a certain way not the actual high school way cause I went to a different high school³¹. Not a certain way you know what—here’s the book, read the book, and here answer the questions. They actually got us working with each other um sharing our own experience that we had gone through and put it in what we were learning, in our lessons. So I think not only did they prepare us academically but they actually prepared us for like the actual world topics that we’re actually going through, that we went through.

According to Antoinette, she became more interested in the learning because she saw herself and her experiences as part of the curriculum. She described a process in which students shared their experiences that teachers subsequently incorporated into the curriculum. This was better for Antoinette because, similar to Gema, it made the material more appealing and more interesting. Moreover, *beyond* learning the academic content, they were learning about “actual topics” that they were experiencing. This appeared meaningful for Antoinette as she felt that they were “preparing” students to engage with the world by addressing the actual topics they were experiencing; topics I would presume, based on her previous comments, which had to do with immigration, language status, xenophobia, and race. She contrasted this pedagogical orientation to her limited experience in a previous high school (and arguably elementary school to a large degree) where the routine was, “here’s the book, read the book, and here, answer the questions.” Her disposition towards social justice was markedly distinct

³¹ Antoinette and Vanessa were both on the waiting list as freshman and came into the school about one month into the school year

from Minerva's in that she felt the curriculum mirrored her reality.

Many students' identified with the curriculum in the way that Antoinette did. That is to say that students reported that they connected with issues and topics that both were personal to them and their communities as well as allowed them to become a part of change. Vanessa, like Antoinette, was a student who identified strongly with her community and her Mexican roots. Below she shared how one particular unit (returning to Mr. Dario's class once again) impacted her and changed how she began to relate to and understand science:

I've never liked science actually in my whole, I've never, that was my thing. It's weird I'm doing healthcare now. But it was the projects I think that got me especially for science, it always stands out for me, the pollution on 26th street because we have the power plant right on 31st. So that's a project that has stood out for me the most.

In chemistry class, students learned about one particular decades-old coal power plant in Little Village and the associated pollution and adverse effects to the community's health and quality of life. The chemistry teacher, Mr. Dario, consulted and worked with an environmental justice organization based in Little Village to bring to the classroom an authentic and relevant environmental concern with which students would engage (Morales-Doyle, 2015). The plant was finally shut down in 2012 (Chicago tribune, 12/1/2014) several years after this class engaged in this project (2006-2007). Students were exposed to learning science that was connected to a genuine health issue that held devastating consequences for their community. At the same time, students were introduced to a community-based organization involving community members as social change agents waging a strong, lengthy campaign against environmental racism. This was a meaningful unit for Vanessa, I suspect, because of its closeness to home and family. As she confirmed, she's a Little Village lifer—she's proud of her heritage and her community. Learning about the plant and its impact on the community changed her orientation towards science, a subject in which previously she

had no interest.

Much like Antoinette and Vanessa, Ann felt a strong connection to the school's social justice orientation. The opportunity to connect her learning to uncovering injustices *and* acting upon that knowledge made her high school experiences meaningful. Below she described what made her most proud of having attended Sojo.

Yeah, I always feel very uppity about it because whenever I tell other people about it, it was like every other high school just it always had something to do with social justice involved. *Noone* ever understands what I mean. So I'm just like, yeah, if I did something for an art class, which is the easiest thing to explain, I'd be like everything I did was for a cause...I just didn't draw this just to draw it. It was cause something was happening. There was a movement I was interested in....Whenever we would read or do something for English class, or literature, it was the same thing....Same thing for Chemistry. It was like the crew, but we had a chemistry one. So we would go to them and learn and teach at different conferences and different states about everything that we learned in chemistry class and we would create a whole presentation on it. So it wasn't just us learning about it and "hey, what's this chemical" and "how do these things bond together." It was how does this impact my life and how can I teach others to make their life better. It was the same for every single subject....Everything we learned, we learned for a specific reason which was to help ourselves really understand certain like movements or situations and to really be able to make a difference with it.

She was animated in her speech as she recalled, "everything always had a deeper meaning" when it came to learning at Sojo across the board. Often times, the curriculum represented or connected to some type of movement or social justice cause and this strongly resonated with her. "Sojo is the one thing that helped me realize that everything I do has to have a cause,"

she shared.

Ann, the artist, related to me the many ways in which she capitalized on the art teacher's vast experiences and networks in the city; consequently, participating in arts-based internships and mentorship programs herself. Ann hoped to open up a free, public Arts Center for black and brown youth. Her art activism was tied to how she could contribute her growing expertise to her community and be an agent of change.

Ann and others do not explicitly mention the social justice content of the curriculum as ways in which their teachers cared for them. Notwithstanding, I argue that the manner in which students like Ann, Vanessa, and Antoinette found personal connections with the curriculum in deeply personal and meaningful ways are examples of critical care—a type of care that extends beyond mainstream, academic support and success. Critical care scholars, particularly drawing on Latin@ contexts, explicate a critical care as linking learning to “broader goals of community survival and development” (Antrop-González & De Jesús, 2006). Learning contexts that represent instantiations of critical care “acknowledge community and student contexts and seek to affirm the identities, social and cultural resources of Latina/o students and constitute the best possible response to traditional forms of non-caring, subtractive school and the systematic failure these produces” (ibid, p. 413).

I return to Jenny, the only African-American student whose voice is represented in this study and whose quote opened up this chapter on care. At the time of this writing, Jenny had returned to Sojo but this time as an English teacher. Jenny found her own passion for wanting to teach and fill what she considered a critical void in diversity within the teaching profession. She shared below when and how this happened.

I kind of decided junior year of high school. Because before that I was like, oh no, I'm not ever gonna be a teacher. They're under-paid, not appreciated. I'm not doing it. I basically decided that I was gonna be a history teacher. That was really, really

influenced by Mr. Morel, Mr. Keller and Dr. Mosley. They were very passionate about the subject and I also thought that, at the time I thought, well I still think that there is a disparity of African-American women as history teachers. I've never had an African-American [female] history teacher. Ms. Cherry taught history but that was the only one. And I don't know if it's that African-American women don't know their history, if they're not interested. I don't know what it is, but I've never seen one so I was like, that's what I'm gonna do.

Jenny described all three history teachers, 2 African-American and 1 White male, as being passionate about the subject. All three are males and this helped Jenny make a connection between her role as an African-American *female* and her being able to help fill this void. She saw teaching as an agentic act in contributing to her community.

P: And is that what teaching provides you with? An ability to give back to your community.

J: Yep, that's exactly what it does.

Besides History, she was also open to teaching English (i.e. Literature). She explained to me that Literature was a form of history in that unpacking "what these people were feeling when they were writing these pieces of work and how they affected them and what time they were coming from" was interesting. She asserted that she "care[d] about people" and found the human aspect of literature to be fascinating.

Moreover, she shared that it was important to her to bring into the classroom multiple perspectives; her own and others. In this respect, she shared how Ms. Ingrid, a white female English teacher, influenced her thinking.

I need to say something. I liked the way that Ms. Ingrid teaches too. Because, [although] Ms. Ingrid is white, she definitely did a great job of incorporating the literature that would relate to the African-American students and the Latin@ students

in that class. And that speaks volumes for me because she didn't have to. We could have been reading those European models that I spoke about earlier but we weren't. But I really, I really want to make sure that my class is student-based and by being student-based I mean I want to incorporate literature that's relevant to them. So if I am reading Hemingway or if I am reading *Scarlet Letter*, I want to be able to tie that back into or relate it somehow to the African-American experience because I think that that is so important. So I'm not saying that I have to read African-American and Latino literature all day...I can't do that...because when you go to college, there's gonna be all.

Jenny was quite aware of who was teaching her—Black, White, and male. Having African-American males and white teachers made her conscious of the dearth of Black female teachers in the profession. This made her conscious of her own potential to be a role model for young people of color. In the quote above, she was reflective of a white teacher bringing in culturally-relevant literature for her Black and Latin@ students. While she was tired of engaging with a Eurocentric curriculum and, as an African-American, felt the responsibility to teach young folks their legacies, she also recognized that students in her community needed access to the dominant program they would most likely experience in college. Ultimately, Jenny's thoughtful reflections on her own education contributed to her harvesting culturally-relevant pedagogical practices that will allow her to pay it forward and show her students how much she cares.

5.4 Sojo Critiques

By applying a critical lens on this issue of caring, most students claimed to have experienced caring teacher-student relationships that took into account who they were as Latin@s and African-Americans. However, in this same fashion, Renee and Roxanne had

their own criticism with respect to this notion of care and how (or if) it manifested itself. For example, Renee was critical of the way the school sometimes handled discipline particularly in light of the community from which students came.

I think afterwards [after the founding principal left] they got really, really, really strict...maybe because I heard from them personally...I know Yari for sure got kicked out because she was always fighting and she was always a trouble maker and then she tried to go back to high school and [Nuñez] was like “no you can’t.” I don’t know why. I don’t remember why but I just figured, I mean, it’s a bad neighborhood. What do you expect? Not everybody’s gonna be all nice and stuff. But...if we are in a bad neighborhood to help out the bad kids, then why not let them back in?

Renee expressed frustration with the fact that there was a level of hypocrisy on behalf of the administration. She went on to state that “there was stuff that I did hate about Sojo.” She was more critical of the school than her peers in this respect. It is of no small consequence that 70 percent of the incoming class graduated from Sojo—district and neighborhood graduation rates hovered around 50% (cps.edu/SchoolData/Pages/SchoolData.aspx). In other words, while the graduation rate fared better than the district, there was still significant room for growth. Over the four years, the attrition rate was due in part to Black students leaving in the first couple of years due to the racial tension, Latin@ attrition due to gang harassment or increased gang involvement, and some students exiting their senior year to alternative schools whose programs would allow them to graduate on time.

While Renee was critical of administrators being too hard on students towards the end of her time at Sojo, Roxanne worried that some were being too easy, at least in terms of academic expectations. Roxanne was critical of caring relationships interfering with teachers’ judgment of students’ performance levels and ultimately the grade students were given.

Below is our interview exchange regarding her thoughts on this issue.

R: We were babied a lot though.

P: You thought that was a good thing or a bad thing?

R: Both, because a lot of things were handed to us...not that it was a real bad thing. Yes, you know we were cared for a lot but then that relationship somewhat affected...students and their...level they could achieve—their grades and stuff. So like if you have this really close relationships with the student and you know that they're not doing well in class, by the end of the semester, I feel the grade they're given really depends on the relationship.

P: So were there teachers that you were really close to?

R: Yeah. I did feel close to a lot of teachers. I mean throughout high school, I only failed one class.

Roxanne associated teachers' personal relationships with students to teacher's not wanting to fail students. This, in her view, did influence how much students could achieve. In other words, if a student was close with a teacher, they could potentially slack off with some level of confidence that they were not going to fail or students may have received top or passing grades despite not performing to that standard. Though Roxanne did not share personal knowledge of this being the experience of other students, the last quote from her above strongly affirms her own encounter with this type of paternalism. Roxanne connected her close relationships with so many of the teachers to only having failed one class as opposed to claiming to have earned the grades she ultimately received. It bears noting that Roxanne self-reported struggling in college academically. In particular, she shared her struggles with writing lengthy papers and in math class. Both areas of struggle provoked her to question how well teachers at Sojo prepared her for college-level academics.

Renee and Roxanne's critiques of Sojo administration and teachers' enactment of caring serve as two counter data points to the overwhelmingly positive comments regarding

students' recollection of their high school experiences. Moreover, with respect to Roxanne's criticism about teacher-student relationships clouding teachers' judgment of student performance and ultimately their grades, at least one other student raised this issue in his reflection on the M4SJ class. Succinctly stated here, Antoine (the aldermanic hopeful) felt that in the M4SJ class, students were asked to think in ways they had not previously been called to do in most other classes, mathematics notwithstanding. I elaborate on this point more in Chapter 6 (Rigor and Interdependence) but include it here to corroborate Roxanne's critique of teacher expectations.

While these were two critiques raised in the interviews, there is additional evidence of student discord with staff and administrative actions. I can remember anecdotally, for example, the student Yari—mentioned in Renee's critique—challenged, in her view and experiences, the administration's disproportionate profiling of students' wearing the local gang-associated colors. Her argument was that the staff members were often quicker to call students out wearing the colors of this local gang as opposed to other rival gangs in neighboring gang-affiliated turfs (including the east side of Little Village). She went as far as to have her and her friends wear different colors to see if her suspicions of profiling were correct. In essence, she mathematized her lived reality.

Marisol, during our interview, recalled a student sit-in that her class of students carried out calling the staff and administration out on their double-talk. While Marisol could not remember the exact issue, she did recall that the students organized the impromptu sit-in to raise attention to contradictions in what staff and administration espoused as social justice values and actions they took. Moreover, Antoinette (the community protector) in her mid-year survey of the M4SJ class raised the following critique of Rico:

What I dislike in your class is that sometimes....I feel that you don't say anything to our African American students as you do to the Mexicans. I'm not saying you're

racist, but to notice what you do during class. For example, if [an African American student] is sleeping, you call her out once and if she don't listen to you, you don't do anything about it nor tell her anything anymore, but if [a Latino student] or somebody else is sleeping, you'll talk shit till we listen to you. (12/17/08)

I share the above quotes and anecdotes to capture ways in which students were critical of the staff and administration and ways they tried to speak their truth to power. While it was a school with a social justice vision and mission, students were at the same critical and spoke out on occasion when they felt their social justice values were being violated.

5.5 Summary

I feel like...Sojo's a great school but Sojo would be nothing without its teachers...I learned a lot from the curriculum just because the teachers had so many stories and so many examples and so many things for me to learn from.

The above quote from Ann the artist represents in a succinct way many of the students' experiences at Sojo. Their mostly positive reflections were in large part due to the relationships they developed with teachers and the ways in which teachers through their personal stories and their curriculum connected with students' engagement with both content and the world. Caring in a critical way has to do with both genuinely (authentically) caring about young people, their well-being, their futures and helping them understand who they are in the world.

Teachers at Sojo, based on students' remarks and reflections, cared about students' academic development and success as well as their understanding of who they were as dispossessed youth (Camangian, 2015). Students connected with different aspects of the curriculum in different ways. For some, their dominant justice orientations served as entry points to learning the academics more readily and more effectively. For others, their orientations towards engaging in "connected" ways (Boaler, 1997) vis-à-vis real-world

contexts offered them a more just perspective on the world and a more in-depth examination of the subject.

It is not just that teachers cared, but rather what teachers cared about—racial/ethnic solidarity, forming authentic relationships, giving students the tools to be able to use knowledge to better their community. It is also about that which students cared. For students like Antoinette and Gema, learning was a vehicle through which they could come to better understand their world. For Vanessa and Ann, learning was more meaningful when it was tied to uncovering injustice in their communities and having opportunities to use that knowledge in empowering ways. For Calvin and Minerva, it was having opportunities to learn science in connected and interesting ways.

The curriculum was an extension of a critical care and there was a mix of critical pedagogy and culturally-relevant pedagogy. Teachers were highly engaged in students' academic preparation. By offering the reader students' thoughts and reflections on their high school experience in general, one gets to understand some of the interview participants in a broader, more holistic sense. Students largely felt connected to Sojo teachers and the curriculum that was focused around social justice. On one level, it's important to understand students' perspectives on social justice and learning and agency going into the M4SJ class because I make no claim that the M4SJ radically changed students' orientations particularly in the area of justice. Engaging with critical pedagogy was part of the norm (in that it happened often though not always) and so walking into the M4SJ class was not an anomaly.

Students also knew Rico literally from day one and so over three years came to know him and know what he was about, so to speak. I intentionally left student comments out with respect to Rico to avoid repetition since the next 3 analyses chapters are based solely on his class but he could have easily fit in this chapter as well. He was available for tutoring on most days with few exceptions (TJ). Rico's class and critical stance was similar to Mr. Dario's—

they both worked with student crews to present at conferences on critical pedagogy in their respective disciplines. It is somewhat of an understatement to say that Rico fit right into the Sojo staff and culture particularly given his status as design team member and continuous involvement with the math dept. This context is important to help situate the class and the ways in which it built upon this brief history but also in the ways in which it stood out.

6 LEARNING WITH RIGOR AND INTERDEPENDENCE

In this chapter, I address the first of 3 themes that surfaced from my analysis of the data from the Math for Social Justice (M4SJ) class—learning with rigor and interdependence. To begin, I would like to offer up a definition of these two terms. The concept of *rigor* represents one of three major shifts in the teaching of mathematics according to the Common Core State Standards (CCSS) document. In this document, CCSS authors describe rigor as “deep, authentic command of mathematical concepts” in classrooms that “pursue, with equal intensity, three aspects of rigor in the major work of each grade: conceptual understanding, procedural skills and fluency, and application.” (<http://www.corestandards.org/other-resources/key-shifts-in-mathematics/>).

In a previous address by former NCTM president Linda Gojak, she addressed the largely unattended issue of rigor in mathematics education by defining both what it is and what it is not based on conversations with educators. She outlined a rigorous mathematics learning experience as one that “encourage[s] productive struggling” and “embraces the messiness of a good mathematics task”. She described successful engagement with rigorous tasks such that students “take responsibility for their learning. They learn to reflect on their thinking. They persist in solving a problem when the path to solution is not immediately obvious.” (Gojak, 2013).

These above descriptors for rigor matched up well to the students’ account of their experiences of learning mathematics in the M4SJ class with one exception—interdependence. According to www.dictionary.com, interdependence is defined as “the quality or condition of being...mutually reliant on each other.” Hence, this chapter is about the ways in which students were reliant upon each other in order to carefully and methodically (with teacher

facilitation) examine the mathematics; an experience that students' overwhelming described as difficult and challenging, yet productive.

I begin by sharing a classroom exchange that illustrates how the teacher and students in the M4SJ class engaged with each other with respect to the interrelated themes of rigor and interdependence. While the teacher focused students' attention to the precision of the mathematics, students concomitantly took up the challenge to work through the reasoning collectively. This exchange took place during the Elections Unit³² in which students were trying to understand the significance of the poll differences³³ (PD) favoring then (2004) presidential candidate Bush in 10 of the 11 battleground states. In order to understand the significance and probability of this happening, the exchange to follow demonstrates the teacher, Rico, engaging students with two different, simpler contexts: the probability of getting all heads in a 10-coin toss and the chances of the local baseball team (Chicago White Sox) winning 2 of their next 5 games. I offer up this information as background context to the following exchange though attention should be paid to Rico's facilitation and not necessarily the mathematical substance of the exchange. What follows is the co-researcher's account of this classroom interchange:

³² In this unit, students investigated polling data for the 2004 Presidential Election in which President-elect Bush won in a tight race despite exit poll data favoring his opposition, then Senator John Kerry. Students learned the statistical knowledge necessary to understand both the nature and significance of discrepancies between exit polls and actual voting data.

³³The poll difference is the difference between the exit poll data for a given state (the proportion of voters that went for one candidate versus another) and the actual votes once all votes are in and counted. Poll differences should favor one candidate or another in a *random* fashion given that statistically the exit poll data should already account for bias and sampling variation (Freeman & Bleifuss, 2006).

Carlton³⁴: What happened in Ohio, did it happen only there or elsewhere?

Rico: In other places as well. More states shifted in favor of Bush than Kerry. There were a total of 11 battleground states³⁵, 10 where the poll difference favored Bush. Statistically this should not happen. We know that. What do we know can happen statistically, if we have 10 coin toss and how many heads and tails we can get?

Students: 5-5, 6-4, 3-7

Rico: So what is the probability of getting all heads in a toss of 10 coins?

Some silence as the students are trying to make sense of this shift? And figuring out the response. Some I don't know, some not sure what you are asking.

Marisol: 1/5

Carmen, Ann: I don't get it, you [Rico] teach it.

Carlton: $(\frac{1}{2})^{10}$

Rico: Carlton, what are you talking about? (writes this $[(\frac{1}{2})^{10}]$ on the board)

Carlton: I don't know

Co-researcher: Explain what you did, go ahead.

Ellen explains to Carmen and Ann how they got the $2^{10} = 1024$. Together the class figures out what $1/1024$ means, that there is one sequence of 10H out of 1024 total sequences.

³⁴ All students' names are pseudonyms to protect their identity.

³⁵ Wisconsin, the 11th state, did not have a poll difference hence the mathematics entailed raising $\frac{1}{2}$ (the random probability of the PD favoring either candidate) to the 10th power and not 11th power (Freeman & Bleifuss, 2006).

Rico: You all know another way to do this.

Vanessa: Probability of one head is 0.5 and so probability of getting ten heads is $(0.5)^{10}$.
At this point Rico asked students to find the probability of the White Sox winning 2 games out of 5 games. Rico – what else do we want to know? Calvin mentioned this last time.

Calvin: What is the probability of one win?

Rico: So that is 0.6. Now solve the problem. Miriam and Guillermo, can you come up and share how you solved the probability? You both did this so can you teach us how to do this.
There was some prodding to get both of them to get up there. Renee, Ann, and a few others chimed in. Ann almost ordered Guillermo to get up there 😊. Miriam checked in with Mónica and consulted with her before she went up to the board and started explaining. Guillermo worked with Julie and Ann as well before getting up there. This was really interesting to see, students collaborating and working with each other to create a shared collective understanding. (CRFN, 10/2/08)

I share this classroom exchange to highlight a couple of things. First, this became a common discursive practice in the classroom in which Rico called upon students to recall, revisit, and synthesize the concepts and procedures they had been developing over the previous days and weeks (TJ and CRFN). Interestingly, this mathematical discussion was provoked by a student's question (Carlton) regarding Ohio. Following a class discussion on voting discrepancies in the state of Ohio, Carlton wondered and asked if the discrepancies found there also occurred in other states. At this point, Rico prompted students to think about the statistical likelihood of voting discrepancies occurring in 10 other states, as was the case.

He asked students to re-construct³⁶ their knowledge about the mathematical sub-contexts (coin-toss and baseball) in order to prepare them to connect this learning to the larger context of the PD's favoring Bush in 10 of the 11 battleground states. Rico did the former (as evidenced in the above exchange) by doing the following:

- (1) asking students to determine the probability of getting 10 heads on a 10-coin toss,
- (2) asking Carlton to explain his response/solution as $(\frac{1}{2})^{10}$, (3) asking students to recall another way to determine the same probability [i.e. $1/(2^{10})$],
- (4) switching contexts to the probability of the White Sox winning for the purpose of analyzing a two-outcome situation (win or lose) that does not have 50% probability as in the coin toss (heads or tails), and finally
- (5) asking two students to present their solution to the latter problem (probability of the White Sox winning or losing) for the class.

While the focus of the episode is not to analyze or assess the effectiveness or appropriateness of the teacher moves, it is significant to highlight the ways in which Rico facilitated the learning by asking *students* to do and recall the mathematics. Moreover, by engaging students in simple-to-complex contexts, Rico scaffolded the learning thereby creating opportunities for students to access the mathematics more readily and make meaning of the mathematics in context (Hmelo-Silver, Duncan & Chinn, 2007). Consequently, it bears noting that several students were involved in this exchange and that the two students asked to present the latter problem in the exchange (Guillermo and Miriam) were neither particularly vocal nor strong

³⁶ I use the term re-construction because in this situation, Mr. Al is asking students to think through the situations they have already worked on. Whereas the first time or two they are constructing knowledge, in this excerpt they are constructing it again.

mathematics students (TJ & CRFN). According to the co-researcher's field notes (10/2/08), upon seeing the student presenters' hesitation, their peers 'prodded' and encouraged them to present their work. Both students subsequently consulted with their peers prior to presenting their solution process to the class.

I share this example in opening this chapter on rigor and interdependence to provide the reader a backdrop to the ways in which many students recalled their experiences in the M4SJ class many years later, a class that according to those interviewed, required their full attention and collaboration.

6.1 *Rigor*

Antoinette, a crew member, had this to say about her experience with the class:

You know, it was a very challenging class. You really, you really, really had to put your everything in it, you know, whatever you had; your strength, your dedication, your effort 'cause it was a very strong class.³⁷

According to Antoinette, the class involved a strong commitment to engaging in the class and engaging with the material. It required, she said, bringing everything you had to give and offer to the class. Antoinette, a student highly motivated by the socio-political contexts of the mathematical problems, struggled in the class due to incredible life challenges but she pulled through successfully and did not give up on herself (end-of-year survey). In this sense, she was challenged in multiple ways including and beyond the mathematics. While Antoinette was emphatic about the challenge of the class, others were more specific in talking about the particular nature of the challenge.

Renee, for example, spoke directly to the particular features of the learning that made the class difficult. Renee was a student who during her junior and senior year participated in

³⁷ All quotes in this chapter are from the interview unless otherwise noted.

several local and national presentations presenting on social justice math projects (both from this class and previous years). Furthermore, she was one of only two interviewees who specifically identified mathematics as a subject she had always enjoyed beginning in elementary school and up through at least the time of the interview. She recalled the class as requiring not only her mind but also her heart.

Rico's math was more like putting your heart into it to understand it versus just like he teaches you like an equation and then you do it and you learn it.

Here Renee compared the learning in the M4SJ class (or 'Rico's math') to, in her view, other more superficial ways of engaging the material. In this quote, she described a demanding process where you bring your heart to *understanding* the material versus being given an equation to apply as is characteristic in an acquisitionist mode of teaching mathematics (Sfard, 1998). I interpret Renee's use of the word *heart* to mean that in trying to understand the mathematics, one had to be strongly committed to learning the mathematics. She already liked the subject yet she distinguished Rico's math as calling on another level of commitment. Expounding on what she meant by *understanding*, Renee went into more detail later on in the interview when asked about specific aspects of the class experience she liked. In the example provided by Renee below, she drew on their work with the Jena 6 sub-context³⁸ to explicate her thinking.

I like that when we first started it, he made us work it out. You know we were...drawing little circles when we did the Jena 6...and then we were seeing how many times we could combine each one and stuff. We were doing it the easy way and

³⁸ In their junior year, all of the math classes completed the Jena 6 problem as described in Chapter 4. Briefly here, the Jena 6 examined the probability of a Black defendant getting in all-white jury in the town of Jena, LA with 14.3% people of color in the town.

then eventually he got to the equation...but there's other places where they just teach you how to do it and then they just expect you to just do it. Okay, you're done. I mean you learn it but...you never like think back to how...this relate[s] to like the real world and what's going around.

Renee described here the ways in which Rico engaged students in an inductive learning process whereby they began with working through a simpler and familiar context explicitly—drawing out circles and combining possible outcomes³⁹—and from these simpler contexts students were able to essentially derive the equation for combinatorics (probability concept) over several class periods. She described the process of having to work it out and construct for themselves the procedure/rules for calculating probabilities. Students recreated the formula for nCr (probability function for finding number of possible combinations) from first principles. As she said, “we were doing it the easy way and then eventually he got to the equation”. In essence, she indexed the scaffolding strategy that Rico employed similar to the one he also used in the classroom episode that opened up this chapter (i.e. beginning with a familiar and simple context such as a coin toss with equally likely outcomes to the probability of the home baseball team winning with disproportionately likely outcomes).

Renee went on to state that in other places (other classrooms) they show you the process (“just teach you”) and “then they just expect you to just do it. Okay, you're done.” Her critique here was that once you get to the point where you are given a formula, students

³⁹ In learning probability for the Jena 6 problem (full context described in Chapter 4), students began by determining all the different ways to create 2-person arrangements with 3 males and 3 females (m_1f_1 , m_1f_2 , m_1m_2 , etc). The little circles represent the different males/females. In stating “how many times we could combine each one”, Renee is referring to the various ways to arrange or combine any 2 individuals from 3 males and 3 females.

miss the opportunity to relate the underpinnings of the formula or mathematical model to the real-world situation. There is a sense here that by not going back to the problem that it is meant to model, there is limited understanding in terms of mathematical meaning and real-world significance. As someone who had liked and enjoyed doing even decontextualized mathematics, she appreciated that she could make meaning of the mathematics with respect to a real-world context. This can be seen in the featured classroom example of the coin toss and baseball wins. In this situation, students were given the opportunity to own the meaning of 50% and 60% as it gets translated into the formula (.5 and .6) thereby enabling them to go from the concrete to the abstract and vice versa. Students concomitantly engaged with a conceptual understanding of the material, in this case binomial probability (probability of situations involving two possible outcomes as in the case of a two-party election).

Renee stated that this type of learning took a certain level of commitment—one that involved your heart or as Antoinette indicated, your strength and dedication. Renee appreciated learning mathematics the easy way (from first principles) and building their way up to the complex, mathematical abstraction. In this way, students had the opportunity to learn the mathematics conceptually. While this type of learning involved a great deal of commitment, eventually it would lead to reading the world with mathematics (Gutstein, 2006). Taken together, I interpret Renee's stance on learning mathematics in the M4SJ class to mean that it took a great deal of commitment to learn it conceptually but in the end it was going to have some actual significance to the real world. Hence, Renee's description of the ways in which her and her peers engaged in the learning coincided with a *rigorous* engagement with mathematics—conceptually, procedurally, and vis-à-vis real-world application.

Similarly, for Mónica, an aspiring middle school math teacher, *understanding* and *developing* the mathematics at the conceptual level was the very thing that made the class

challenging. She admitted to me that going into the class, she was doubtful of how Rico was going to pull off covering mathematics content to any great degree. Like many social justice skeptics who believe that mathematics in social justice contexts either does not exist or gets watered down (Tan, Barton, Turner, & Gutierrez, 2012), Mónica went into the class with her eyes on the prize, so to speak—the mathematics. Mónica, like Renee, also spoke specifically about having to derive the formulas and equations themselves as opposed to the teacher giving them the formula.

Yesss, it was [challenging], well. It was challenging but not...It was ok, I guess...the challenging part was those formulas, having to figure those out ourselves rather than being given to us. So that was one of the challenging parts.

It took Mónica a little over a month into the class to realize and acknowledge that developing the mathematics at a conceptual level was contributing to her understanding of the mathematics. Mónica shared with Rico her reflections regarding his insistence that students unpack and understand the mathematical principles.

At first, I will be honest and say that I didn't like to walk into 3rd pd math class. I didn't like it when you would make us answer why you did this or why is that number there. But, I realized that what you are doing is helping me be more confident of my work and helping me be a better learner. I have learned to appreciate that. Thank you. Also, class has become a place where people can speak out and they know that they-other classmates-will listen to their questions and help them understand if they don't get it. (Student Journal #5, 10/13/08)

It is noteworthy here that Mónica (without being prompted to talk about the collective work of the class) connected what students were learning with how they are learning. She pointed to her own growth as a confident, mathematics learner in a space where students supported one another in accessing the content.

Antoine, a student who was highly engaged and motivated by the socio-political contexts, reflected on how in this particular class, Rico challenged students to think through the mathematics for themselves in order to again, *understand* the mathematics.

You know he wanted us to think and try to figure out the answers by ourselves so it was a little bit more different I think...that's what made it hard was the thinking...and he really wanted to challenge us and to think and not just get the answer but understand why is that answer like that and so that way if we ever get a problem that's outside of social justice but a similar problem to it, we'll know how to figure it out.

Antoine too remembered the challenge of *understanding* the mathematics at a conceptual level ("understand why") and asserted that the students were expected to "figure out the answers by ourselves." This did not mean that students were left on their own by any means but that the cognitive demand of having to develop the mathematics inductively was placed on students.

Placing the responsibility onto the students for learning the material, however, was not an easy and straightforward task. In fact, it required continual and conscious effort on behalf of the teacher over the course of the year. In Balasubramanian's (2012) assessment of Rico's attempts to place the ownership of learning onto the students, she asserted:

Several times during the year, Rico struggled with students' learned helplessness. He repeatedly urged students to take ownership for their learning, be responsible for doing quality work in this class, use this opportunity presented to them and support others in the process as well. Students often responded positively. (p. 151)

Within the first month of the year-long class, Rico opened up a dialogue with students to get a sense of how students were feeling regarding their learning in the class. According to Rico's journal, students shared their concerns and their critiques; whereas, Rico shared with them his frustration and struggle to support students to be active learners. He shared with

them the importance of being able to “grapple with complicated ideas” and reiterated, “they had the right and the responsibility to demand clarity from their teachers.” This was his expectation of them in the M4SJ class and the class could not move forward if everyone did not understand (TJ, 9/22/08). I share these reflections by the co-researcher and Rico to highlight the struggle to get students to take responsibility for making meaning of the material. It was not as if the curriculum, as interesting as students claimed it to be, alone would motivate students to be co-constructors of the teaching and learning.

As specified in the school and class context, students were not tracked by mathematical ability. The average ACT⁴⁰ mathematics sub-score for this class of students hovered around the district average, which on a whole is sub-par placing them in non-credit, remedial math courses upon entering college (CCSR, 2013). It was in the fourth year of choosing a required mathematics elective that students *selected* the M4SJ class. The implications of the context—low-income, non-selective enrollment, neighborhood school—meant that the range of abilities and knowledge base in this class was wide and fragmented. The teacher journal (TJ) and co-researcher field notes (CRFN) revealed judgments on students’ abilities as they came to be expected over the course of the class based on students’ performance in the class therein. For example, mid-way through the school year after having first-hand knowledge and ample evidence of students’ abilities, Rico reflected below on how he thought students might fare on a slope⁴¹ activity:

⁴⁰ ACT is a standardized test comprised of four sections and corresponding sub-scores in English, Reading, Math, and Science (sometimes a writing component). The test is used by many colleges for entrance requirements and sometimes course placement.

⁴¹ Slope has traditionally been and continues to be a 9th grade Algebra I standard in the district despite its standing in the Common Core State Standards in middle schools. In my 15+ years of experience teaching

The quiz would probably just be “practice” on finding slope, some points on a line given the equation, some simple graphing, and maybe one explanation...I suspect for some students, it will be pretty trivial (Minerva, Mónica, Gregory, Carleton, Ann), for some, doable (Carmen, Roxanne, Vanessa, Calvin, Renee, Gema, Ellen, Marisol, Guillermo, Tuan, Antoine-who missed class today and will be disadvantaged), and some will be challenged (Julie, Jenny, Miriam, Antoinette)...and Daphne would fly through it if only she were here. (TJ, 12/5/08)

While Rico acknowledged later in his reflective journal that these categories should not be considered fixed, the larger point here is to contextualize this notion of challenge and rigor with respect to the variance in students’ abilities. Ellen, for example, reported that it was the most challenging class she had taken in high school. Calvin and Antoinette while not ranking their classes per se also described the class as difficult: more difficult than they had anticipated. Antoine and Mónica both expressed in their interviews that in the M4SJ class they were required to engage at a rigorous level unlike any other class they took in high school; whereas, Jenny overwhelmingly struggled despite her consistent effort towards getting through the class (TJ & CRFN, 2008-2009).

Students’ journals corroborated the ways in which students’ levels of confusion and clarity fluctuated throughout the year. In the 3-week sum up conversation, many of the students agreed that a major concern was not understanding how to do the homework when left to do it alone at home (TJ, 9/22/08). Many student journals in the first two months of the school year called on Rico to slow down. At the same time, students attested (in their

mathematics in neighborhood, non-selective high school in the district, most lacked a conceptual understanding of slope and many struggled to recall and implement its algorithm correctly and consistently.

journals) to ways in which they became unstuck upon receiving help from Rico and their classmates. Below are just a few examples from students' journals (SJ) to highlight this point further.

Marisol: I also think you move to[o] fast and...I'm not advanced where I can just pick it up really fast...So it's going to take me awhile. (SJ #2, 9/20/08)

Gema: Since I was absent on Thursday, I was confused on Friday with the coin tossing but later on understand it after three people explained it. My group is really supportive when someone is having trouble we all try our best to not leave someone behind and clueless. (SJ #2, 9/12/08)

Ellen: I know what we are now learning is hard but it's important in the real world. Sometimes I get confused because I didn't know what fixed rate, subprime loan meant because my family doesn't own a car, house, or other things. I lack information. (SJ #10, 1/10/08)

Antoinette: At first, I had a hard time understanding since I really did[n't] get it. But little by little I understood it better. (SJ #12, 2/24/09)

The evidence taken both from the class and the interviews indicate that the class was a challenging experience for many of the study participants. Not only was the mathematics difficult, but as Ellen pointed to in her journal entry, the real-world contexts and their associated terms were challenging to comprehend.

While no one person described the class as easy, three students did not classify the mathematics as difficult. Minerva, for example, described the mathematics as 'doable' but that applying the mathematics to real-world contexts was what made the class challenging. As evidenced from her interview, this was largely due in part to her view that anything short of Calculus was not really college-level (i.e. difficult) mathematics.

To me college level is like Calculus and it's like scary math but this [M4SJ] was more like doable math. So I mean I guess but I guess it's like taking two, the high school and the college part. So I guess the high school part was more so the math that we actually used but the college part came from more so like you're taking things in this bigger picture and using math to like try to address problems I guess. Or like apply it to these real-life scenarios. (Minerva, aspiring scientist)

In describing the M4SJ class, because the content was not Calculus, she automatically categorized the mathematics as 'doable' and not 'scary math'. While the field notes indicated that Minerva struggled less than her peers, both her journal entries and her interview corroborated her lack of confidence in mathematics irrespective of her actual abilities.

Vanessa and Ann, both students who were consistently and actively engaged in the class activities and discussions, qualified the challenging mathematics in distinctive ways. Ann asserted in the interview that the class was challenging, "like every, every problem—I didn't have a hard time working through—just that it was a lengthy process." Here Ann pointed to the problems as challenging but not difficult for her⁴². Rather, she felt the process by which they took to comprehend the mathematics with depth was simply lengthy. Vanessa stated emphatically that "the math was not hard" once they "learned how to incorporate the concepts with the problems" (personal e-communication, 4/4/16). Hence, for Ann the problems were lengthy and perhaps cumbersome whereas, for Vanessa, the key was in relating the mathematics to the real-world situations. While some of the student reflections

⁴² In the teacher journal and researcher field notes, Ann was often positioned as one of the stronger math students.

have alluded to students' commitment to collective work and understanding, I now turn to this aspect of the learning—interdependence—more explicitly.

6.2 *Interdependence*

I intentionally use the word *interdependence* to describe students' assertions to learning collaboratively because there was a strong sense from the larger corpus of data that students relied or were mutually dependent on each other in order to understand the mathematics. The notion that students were able to access the material because of the way they helped and supported one another was a major theme throughout the various data sources. Below are just a few of the student responses vis-à-vis their journal entries (SJ #4) to the teacher's prompt in October of 2008, *how do you think we are moving as a class?*

Ellen: As a class we are moving fine. I feel that when everybody collaborates we do better. That is because we are learning from each other. Everything we do is challenging but we work together to solve the problems. (10/3/08)

Marisol: Something that is interesting about our math class is the idea of having group discussion. I think I get more engaged to the work. (10/3/08)

Antoinette: Now I do think we moving forward as a class not as individuals. We are working better. I think now we have better group and class discussion. (10/2/08)

Both Antoinette and Ellen indicated that the class as a whole was moving forward *together* in understanding the material, while Ellen specifically attributed this to them learning *from each other*. Marisol wrote in her journal above that she felt more engaged as a result of the group discussions they had in class. For her and others, they wrote in their journals that they learned well and in some cases better from their peers. In the journals, students overwhelmingly talked about the class moving forward together benefitting in multiple ways from discussing the mathematics with one another and learning from one another. In a follow-up e-

communication with Vanessa, I asked her if there was anything unique about the class besides the social justice topics. She wrote on 4/4/16,

And the whole class itself was unique...it was a class where we weren't being set to fail like the rest do...[if] there was something we did not understand, WE as a class solved it. (emphasis in original).

Remarkably, this is, in essence, the same thing Vanessa wrote in her mid-year survey over seven years earlier. At the time, Vanessa attributed the class understanding to Rico's orientation towards students and the class. She wrote in December 2008 that Rico's class was about "comprehending what you're doing and why" as opposed to being a class focused on "pass or fail." Although Rico may have set up the conditions for students to take ownership over their own learning and take responsibility for making meaning, students opted to take this up.

Both the teacher journal and co-researcher field notes underscored times throughout the year in which students took the lead in the class to *collectively* make meaning of both the socio-political issues and the mathematics. The classroom episode from October of 2008 that opened up this chapter was selected largely to illustrate one instance of this happening. In my analysis of the field notes, this happened often. On 1/27/09, the co-researcher wrote in her field notes, "A very very interesting discussion indeed, with students taking charge and grappling with the issue of what meaningful action can take" referring to students' agentic stances towards presenting their work in the community. On 3/13/09, she wrote, "Quite a few of the students are having interesting challenging mathematical conversations—Carlton, Roxanne, Ann, Mónica, Minerva, Gema and so on." Below is Rico's reflection from one of the first days of the HIV-AIDS unit on 3/5/2009 regarding students' knowledge and queries.

We started out with a pretty interesting discussion about AIDS. Lots of interesting cross-room discussion, people like Julie having interesting questions. Students

actually know a good deal...that you cannot get AIDS (or HIV) from a toilet bowl or kissing, that you can get it from sharing needles, body fluids. Ann, in particular, seems to know a lot, was teaching Julie and others....this conversation went on for about 15 minutes, interesting, and seems like people are pretty aware and interested. Marisol, in her end-of-year survey commented that what she most enjoyed about the class “was how we had to help one another to understand a concept. We had to work together, you wouldn’t give us any answers.”

There exist many entries into students’ journals, student survey reflections, video transcripts, and teacher and co-researcher journals that point to instances in which students did take up the teachers’ call for collective work. I drew on data from multiple sources to substantiate the large degree to which students worked together to unpack the mathematics and the socio-political contexts. This is not to say that there were not days where students were frustrated and/or the teacher struggled to keep every students’ attention on the material. For example, the following are two journal entries in which some students struggled to stay on task.

There’s also the issue of who’s engaged and who is not. Antoinette has pretty much checked out. Renee is only marginally there, and Marisol is busy texting. All three are doing their other work as well (chemistry, history, whatever). Jenny is exhausted and stressed and totally tuned out. But beyond them? I actually think most of the others were tuned in today. In fact, when I, at one point said, this isn’t working, a number of people disagreed w/ me and urged me to continue. But my continuance wasn’t very useful. (TJ, 12/5/08)

[It] was quite a powerful 5 min clip. While some of them had their eyes glued to the video, I noticed that Jenny, Marisol, Antoinette, Carmen, Renee and Vanessa were also meanwhile multi-tasking. Jenny had her back for most of the time to the

computer, so not sure how many of the “reasons” she caught that were just flashing across the screen. (Rico later mentioned that Antoinette, Renee and Vanessa had watched this clip yesterday when they met). Carmen and Renee were talking about other stuff and Marisol was busy turning some pages while the “reasons” were flashing. I know I was busy looking at how intently everyone was looking at it instead of reading the reasons, so I am sure that I myself missed most of it (Gregory walked in a few minutes later, so I am not sure how much of the video he saw.) (CRFN, 10/2/08)

While it was rare, on a couple of occasions it was clear that students either should not or could not work together. This became evident through Rico’s personal knowledge of student dynamics or, on a couple of occasions, students expressed their inability or refusal to work with someone in particular. I share this to disabuse the reader of the notion that this class did not experience some of the typical high school student dynamics, both good and bad.

Notwithstanding, in their interviews that took place many years later, students talked about this particular feature of interdependence in various ways. For example, Ann discussed the collaboration as challenging at times but in the larger scheme of the class, it was critical to helping everyone access the mathematics.

I remember being really mad at everyone else in class cause we worked together so much and we were always one unit to always make sure that everyone understood the projects, that everyone got like the process. I remember being really annoyed when some students wouldn’t get it and then I would sit there and I wouldn’t get a problem and then everyone would be really annoyed. So, it was a really, really good process and I know that everyone completely understood all the problems and the process at the end of the class.

Ann shared that this lengthy process of making sure that everyone advance and move through the understanding as a ‘unit’ tried her patience at times but she understood and agreed with the larger purpose. She pointed above to the necessity of working together so that everyone could ‘completely’ understand the problems.

Gema, recalled the class’ collective work around writing the Op-Ed piece to the Huffington Post. Remembering this piece of writing that they put together as a class as a culmination of their work in the Elections Unit reminded Gema of the difficulty in the unit.

That one was interesting and it was hard at first cause I remember we couldn’t really understand how to do it but then after, after we kept helping each other we, we understood it. I think that was mostly a thing that, even though we were segregated, we kind of if someone needed help with something and somebody got it, we would help that person or like if I were to be struggling in it the class would help.

While it is not clear if she is referring to writing the Op-Ed piece or the unit itself as challenging, it is clear that she believed students were able to understand the work *through* their shared commitment and perseverance to support one another in drawing out meaning. Students overwhelming across interviews and across the data sources, raised the significance of relying on one another as intellectual resources to make sense of the mathematics.

Although my focus in this chapter has been on the students’ interdependent ways of getting through the mathematical rigor, this is not to say that they did not struggle at times with understanding the socio-political context. Students did not raise this in the interviews but other sources, in particular the field notes, pointed to students at times struggling to make sense of the socio-political context. Ellen, for example, felt she lacked cultural capital (Bourdieu, 1986) because her family did not own anything making it difficult for her at times to keep up with the jargon associated with loans. The co-researcher documented a

conversation between her, Antoine and Carmen (class member not part of this study) trying to make sense of the socio-political terms in the article they were reading on corn subsidies.

Antoine and Carmen were trying to make sense of what de-facto export subsidy mean.

Antoine and I talked about it for a while and made sense of it. Antoine continued to think about it—asked if Carmen understood it well enough to explain and she said no.

He persisted with it and we talked about it and made sense of it.

I believe here that Antoine persisted with talking about it so that Carmen would have the benefit of thinking and discussing it further. She may or may have not engaged as it is unclear. This excerpt nonetheless illustrates another example of students struggling to make sense of the socio-political context. In this case students were unpacking (im)migration factors that resulted from NAFTA (North American Free Trade Agreement) and associated corn subsidies—economic policies and factors that ultimately devastated Mexican farmers, essentially putting many out of business and pushing Mexicans north of the border.

In the HIV-AIDS unit, students struggled to make sense of the socio-political content in trying to disentangle the social, political, and economic factors that could account for the disproportionate HIV-infection rates among Black females. Indeed, students needed to engage in a sophisticated socio-political (and mathematical) analyses of the HIV-AIDS data to make sense of it (Balasubramanian, 2012). On 4/21/09, Rico “pushed” students to think critically about how they were going to present and explain the data for their upcoming community presentations.

I asked how would students explain the fact that both Latinos and African Americans are disproportionately impacted by HIV/AIDS. This brought up a pretty interesting 15-20 minute conversation that only finally got rolling right before the end of class. I said that here we had been studying these numbers, and now we had to speak to the community. Ann kept asking me what I was asking, and said that they could not really

answer the question, it was really just opinion. Someone said that we had numbers as well. It strikes me that the difference between “opinion” and “analysis” may not be that clear. Jenny asked me if I wanted them to explain, and I reiterated that I wanted to know what they thought about the explanation and what they thought they should teach the community. We went round and round on this for a while.

By and large, this was not the type of rigor and interdependence that students spoke of in the interviews as they spoke of these two constructs only in relation to the mathematics. I have included it, nonetheless, to illustrate that both the socio-political contexts and the mathematics were at times challenging for students.

6.3 Summary

Going back to CCSS working definition of mathematical rigor, students’ reflections both in the post-class interviews and in the data from the class (journals and surveys) reveal that they believe to have experienced engaging with such rigor. Students like Mónica and Renee spoke of engaging with conceptual underpinnings of the mathematics whereas Minerva and Renee spoke of learning the mathematics in context (i.e. application). Renee saw connecting the mathematics to real-world contexts as significant and illuminating for her with respect to understanding the mathematics conceptually and associated implications for the real-world context whereas Minerva believed that the actual application of the mathematics to the real-world contexts is what made the class challenging and college-like. Contrastingly for Vanessa, the challenging problems with which they were presented were mitigated by being able to connect the mathematics to something real-world as did the collective ways in which students worked to persevere through the mathematics. Students’ insights into their experiences in the M4SJ class are indeed unique to their own personal mathematical and socio-political identities and further illuminate for critical mathematics

educators the various ways in which engaging in math for social justice can take shape for youth of color.

As Mónica, an aspiring middle school math teacher, described below,

Well, we kind of helped each other or we would build on ideas from each other so let's say I started the formula but I didn't know where to go, another student would come and 'well let's see how we could figure this out' and then another peer or some other student—that's how eventually we were able to. It was a lot of classwork though.

Mónica's description of how the class worked together to get through the mathematics is not unlike the opening classroom episode that showed students coming together (through Rico's facilitation) to help and support each other in sharing their knowledge for the benefit of all. As students became more comfortable with this level of collective work, they at times led it themselves with Rico's help. The reliance on each other as intellectual resources was a particular experience that many students' raised in the post-class interviews as being memorable, meaningful, and largely unique to this class. In this way, students took responsibility for the learning and struggled in productive ways attending to the rigorous demands of the class in interdependent ways.

While I contend that from the students' perspectives the mathematics they learned was rigorous, it was clear from the data (TJ and CRFN) that students' mathematical understanding revealed conceptual and procedural gaps that covered the gamut from place value to solving systems of equations⁴³. In spite of this, students engaged productively and

⁴³ Balasubramanian (2012) discussed the mathematical complexity in the Elections and AIDS units with greater detail including the ways Mr. Al tried to address students' knowledge gaps.

substantially with college-level mathematics. The rigorous and interdependent ways in which students working through the mathematics within a heterogeneous classroom was analogous to how I originally envisioned students to learn in the IMP classes when proposing it to the founding principals but for reasons unexamined, it did not happen. I assert this based on students' categorization of rigor and interdependence as a unique experience in the M4SJ class and not for any other reason or knowledge of how students engaged in math class prior to their 12th grade year.

As Rico often asked, why did students take up the challenge and why did they consistently commit to bringing not only their mind but also their heart, as Renee put it? While I acknowledge that with 13 students interviewed, each and every one of their stories and trajectories—mathematical and socio-political—were at times convergent and at times divergent, I attempt to respond to this query in the next section.

7 STUDENTS' SOCIO-POLITICAL ORIENTATIONS

In this chapter, I focus on the ways in which students made meaning of the socio-political aspect of the curriculum. It has proved difficult to disentangle the mathematical goals from the socio-political as the exact premise of the class and curricular design of the M4SJ class was for students to use mathematics as a lens to examine and understand aspects of their social reality. In light of this, I outline in this chapter some of the mathematics that students came to understand about mortgages in order to contextualize the socio-political connections students made throughout the class. Students in the M4SJ class explored three major topics⁴⁴ but I chose to highlight their work and reflections with respect to mortgages and associated predatory lending practices in their communities because the students overwhelmingly spoke about this particular unit (mortgage interest was a significant part of the Displacement Unit) in the post-class interviews. I begin with a classroom episode in which students discussed their thoughts on how to organize the then-upcoming community presentations in which they would share their learning from the class. I then provide a more detailed description of the unit from that found in Chapter 4 (Curricular Context: Section 4.6.4) to situate my three main findings or sub-themes related to students' socio-political orientations: Political Relevance, Strengthening of Social Agency, and Black and Brown Unity.

⁴⁴ I consider the first 3 units (Elections, Displacement, and HIV-AIDS) to be the major units whereas the 4th unit (Criminalization) was self-directed and lasted only 2 weeks.

7.1 *The Community Presentations*

As an end-of-year culminating event of the class and in an effort to share their learning with their communities, the students committed to doing two presentations in the final weeks of the school year, one in each of the 2 neighborhoods. The excerpt below took place in late April in which students were engaged in a collective discussion regarding who should participate in the end-of-the-year presentations to their communities. On this particular day, several students in the class were also participating in a school-wide day of silence “in support of the GLBTQ youth who face silence because of their sexuality” (CRFN, 4/28/09). For this reason, the conversation below mostly took place vis-à-vis student writing on the whiteboard with the whole class crowded around the front as they wrote, read, and responded. I begin this section with an excerpt from the co-researcher’s journal detailing a segment of this exchange.

Should everyone be present at both meetings (Vanessa, Ellen, Miriam and Antoinette may have a soccer game for one of the days! A big problem, because the dates were collectively decided..., others may have work etc, some said split [half of the class present at one presentation and the other half at the other] and others said everyone should be present). At this point again the issue of why would not everyone be present came up. Gema wrote everyone should be there, we are a class (by this time she had gotten frustrated with the conversation and went to the back of the class to sit down). Renee wrote that if everyone comes that would help because people can circulate amongst the parents and do more explaining and helping. Ann and Roxanne could no longer contain themselves and said they had to talk and raised the question of why some people are not interested in presenting when they had decided as a class that everyone will present. Renee said that there will always be people who don’t want to

do something but why should that stop others. Roxanne said something in response, and it seemed like she was really frustrated that some people are not participating. I am not sure who she is referring to or what her issue is. Rico said that no one had said [anything] about non participation, only that they would participate in different ways. Jenny was very clear however that she did not feel confident about presenting the math as she was not sure of it herself and so wanted to do a poem on AIDS. Rico said that he was going to have a conversation with her later during lunch about “this attitude.” Finally everyone agreed that everyone should try to make it in solidarity—if people had work, soccer finals etc, then Rico can consider them. But the presentation group will be different for each day. (CRFN, 4/28/09)

In the above excerpt, the co-researcher documented a discussion among several students as they struggled to come to a consensus on whether everyone in the class should be expected to participate in each or both of the community presentations about two weeks away from the date of this class. The level of frustration that grew throughout this conversation provoked at least Ann and Roxanne to break their silence. It appeared that several students were bothered by the thought that some might not participate or even be present. Gema, for example, after reaching her own frustration threshold, decided to step away from the whiteboard—where everyone was standing—and sat down. In the end, as noted above, the students came to a consensus that “everyone should try to make it in solidarity”. I share this excerpt to underscore the level of commitment and emotional investment that several students maintained in wanting everyone in the class to be present at the community presentations. Upon speculation, the way in which students were adamant about all of them presenting may have been about everyone carrying their weight or about everyone showing solidarity to one another and/or to the community. I suspect that both of these factors, perhaps others, may have played into the intensity with which several students (Gema, Roxanne, Ann) appealed to

the class that every single person participate. Jenny stood firm in her active resistance to present any content related to mathematics but she would be willing to write and read a poem on AIDS, the unit that most resonated with her (Post-class Interview⁴⁵).

Notwithstanding, it is striking to see students impassioned to hold one another to task for following through on their commitment to one other in presenting to their communities on the learning they had experienced in the class. It is also striking that the conversation (verbal and written) took place at a moment of high stress for students with high school graduation right around the corner and many classes wrapping up with final papers and exams (CRFN, 4/28/08). This is significant because students could have easily minimized the event given all of the competing priorities for their time. This begs the question—why *did* students take up the challenge to come together and present in both communities? I offer up some insight into this query in explicating the 3 sub-themes in this chapter on socio-political orientations. In setting up students' reflections, I first offer a more detailed description of the Displacement Unit and in particular, the mortgage work students did in the class related to interest on mortgage loans.

7.2 Displacement Unit

The unifying theme of displacement was intended in large part to have Black and Brown students “understand the causes, mechanisms, and roots of displacement in each neighborhood...to see that both [communities] have the same larger context—a global political and financial system that plays out in particular and sometimes contradictory ways...” (Gutstein, 2013b, Reflections section, para. 2). On the one hand, both North and

⁴⁵ For this chapter and the next, I have cited all student quotes and corresponding sources given that I draw from student journals (SJ) and student surveys that were completed during the 2008-2009 school year and interviews that took place 2-4 years after the class had ended.

South Lawndale were experiencing displacement in particular because of the predatory lending practices that targeted both low-income communities. Both North and South Lawndale had a rise in foreclosures in the previous 3 years (2005-2008) and some of the students in the class had personal experiences with their families' struggle to manage unaffordable mortgage payments including one student's grandmother losing her home and another whose mother was on the verge of losing hers (Gutstein, 2016). On the other hand, the economic and socio-political dynamics of gentrification and immigration/deportation, both factors in displacing community residents, played out differently in each neighborhood. North Lawndale, given its prime location (close to downtown district, near public and highway transportation), saw a rapid infusion of newly constructed and apartment-converted condominiums priced two to three times beyond what the median household income could accommodate. Little Village, on the other hand, home to the largest concentration of Mexicans in the Midwest, had experienced several ICE (Immigration and Customs Enforcement) raids in recent years sparking community-wide protest involving broad participation from youth to pro-immigration activists to religious leaders. In addition to gentrification in North Lawndale and deportation in Little Village, both communities were experiencing high rates of foreclosures which could be traced back to sub-prime mortgages in many cases. In this way, displacement as a larger theme, served to help students unpack the similar and distinctive ways various economic and political forces affected their communities.

The first few weeks of the displacement unit were devoted to students extrapolating, and extending 'linear' trends in home sale prices in North Lawndale. This particular context provided students with opportunities to re-engage concepts like slope, line of best fit, and linear regression. Being able to understand the housing price trends in the context of displacement served to establish the motivation for using mathematics to determine

affordability ranges in both neighborhoods. In other words, students engaged with the question of whether community residents (median-income households) could afford to take advantage of these new housing developments. Students asked—*are these new developments designed to keep us here or push us out?* Modeling affordability entailed that students study about recursive functions and Discrete Dynamical Systems (DDS)⁴⁶. Without getting into the specifics of the mathematics, the big idea here is that interest accrues on every month that a mortgage balance is carried over creating a situation in which mortgage payments in the first 10-15 years tend to pay more interest (due to initial large balances relative to small mortgage payments) than lowering the principal balance. In part, the mortgage aspect of the displacement unit was for students to unpack and critique the disproportionately unfair advantage that a lender has over low-income borrowers.

A great deal of class time in this unit was devoted to unpacking both the mathematical (interest-bearing) and socio-political (unfair advantage) ideas just described. Students spent several days examining a \$150,000, 30-year mortgage at a 6% fixed annual interest rate and modeling it mathematically: initially by hand and eventually with a calculator program allowing them to manipulate various inputs including the monthly mortgage payment but also interest rate and the initial loan balance. For example, they could take the template case above and change the interest rate to 5.5% or change the house price to \$130,000. The ease with which students could change the terms made the calculator a valuable resource down the line when looking at balloon mortgages or negative amortization cases. Students used the

⁴⁶ Discrete Dynamical Systems (DDS) is a mathematical representation of any situation that represents a change over time such as a mortgage balance that changes from month to month as a function of the monthly mortgage payment and interest recalculation.

template loan terms above and the calculator program to initially determine and consider several mathematical calculations:

- (1) The monthly mortgage payment required to pay off this debt in 30 years;
- (2) The amount owed *if* the average wage-earning person in their community were to pay only an *affordable*⁴⁷ mortgage amount; and
- (3) The loan amount families in their communities *could* afford based on the median household income without hardship.

Through their collective effort at answering these questions, students established several things. For one, a family would have to pay \$899.33 a month to pay off this debt in 30 years. However, if the average Little Village resident paid the recommended 30% of their disposable income (\$807.92), they would still owe \$92,000 after 30 years. Students calculated that a Little Village and North Lawndale resident, earning the median income and without experiencing hardship, could afford a home priced at \$134,750 and \$84,500, respectively (Gutstein, 2013b). Through this investigation, students were able to confirm that the new housing developments cropping up around the neighborhood were not designed for the average family in their neighborhoods.

From this investigation, Jenny, the student who actively resisted presenting any math-related content for the community presentations, explained what she learned about these queries related to mortgages in her journal.

This week was a turn-around week for me. I think that I have been more engaged in the work we've been doing in class because I understand it more. The subject that

⁴⁷ According to the U.S. Department of Housing and Urban Development, a family should use up to 30% of their monthly income before experiencing financial hardship.

we're studying is more visible and easier to understand both mathematically and socially. I learned how to find the possibl[e] monthly payment for a mortgage of 150,000 dollars. I also learned what the payments meant in terms of foreclosures and debt. Part of our job this week was to find the best payment plan that would allow the family to pay back the whole loan but it would also cause the family to not have enough money for food which means the loan plus the interest rate was not affordable. (SJ #10, 1/12/09)

Here Jenny expressed, in a somewhat roundabout way, that the typical family in her community could not afford the “best payment plan” that a \$150,000 mortgage loan required (\$899.33 monthly installments). The best payment plan needed to pay off the loan in 30 years “would also cause the [median-income] family to not have enough money for food” causing them hardship; thus, rendering the “best payment plan” unaffordable. Moreover, students were finding home sale prices well above \$150,000. In their community presentation power point, students shared advertisements for actual properties selling for over \$250,000 in both communities.

A key classroom episode of the mortgage investigation occurred on 1/6/09 in which students analyzed the life of the \$150,000 mortgage loan in detail. It was in this class where students determined that the average Little Village family could *afford* to pay \$808 (not the required \$899.33) without experiencing hardship. In the very first payment of the life of the loan, students calculated that only \$58 went towards lowering the principal while \$750 went towards pure interest. Further analysis on this same day revealed that by paying an *affordable* amount, the family after 30 years would have paid a total of \$291,000 leaving \$92,000 still owed. The mathematics here prompted Rico to put the following equation on the board:

$$\$150,000 - \$291,000 = \$92,000$$

He asked students to “check out that math” (video transcript, 1/6/09). This followed with students’ questions and comments regarding the bank “taking your money” as Antoine declared emphatically. Renee asked why it was legal and Daphne inquired about why were there not people in the community that could help inform families of their financial viability regarding home-ownership.

The remaining part of this week was spent on students’ continued work with modeling interest-bearing scenarios with mathematical formulas (DDS). Students were then asked to reflect on the mathematics they were learning during this particular week as well the meaning of the following equations:

$$(1) \$150,000 - \$291,000 = \$92,000 \text{ and } (2) 1 - 6 = 4,$$

The first equation represented the mathematics of the mortgage situation from above (based on paying what was affordable versus required) and the second equation represented the third-world debt situation in which third-world countries have repaid 6 Euros on every 1 Euro borrowed leaving an additional 4 Euros still owed. In this way, Rico asked students explicitly to connect the two equations between the local debt of mortgages and the global debt between countries.

Although several student journals were missing, of the remaining 8 journals, all but one student connected the two equations to the larger systematic practices of exploitative banking. Marisol, the outlier, wrote that the equation (singular) meant, “many citizens from both communities...can’t afford \$150,000.” Everyone else spoke about the over-arching concept of debt and, how as Gema stated, “the poor stay poor and the rich get richer.” Renee related, “these numbers are bullshit” and “since the U.S. does it to other countries, they allow the banks to do it to other people” keeping many poor. Antoinette noted that “owing is the magic word for America” and Minerva thought it disturbing “how banks use the public’s money to make its own money.”

After this class, students then spent several weeks continuing to build their mathematical knowledge of sub-prime mortgages such as balloon, adjustable-rate, and negative amortization scenarios. The extent to which the disadvantage of mortgage lending was felt by the average homeowner in their community was dramatic and began to explain for students one of the structural obstacles their families and communities faced.

I contend that this was a critical moment for students in building on and extending their socio-political awareness. For one, during the post-class interviews, students remembered the “mortgage” unit more than any other unit often times only remembering this unit and not others. Second, in preparing for the community presentations, again students overwhelmingly wanted to focus the presentations on what they had come to understand about interest-bearing loans. The work on the mortgages also facilitated students connecting this work to student loans and credit card debt. I turn now to the first of 3 sub-themes (socio-political relevance, student agency, and racial solidarity) that speaks to the significance that learning about interest-bearing scenarios, specifically, held for students in this study.

7.3 Theme #1: Socio-Political Relevance

I begin with students’ reflections on their initial (retrospective) orientation to wanting to take the M4SJ class. I then follow with students’ reflections about the particular salience of the work they did in unpacking the mathematics of mortgages both during the course vis-à-vis their journals and in their post-class interviews.

A majority of the students interviewed signed up for the class precisely because they knew they would be learning about issues affecting their communities⁴⁸. Antoinette, the

⁴⁸ A few of the students indicated that they took the course because they wanted the experience of being in a college-level class and/or wanted to be taught by an experienced teacher given that the students had

community protector, saw mathematics as a secondary outcome whereas she was *anxious* to take the class to find out about her community.

I was actually very anxious to go into that class when I heard about it... Rico actually gave us a little feedback [on] what we were gonna do, how it was gonna be and he actually got most of us really interested you know in signing up for that class. So like I said the reason I signed up for it was because it was a great way actually for me to understand math a little better, get a better understanding of it. And not only that but get a better understand of what I wanted to know, like topics that I wanted to know— why? You know, that’s the question we used to ask, why? (Post-class Interview)

Antoinette recounted the enthusiasm she felt in wanted to take the M4SJ course. Rico’s introduction to the class “got most of us really interested”. And although Antoinette saw it as an avenue for understanding mathematics better, being able to engage in community issues or topics represented for her what she “wanted to know” and better understand. In this way, she foregrounded the socio-political learning of the class over the mathematics learning.

Similarly, Gema thought that learning about their communities and more specifically, engaging with topics they collectively chose was critical in drawing her interest (Post-class Interview).

The data strongly suggest that students identified strongly to topics they saw as germane to their social reality. In the first journal of the year (one week into the school year), students were asked to share their initial feelings (excitement, boredom) about the five units outlined in the syllabus. Ellen wrote that because she was born in Mexico, she was

all new teachers up to this point. These reasons were given by 3 of the 13 students. A fourth student was programmed by mistake but never advocated to be removed from the class.

personally interested in learning about immigration and deportation; whereas, Gema was interested in displacement and criminalization of youth because these topics “are the ones [she had] witnessed” in her community. Vanessa felt “strong about women being [em]powered” highlighting her particular interest in the unit on sexism and Antoinette was most interested in the displacement unit because it was her “people” getting displaced. One instance of *disinterest* was Minerva’s lack of desire to explore gentrification yet again, as she felt that it was a topic that had been overly discussed in the school. Additionally, Mónica did not initially see the value in studying the 2004 election since it had already passed but instead wanted to understand what they could do about the current election of 2008. Nonetheless, students generally identified with units they found to be most rampant in their communities and most relevant to their experiences as women, as youth, and as committed community members.

Given students’ distinctive dominant and subordinate identities (Flores-Gonzalez, 2002), not all students connected to each unit the same way nor were their interests always convergent with their identities. Jenny communicated then (class surveys and journals) and later in the post-class interview that the unit on HIV-AIDS was the one that most stood out for her given the rising rates of infection among Black women. Contrastingly, Ellen, an undocumented Mexican and someone who consequently could not vote, spoke about remembering the Elections unit well and often. Moreover, Antoine, one of only 6 males in the class, felt strongly throughout about learning about sexism. I share these three examples to show that sometimes the connections that students made might appear obvious whereas at times, not so much. Nonetheless, I turn to students’ reflections on investigating the mathematics of mortgages given the salience it held for students per their reflections both during and post the class.

Gutstein (2006) has outlined three types of real-world contexts: (1) real-world contexts that are not relevant to students' lives (eg. maximizing the profit for a fictional bakery), (2) real-world, apolitical contexts relevant to students' lives (eg. choosing the best cell phone plan), and (3) real-world projects that are political in nature and build on students' sense of justice. The mortgage unit was contextualized for students within the 3rd type of relevance—socio-political relevance.

To begin the unit, Rico had shared with the class how Carmen's⁴⁹ grandmother had lost her home due to a sub-prime, home-equity loan she had acquired in order to keep up with the rising property taxes in the neighborhood and a leaky roof (Gutstein, 2013b). The notion that predatory lending was happening in their very backyard was prominent for these 12th graders. Renee, as a second example to Carmen, paid close attention to her mother's mortgage situation that similarly almost cost them their home (Gutstein, 2016). Years prior to taking the class, Renee had seen her mother agree to financing a large contracting job to construct a home addition. Without knowing the specifics of the interest, Renee suspected something amiss given the quick approval time and exorbitant amount. She recalled during our interview how even as "a little girl" she warned her mother not to sign off on the contract, but much to her dismay, Renee's mom did not listen to her. Renee had shared this particular situation with Rico prior to enrolling in the M4SJ class and told me that she was further encouraged to enroll in the M4SJ class—knowing that they were going to look into unpacking how mortgages work augmented her motivation. Hence, Renee had an interest in

⁴⁹ Carmen was student in the class but was not interviewed as part of this study. Mr. Al received permission from both Carmen and her grandmother to share her story with the class.

understanding mortgages so that she could help her mother in situations where she, Renee, felt that her mother might be getting ripped off.

Similar to Renee, Ann also found herself worried about her family's ability to pay their mortgage. While taking the class, Ann insisted on looking into her mother's mortgage statement and shared with her what she was learning in class. Ann, during the class, demonstrated a solid understanding of the mathematical model for mortgage loans and how to use the program they had created on the calculator to determine the month by month balance for a 30-year loan for any given interest rate and loan amount (TJ, 1/6/09). She recounted the following during the interview:

I wanted her to understand cause we always had problems with our mortgage and how expensive it was and that was one of the problems that we worked in the school; like how expensive it was and how the community isn't really educated in terms of understanding like how [long] it's going to [take] for you to pay off the entire mortgage and how much it's gonna be per month per year. So I went through everything for our mortgage. She realized how expensive it was and how we were being overcharged. So I think that was one of the main ones that was really important for me to explain to her.

Ann spoke of wanting to teach her mom about the mortgages situation to show her how they "were being overcharged." She demonstrated here a justice orientation to the learning, which for Ann, carried quite a bit of weight. As she stated, this unit on mortgages "was one of the main ones" that she wanted to explain to her mom. For Ann, the unit on mortgages had socio-political relevance for her family and Ann shared this knowledge with her mother hoping that she too would see the inequity in the lender-borrower relationship.

As students were learning about and modeling the mathematics of mortgages, they were also learning about the rise in foreclosures in both communities and across the country.

It is of consequence that the M4SJ took place in the midst of the mortgage crisis. In this sense, students were also learning about the political economy. In their journal assignments, Rico would often give them an article to read or a graph to interpret related to such trends as rising debt, rising healthcare costs, upsurge of foreclosures, and income growth disparities.

After the classroom episode on 1/6/09 in which students realized how much of the 1st payment (\$58 out of \$808) actually went to lowering the principal, students continued to explore and create scenarios for balloon mortgages, adjustable-rate mortgages and negative amortization—all mortgage provisions that further exacerbate the amount of interest and debt one acquires. Marisol, after reading an article about the widespread mortgage crisis and its devastating effects on families across the country, had the following reaction:

The article was really upsetting in many ways. Families are losing their homes due to lack of information when signing their loans. The article is very related to our unit because we're learning as a class about balloon mortgages, sub-prime mortgages and adjustable mortgages. Foreclosures are not only happening in Chicago, IL but in many other cities like Orlando, FL, Boston, Houston, Baltimore, Oakland, and California plus many more. It also seems that financial companies have received billions of dollars in federal aid to stave off collapse while putting families in the streets and nowhere to go. Some questions that were brought up, while reading the articles was why are loan places tricking families to sign a plan they don't even know what their signing. Where do the families go when they lose their homes...It's really devastating reading about families that think their signing a loan that is right when in reality at some point of their mortgage it's going to leave them in the street. (SJ, 2/20/09)

In their journals from February 2009, students had similar reactions to Marisol's in reading about the national upsurge in foreclosures. Hence, in learning about mortgages and predatory lending practices, students made the connection between what was occurring right

in their backyards to a social injustice happening across the country. Moreover, a month into the Displacement unit, students viewed a short promotional video of a proposed development for a highly sought out and contested property in Little Village at the hands of a “transnational capital investment fund.” (Gutstein, 2013b, Studying Neighborhood Displacement section, 2nd to last para.) In this way, students had opportunities to make connections between their communities and large-scale predators such as these global investors.

Fast forward many years later to the post-class interviews, students were typically hard-pressed to find rigorous ways in which they personally engaged with mathematics in their daily life beyond basic budgetary and shopping demands. I was, nonetheless, interested in what types of connections students could make between their particular experiences in the class and their experiences in the world as it related to mathematics and social justice. In the case of Antoine and Gema, they shared their personal accounts of applying the mortgage formulas (DDS) they learned in class to a payday loan and comparing various mortgages for her in-laws, respectively.

I was kind of worried [be]cause I took out like \$500 dollars [be]cause I had to pay some parking tickets [be]cause they said they were going to boot it away and I didn't want them to boot it away and I didn't have \$500 dollar. So I went and put that [car title] on it [collateral for payday loan] and then afterwards I was like spending all night figuring out the math and how much I was going to pay in interest. I figured out so clearly that at a certain point when I asked the representatives how much the interest would be the next month, they didn't give me an answer. (Antoine, Post-class Interview)

They were looking at different houses and then they were varying by neighborhood and prices. And then they were talking to the real estate agent and stuff and like, the older brother, he actually graduated from Prius University and he was helping them also, but

he wasn't, he's not good at math so he was not really sure about the mortgages and like they had the papers and I was looking at them and I actually was like helping them and explaining it to them, like which mortgage would be better for them and cause I was like the banks are not gonna tell you, they will lie to you and everything and just so they could make money out of you. (Gema, Post-class Interview)

The above occurrences are instances in which Gema and Antoine applied the mathematics they learned in the M4SJ class to an authentic situation in their life after high school. Antoine, after putting up his car for collateral on a payday (i.e. high interest) loan, spent many hours figuring out how much interest he would be paying the very next month. He contended to have determined a precise amount; one that the representative was unable to produce because, as Antoine noted, he probably did not know himself.

In the case of Gema, she described how she was able to look at the bank loan paperwork provided to her in-laws and help them make sense of the embedded mathematics for their particular situation; a situation, she noted, that her brother-in-law, a graduate from a very selective university, *Prius University*, struggled to understand. For these two students in particular, they were able to apply their mathematical learning from the class to a real situation in their lives. Hence, the relevance was explicit and formidable.

Furthermore, both Antoine and Gema recounted their experiences in such a way that they felt empowered by the mathematical tools at their disposal. Antoine noted his ability to calculate the interest to a level of precision that was beyond the payday representative's whereas Gema demonstrated a sense of accomplishment for being able to interpret the loan paperwork—a mathematical situation that a university graduate struggled to examine.

Connecting the relationship between interest-bearing scenarios and students' lives as future consumers of credit was cogent. Students, like Gema and Antoine above, related in a myriad of ways the value of understanding interest to their lives, both present and future.

Renee expounded below how she came to use the calculator program to help her analyze her own credit card bill, immediately.

The most helpful part of this unit was the dynamical systems. As soon as I really learned how to work with the dynamical systems I came home and grabbed my credit card bill and the mortgage and plugged them in the calculator. Paying the minimum balance on my credit card wasn't enough. I would have to pay double my minimum balance to get out of it in less time. Obviously, what my mother [a low-paid factory worker] is paying isn't enough to finish paying the house in 30 years. The worst part about this is that what she pays isn't 30 percent of her income, it's more. (Gutstein, 2016)

Renee made strong connections between the mathematics they learned (and were learning) in class to her own situation—and her mothers.

For Calvin, he remembered very little about the class in the post-class interview with the exception of the mortgage sub-unit. Calvin insisted on paying his way through community college and avoided buying a car on credit because the M4SJ class, he confessed to me in our interview, scared him out of taking risks on loans and potentially acquiring bad credit. Vanessa and Ann, having read the terms of their own student loans, conveyed to me the urgency they felt with paying more than the minimum payment so that they could avoid exorbitant amounts of interest. The big idea that students learned was that they had to read the fine print and be watchful borrowers. I discuss this notion of agency in the next section.

For Minerva, understanding how interest works was the most important thing she learned in the class. In a personal electronic communication seven years after the class, she relayed:

I remember learning about mortgage interest rates. I remember how they're able to sneakily skyrocket the amount that the loanee actually ends up paying back for their

loan. This is important/applicable to life considering that asking for loans is a part of life, whether they're for cars, property, school, etc. (4/11/16)

Not surprising, Minerva remembered learning about the precarious nature of interest that 'sneakily skyrocket[s]' the amount of a loan.

Students in learning about the mathematics of this inequitable and ubiquitous situation felt an urgency to want to take their learning to the streets. From the onset, as part of the class syllabus, students had agreed to do two community presentations throughout the year. The year got away from them and they did not organize the mid-year presentation. Significantly, Rico did not want to let the last one pass as that would be a missed opportunity for students to synthesize and share their learning. Nonetheless, the fore-grounded expectation (vis-à-vis the syllabus) that they were going to share their learning in the community does not dilute in any way students' overwhelming desire and commitment to want to inform, educate, and save their community from further displacement and fraud. In the next section, I report on the ways in which engaging with this unit (and the class overall) supported and strengthened students' sense of agency.

7.4 Theme #2: Critical Mathematical Agency

At Sojo, students were accustomed to engaging in issues related to their communities albeit unevenly across grades and subject areas. As noted in Chapter 5, students discussed teachers, classes, and units that they found engaging, relevant, and even transformative. It is important to note here that the data suggest many of the students in the class already had a strong sense of agency prior to walking in the M4SJ class. Given the focus of the school and students' lived experiences, this is not surprising. For this section, I begin with Antoine's story. While Antoine's story was profusely one of struggle, it was also one of tenacity and hope. The details of his story per our interview offered a rich description of a young Latino with a strong sense of justice. More importantly, given the premise of the class, the evidence strongly suggests that there was a shift in Antoine's understanding that mathematical knowledge could contribute to revealing and subsequently fighting injustice. All of the students in the class made this connection to varying degrees but Antoine's development might be considered a hyper-case of what Turner (2012) called a critical mathematical agency—the notion that one can use mathematics in powerful and authoritative ways to understand, critique, and transform unjust situations. I then turn to other students' claims of the class shifting their thinking about the world, thinking about mathematics, and thinking about how mathematics could help change the world.

7.4.1 Antoine's Growing Sense of Critical Mathematical Agency⁵⁰

Antoine demonstrated a great deal of interest in unpacking the socio-political issues the class set out to explore. In the first journal of the year, he wrote, "I am very excited about

⁵⁰ Throughout my retelling and interpretation of his development, I offer data chronologically from the beginning of the class through to his interview several years later.

being in the class and in getting into deep discussion in some of this issues.” (SJ #1, 9/04/08)

In his second journal of the year (9/18/08), Antoine questioned Rico’s insistence on having students take almost a week to re-construct the underlying principles of probability from the Jena 6 unit, a unit they had done their junior year but mathematically consequential for the first unit of the year (Elections Unit). “This week”, Antoine wrote, “was confusing and I felt a little bit meaningless because most of this week was just trying to remember things that we already knew. And if Rico would [have] just reminded us we would [have] saved a lot of time.” Here Antoine did not connect the necessity of *understanding* the mathematics as critical to answering the unit’s central question—*Was the 2004 Presidential Election Stolen?*

Antoine repeatedly expressed his eagerness to move beyond the mathematics into the election. A month into the Elections unit, Rico journaled about Antoine pressing him to move beyond the Jena 6 mathematical sub-context and apply what they were learning to the elections. Antoine even went as far as to claim that students had expressed this exact sentiment during their 3-week sum up of the class two weeks earlier. Rico’s interpretation of the audio transcript from the earlier class did not confirm Antoine’s assertion but clearly highlighted Antoine’s pre-occupation with the progression (or lack thereof) of the class. (TJ, 10/5/08) The larger point here is that Antoine appeared quite anxious to learn about the world and the injustices within it ignoring the significant role mathematics was going to play in informing them on the socio-political aspect of the unit’s central question.

I posit that through the M4SJ class, Antoine’s sense of agency was continuing to evolve in ways strongly supported by the mathematical learning. The class data (journals) suggest he was starting to experience ways he could be more proactive in fighting against injustices. For example, students decided to share their mathematical findings from their investigation into allegations of voter fraud (2004 Presidential Election) vis-à-vis an Opinion Editorial for the online website and blog *The Huffington Post*. Antoine was one of several

students who had volunteered his time after school to contribute to writing it. Moreover, at the end of the Elections unit, Antoine (and one other student) approached Rico about joining the crew (TJ, 11/04/08). Antoine displayed curiosity about his own role in the world as a social justice actor. The idea that as youth they could organize themselves and speak against injustice seemed to resonate with Antoine. During a personal conversation with Rico on 12/10/09, following a crew meeting, Antoine was “persistent and methodical in wanting to know [how to engage peers in youth organizing project] and asked good questions.” (TJ, 12/10/08) Antoine went on to present at several conferences that year on what they were learning in class. In his mid-year survey that took place in December 2008, Antoine stated that the class had given him “hope on believing that a group of urban kids of Chicago can work on social justice issues and make an action plan to follow it.”

I return here to the class from 1/06/09 (highlighted at the start of this chapter) in which students discovered just how little of the first monthly mortgage payment went towards the principal. To Rico’s question of ‘what’s going on here with the math’, Antoine responded with an emphatic, “they’re taking your money!” (video transcript, 1/06/09) A few days later upon reflecting on this same class, Antoine wrote,

This was good. I think that people really understand the math. But also this one aspect of how capitalism works. The reaction that people have to the fact that in a 30-year 6% fixed rate mortgage of 150,000 paying 30% of the median income of a Little Village family would only equal to paying 58 dollars a month and the rest to the interest. That reaction and the decision after it was important to have because we were able to really see how capitalism [a]ffects us. (SJ #10, 1/11/09)

This journal illustrates a shift in Antoine’s orientation towards the mathematics from the beginning of the year. Whereas early on in the school year, he was anxious to move beyond the mathematics and into the deep socio-political discussion of the elections, here he made an

explicit connection between the mathematics of interest and its illuminating role in revealing the politics of mortgages and consequences of capitalism.

Antoine went on to engage more deeply with the mathematics. The data points to him playing a more active role in the class helping and encouraging his peers to engage the mathematics and the socio-political aims of the units. For example, Rico commented in his journal on 1/21/09 that Antoine took it upon himself to walk around to other groups and start helping his classmates with the math. Antoine had now been a regular crew member and some of the math they were doing in class, he had already worked with prior to the class.

I argue that Antoine's sense of agency with mathematics was starting to come together in a holistic sense. Antoine engaged in what Turner (2012) has coined, a critical mathematical agency, a type of agency associated with drawing upon the discipline of mathematics to examine issues of social justice in an effort to reveal injustice and act transformatively upon the world. In Antoine's example, he linked the mathematics of capitalism in mortgage situations as banks "taking your money" to his role in the crew to helping his peers engage with the mathematics in class.

Antoine carried a sense of hope and agency through the remaining part of the year. In his year-end survey, he contended that the most important thing he learned in the class was "the importance of being aware of our social situations so that we can be aware of how to take well care of ourselves and others." He went on to state that even though he knew that the world was messed up, he also knew that "in order to change it we have to change it." This became a common mantra for Antoine.

Beyond the class experience, Antoine carried with him the notion that he wanted to be a part of the solution, as an agent of change. In the post-class interview, he spoke indignantly against the way the world worked. He was, at the time, struggling to raise two children in a co-parenting situation with little financial and emotional support. He had enrolled himself in

college at two different times with little success mostly due to time and financial constraints given his low-wage, full-time job and being a father. I remind the reader that Antoine who had little support and resources was the same person who took out a payday loan to pay \$500 in tickets in order to prevent the city from towing his car. He was completely disillusioned and frustrated with the way in which the current system in the city and the state was being managed particularly at the expense of the welfare of its citizens.

I realized how corrupt this city really is. I mean all these little things like they just start taking money off of you for no reason: left and right, taxes here, taxes there. And then you start thinking about [how] everything's just connected through money. Everybody just wants the freaking money. How do, how a way to live, to run a civilization. (Interview)

Antoine's story was replete with struggle and commitment to stand up against injustice. He reported that he often did math in his head to build up his mental math skills and he attributed this to Rico sharing with the class the ways in which the system had failed them—failed them in not preparing them with the foundational mathematics skills needed to function in and out of schools. Antoine took to heart Rico's advice that doing mental math would improve his skills.

I mean I do math in my head all the time. I remember Rico talking about the way you get better it's like if you do small little equations, calculations in your head or if you think of stuff about how much is this and that. That's just gonna start working on your math and then so when I, for example, now at work, people ask me well how much is it for the 6 months, how much is it for each car? And I give them the answer right away. It's basic math but that really helps them out cause then if you tell them 600 for 6 months and there's four cars and I could tell them how much it is for each car. That

puts it in a different perspective for them oh well then maybe it's not that expensive.

That helps them out as well.

Here Antoine connected the importance of building up his own skills not for a test but to help his clients understand the mathematics involved in making financially sound decisions when purchasing car insurance. More broadly, Antoine began to internalize how mathematics could be a tool to help reveal, unpack, and stand against injustices.

Antoine's sense of agency pervaded his story and he had decided that instead of going to college, he would try to advance himself through the insurance world to both pay the bills and build his credibility as an honest, trustworthy man. These two end-goals would then support his ultimate goal to run for political office.

I want to build my credibility as a character as a person...I want to make sure that I have the money or may provide for my children for myself but also to then have enough to say alright it's time to launch a campaign [inaudible] going back and start helping out the community.

By sharing Antoine's story, my goal was to show the way in which Antoine became *more* agentive through his experience in the class and the crew. I did not have the opportunity to interrogate his justice orientations prior to the class but the data suggest that Antoine came into the class with a strong justice orientation. This was clear in his eagerness early on in the class to delve into the socio-political learning of the class. My claim here is that his participation in the M4SJ class presented him with the opportunity to *further* develop his sense of agency and build on his sense of justice by supporting the development of critical mathematical agency.

7.4.2 Students Writing the World with Mathematics

I turn now to the other students in the class and their reflections on their growing sense of critical mathematical agency. I return here to the opening segment of this chapter in which students were anxiously trying to work out their individual and collective participation in the community presentations. Unlike this aspect of their contentious preparation, students' responses to *what* (content) they wanted to present in the community presentations (SJ #16) converged around the work of the mortgages. That is, students felt strongly that illustrating the way(s) in which interest accrued and significantly impacted the loan balance in a mortgage *and* sub- prime mortgage situation was important knowledge that needed to be shared. Students believed that the mortgage knowledge could help their communities become better informed home-buyers and home-owners and, in effect, reveal and understand their particular disadvantage in this situation. In this way, the community presentations served as a vehicle for students to share the ways in which mathematical knowledge could serve to reveal, critique, and potentially transform an injustice—an instantiation of critical mathematical agency.

In their penultimate journal (#16), students gave Rico input on their goals and purposes for carrying out the community presentation. Mónica stated that she wanted to make the “community aware of how mortgages work and how to prevent a foreclosure.” Marisol similarly stated that she believed that there were “people that are out to get people that are not well educated or well-informed so they can [get] money of them.” She wanted to “show people to be wise when making their personal decisions because other educated people will not care if the person has a home or not.” It is noteworthy that both Mónica and Marisol emphasized that the purpose of presenting their learning to the community was, in essence, to share information in order to prevent more foreclosures. In this way, they were writing the world to transform it.

Ann and Antoinette wanted to share essentially the same message although they were more indignant in their tone. Ann passionately wrote that the purpose was “to flat out let our people know things are fucked up and there are reasons for things being the way they are.” The predatory nature of the sub-prime mortgage lenders seemed to have provoked a drive to inform their community about the perilous nature of interest so that their families and neighbors could make better choices and prevent unwanted debt and loss. Possessing such critical and essential information, in students’ view, contributed to their community’s protection from further deceit that, in Minerva’s words, was “essential to being a strong community.”

Becoming aware of the power of mathematics as a direct tool for fighting against injustice was the most common claim students made with respect to the ways in which the class changed their views about math and about the world. Jenny, a struggling mathematics student, asserted that being in the class made her “*more* conscious about things going on in the world” (mid-year survey) causing her to question what she is being told. I place emphasis on her use of the word *more* highlighting the fact that her experience in the class contributed to her already critical mind-set. Minerva, on the other hand, maintained incredulous at the level of corruptness in elections causing her to want to “watch those in power.” Antoinette claimed to “now...view the world different”. She reported that she “could see the injustices happening and how math could make a difference”. In different ways, these are all testimonies to one aspect of critical agency—agency to be watchful and skeptical.

The notion that students needed to unite and come together was also an emerging aspect of critical and collective agency in their mid-year and end-of-year surveys. Several students responded to coming together and uniting (much like the community presentations) to write the world with mathematics. Calvin declared that he “believe[d] the world can change by using math and that it’s going to take effort and commitment from people”. In a

similar vein, Monica claimed to have learned that “if we unite and work hard, then we know we can make big changes with math being a strong tool.” Ellen wrote,

The world needs a change. This world shouldn't be racist to minorities. This world should be fair. I never imagined that this world was so corrupt. We need to unite to fight for some common goals. We need to fight the cause!

In this respect, the survey data evinced students coming to see their own agentive role in affecting change (individually but mostly collectively) and viewing mathematics as a useful tool in fighting against injustice. All of the students in their end-of-year surveys reported that their participation in the class was consequential in helping them see that they too could do something about the problems in their community and the world *with mathematics*.

Students came together in the end to create an 81-slide power-point for their end-of-year presentations to the community. I conclude the theme of critical mathematical agency with slide #64, the slide ending the presentation on the mortgages-

We as a people need to inform ourselves and others about these predatory loans. We should be conscious about the decisions we make when dealing with the banking system. People need to be educated on this matter. Some ways we could make this happen is by doing workshops, understanding the fancy writing, using internet sources and mortgage calculators to your advantage.

7.5 Theme #3 Racial and Ethnic Solidarity

Given the racial sub-text of the school, I was pleasantly surprised a couple years into the life of the school to walk past the cafeteria and see Vanessa and Antoinette, two non-black Latin@s, sitting among a group of African-Americans. It was for me, one of the first visible signs of authentic integration of African-Americans and Latinos. Vanessa and

Antoinette were crossing racial boundaries in a social setting (cafeteria) in which sitting together symbolized an oppositional stance to the discrimination black students perhaps (most likely) felt at this predominately Latin@ school (Tatum, 1997). As noted in Chapter 4 (School & Community Research Context), there was a real intention on behalf of the administration and teachers to build unity across the communities. Antoinette attributed some of their awareness around building solidarity to the principal's explicit call for racial unity. She remembered that he repeated often one of the school's essential values at assemblies that "we must learn to live together as brothers or perish as fools" as one call for unity. At least for these two Latin@s, his intentions were making their way into students' purposeful social connections.

Below I detail part of Vanessa's story primarily because the issue of Black and Brown Unity was prominent for her. Over the years, I came to see and hear about many authentic friendships that developed between Latin@s and African-Americans. I did not explicitly ask students about race/ethnicity and cross-community relationships though different data (interviews, student journals, field notes, and personal knowledge) led me to unearth the salience of race as an important part of this study and student stories. I begin with Vanessa's entrance into the crew and her reflections on racial solidarity.

7.5.1 Vanessa

My personal knowledge of Vanessa and the data overwhelmingly point to her experiences in the mathematics research crew, in Sojo, and in classes like the M4SJ class all influenced her social consciousness and commitment to justice. Additionally, it is not without consequence that Vanessa was the eldest of 6 children and had personal experiences (either herself and through her family) with gang harassment, challenges associated with undocumented status, and concerns related to financial stability particularly in relation to

paying their mortgage. Her personal experiences with injustice and life challenges inevitably contributed to her sense of justice and her developing consciousness as a young Latin@. The opportunities she had to explore injustice through the curriculum at Sojo, including her role in the crew, only served to help her further articulate her experiences within a larger socio-political framework as part of a marginalized community.

During our interview, Vanessa recalled a couple of social justice projects in math class that stood out for her during her sophomore year on Hurricane Katrina and Racial Profiling. Ultimately, she attributed this first exposure to the mathematics of race that lead her to join the mathematics research crew.

I remember seeing the poster and I remember seeing the picture of the superdome and, I don't remember the numbers exactly...but I know the ratios weren't not even close to who got left behind. So that was one project that stood out for me, that got me engaged in the crew. And right after, I can't forget racial profiling, especially with that video that we saw in the beginning; it was the movie with Denzel Washington. You know I think that caught my attention right away—boom! This is something I wanna do. And from there on I stood with the crew.

Vanessa, a Latin@ strongly rooted in her community of Little Village and possessing a strong justice orientation, was starting to notice issues both related to the African-American community and in the case of racial profiling, common issues that negatively affected both the Latino and African-American community. Prior to entering the M4SJ class, Vanessa had presented at well over a dozen math and education conferences across the country including presenting at the 25th Anniversary of the Algebra Project Conference in Mississippi as one of only three Latin@s among the entire conference—Renee and Antoinette, two students in this study, were the other two.

Hence, similar to Antoine's situation, Vanessa came into the class already possessing a strong level of consciousness. Through her personal friendships, through her work in the crew and her experiences at Sojo prior to entering the M4SJ class, she believed that Latin@s and African-Americans struggled in similar ways. For example, in her analysis of crime and violence in both communities, she saw each community experiencing the same problems:

The reason why some people act so aggressive is not because that's how we are, but because that's how we are meant to be because of what's happening to us. So like all the police and stuff, all these North Lawndale shootings, Little Village shootings, another shooting, another kid dead, or something like that, it's just that that was led by something else. It's just not, people don't just pop out with a gun and start shooting. It's because something is going on that is leading people to do certain things...it's not a way of excusing it, but it's a way of addressing the question: Why?"

Vanessa's engagement with the crew and increased exposure to engaging with and presenting on critical math projects motivated her to go "from questioning things in math to questioning things in life." Vanessa went on to reason that she began to "question everything and everyone...because we're taking [pause] regular math and implementing it. We use our knowledge to address other issues that affect others, people of color, low-income people, etc." (journal document) Notably, Vanessa connected the mathematics with the issues that affect not only her community but others as well including North Lawndale. In her description of her high school, she stated that it was in her sophomore year "when [they] actually started putting projects and problems that do affect the community and that affected both [of] us because you know it was Black and Mexicans."

According to Vanessa, she experienced a particular turning point when, as part of the crew, she participated in a youth panel in New York at the end of her sophomore year. This opportunity allowed her to share her experiences and connect with youth from other cities

that were trying to organize and fight against injustices in their part of the country. She was particularly struck by hearing it directly from her peers. In our interview she recalled,

But hearing it from the youth, it was kind of like ‘oh wow’ really? It’s not only happening in Chicago. It’s not only in La Villita, in North Lawndale. It’s actually hitting other places. And then you know, that’s when I actually wanted to go to workshops. I was reading the pamphlet, oh this one sounds interesting, I’m gonna go.

She described this experience of connecting her own experiences with others as influencing her participation in the radical math conference. Whereas initially she was not particularly interested in participating in several days of workshops, she noted that after her experience making connections with other youth, she had a sudden change of heart. As she stated, “that’s when” she became interested in the content of the different workshops making note of ones she wanted to attend. Vanessa continued presenting at conferences after that and encouraged a couple of her friends, Renee and Antoinette, to join her in the crew, which they did.

I conclude this section by sharing below a classroom episode involving Vanessa defending Black and Brown relationships followed by other students’ reflections about race relations. This episode from the teacher journal illustrates students, Black and Brown, and Rico, a white teacher, struggling to work through ongoing tensions in the community between the Latino gang and Black students making their way in and out of the neighborhood. On this day, Rico interrupted the work on mathematics in order to confront and try to address the emotional fallout following black students getting harassed/attacked along the 31st street corridor by the Latino gang. Prior to coming into the M4SJ class, the students had come out of an impromptu advisory (non-subject class in which students weekly meet in cohorts to go over school announcements) that was called at the last minute upon staff/administrative knowledge of a racial incident occurring that morning. Even though at the start of the M4SJ class, students had let Rico know that they wanted to work on math (as

opposed to talk about the incident at hand), when Rico saw that several of the African-American students were visibly upset, he decided to interrupt the math to engage students about their pain and anger instead.

I did not feel that we could go forward with the pain and anger in the room, so I went to the front and talked. I explained what was happening in Gaza and how I felt as a Jew. I made a parallel between what Israelis are doing to Gaza to how African American students feel in Little Village (that is a way too strong parallel and I should have made that clear). My main point is that Jews have to speak up in solidarity with the Palestinians in Gaza against oppression, and that Latinas/os in Little Village needed to speak up in solidarity with African Americans in our school/Little Village against oppression. I tried to say that African Americans are in a position on the bottom as an oppressed minority in this setting. Unfortunately, as Patty [author] pointed out, it came out like I was blaming Latino/s students. I apologized for that, and students started talking. Jenny [African-American] was particularly eloquent, explaining that if students wanted others to care, they had to show care themselves, and she said that went for both African Americans and Latinas/os. Daphne [African-American] expressed her anger at the [advisory] teacher, Julie [African-American] expressed her pain. Antoinette [Latin@] asked what did I want Latinas/os to do, they couldn't necessarily confront [neighborhood Latino Gang]. Vanessa agreed with Daphne that one of the class diverted and talked about BS stuff rather than the issue at hand (which was what Daphne was so angry about). Renee [Latin@] said that there were Latina/o students who stood w/ African Americans, and we got into talking about the first immigration march when only 5 Black students went. But Vanessa pointed out that a lot has changed since Freshie year, and that Black and Brown students are much more together (in the senior class) now than back then. Someone

(not sure who) was upset that teachers are always telling the seniors to be role models, when they (teachers) themselves are not (not clear what they meant specifically). (TJ, 1/13/09)

There a couple of striking points that I want to highlight here. The first point is that Sojo, as many students pointed out in their interviews, was a place where teachers and students *tried* to confront racially-charged incidents and resulting tensions that clearly impacted the students in the school even if they occurred outside of the school building. Rico saw that, in particular, 2 African-American females (Julie and Daphne) were emotionally troubled by the issue at hand and so he decided to interrupt the mathematics to confront and discuss what was going on. This was not unusual as Antoinette pointed out in her interview, “that was the topic with Rico, always. He had a lot to say about that [race], somehow or another.”

The second point I want to underscore from above is the messiness of confronting racism and engaging students (and adults) in discussing it. On the one hand, students are raising issue with how the advisory teacher decided not to deal with it by opting instead to move on and talk about other “BS” or non-consequential topics to the students at this particular time. On the other hand, Jenny is looking to herself and her Black and Latin@ peers challenging them to start by caring about the issues themselves before pointing fingers. Rico is appealing to the Latin@s in the room to take a strong political stance with Blacks and against being harassed by the Latino gang provoking me to reject even the slightest intimation that Latino students in the school are the perpetrators. In this sense, Antoinette likewise pushed back on an issue she felt largely out of her control. Vanessa, having been committed to this issue of racial solidarity, pushed back as well noting the progress that had been made over their four years together. The larger point here is that this work is messy, painful, and in this context, uncharted territory.

Much like Vanessa's own impressive critical viewpoint around race, there were other students that shared similar viewpoints. Whereas the topic of displacement (Unit #2 that encompassed Gentrification and Deportation) lent itself to helping students consider a common socio-political reality between communities, it also supported a rationale for racial solidarity. I am not suggesting that students' orientations towards racial unity began with this unit; simply that this unit helped support this orientation for students like Vanessa who were willing to take it up. This was certainly a major goal of the Displacement Unit. One could argue that this was also true for the Elections Unit (voter disenfranchisement) but to a lesser degree in the AIDS Unit⁵¹. Notwithstanding, some students wrote somewhat extensively and uniquely about the Black and Brown connection in arguing to present on the sub-prime mortgages in preparation for the community presentation. For example, Ellen stated that she "definitely" wanted to teach about the mortgage situation because "this is a problem that is affecting both communities." Mónica stated that she hoped people in both communities might come together and see their similarities rather than their differences and Minerva, in proposing the content for the community presentations, argued for the same.

I think we can use the same presentation in both neighborhoods. The only difference I would make is for the displacement unit, we should put more emphasis on the neighborhood we're in at that time: how its impacted, the outcome, rate of change, examples of the displacement being in progress, etc. But we should still mention the other neighborhood so both races realize we're all in this together.

⁵¹ Students investigated HIV infection rates and saw that Black females were over-represented while Latinas were under-represented based on city and state demographics.

Minerva wanted to tailor the presentations to each community and speak specifically in terms of the local impact (foreclosures, median home value, median household income). This would allow community members to get real-time data specific to their community rendering the information, perhaps, more useful and enlightening. Moreover, I share her writing to highlight further her call for helping each community “realize [that] we’re all in this together.” It bears noting that Minerva did not strongly identify with social justice ideals; certainly, not nearly as much as many other students who spoke of “my people” and “my community”. Nonetheless, at least on an intellectual level, Minerva could objectively see that within the sub-mortgage crisis both communities had been misled and targeted albeit at different rates and to varying degrees of detriment.

I end this section with the students’ final power-point slide entitled “Why Should We Care?” with which they concluded their community presentations. The slide speaks for itself:

- Both communities face the same problems but different situations
- There are many lies and stereotypes about both Mexicans and African Americans
- “Mexicans steal the jobs of U.S. citizens.”
- “African Americans are lazy.”
- Don’t let them pit us against each other!

7.6 Summary

In conclusion, in this chapter I drew on students’ reflection regarding the socio-political nature of the learning they engaged in the M4SJ class. In particular, several students felt strongly about learning about their world whereas the mathematics was a secondary objective. This was true for Antoinette who wanted to learn about her community and her

world and for Antoine who anxiously wanted to get into deep discussion about the socio-political topics. Students helped generate the themes that drove the curriculum and many like Renee and Gema chose the class because they wanted to understand the mathematics of mortgages and the criminalization of youth, respectively; two themes that spoke to their personal experiences.

In the case of the mortgages, the unit highlighted in this chapter, students made strong connections between learning the mathematics in relation to their communities and their futures. They were inspired to be a part of change and teach their families and their communities the ways in which they were being duped by interest in hopes that their presentations would make a difference, even if they only helped one person as Ann reflected in her journal.

Students were impacted by all of the units although differentially across students. But across units and through the learning with which they engaged in the class, students made connections between their local conditions and larger economic and political structures that create injustice—like legal banking policies, democratic anomalies, and disproportionate access to information and healthcare.

Ellen asked in her first journal “I would also want to know why are all the Hispanics and African Americans treated unfairly.” I cannot say how students might answer this question but it’s telling that a student would ask this in her first journal in a mathematics class. Students knew what they were in for. Students made connections across communities seeing their struggles as emanating from common causes. Black and Brown students took it upon themselves to resist society’s (and the larger community narrative) expectations to hold the other in contempt. These two actions—connecting in struggle and resisting disdain—are not isolated. The displacement unit contributed to students’ commitment to learning how to

“live together as brothers [and sisters] or perish as fools.” I feel confident that many of the students took this commitment to heart.

8 STUDENT NARRATIVES ON LEARNING MATHEMATICS

8.1 *Introduction*

For this chapter, I share three stories: those of Mónica, Calvin, and Marisol. I have chosen these three students' stories because of their distinct mathematical trajectories after high school and the fact that all three had taken several college math courses. Given their post-secondary math experiences, these three students had significant mathematical experiences after the M4SJ to provide in-depth reflections on learning in a traditional context, with a reform-based curriculum (IMP), and learning math related to social justice issues in light of their college experiences. They were not the only students to have had significant post-secondary mathematical experiences but I chose them given their different socio-political orientations as well. Without the need or desire to quantify their justice orientations, their stories inevitably will allow the reader to see how their mathematics experiences and dispositions interacted with their justice orientation. Building on the interviews, these three students experienced and reacted to college math in different ways given their mathematical orientations, their socio-political orientations, and their future goals.

At the heart of why I think stories are important is because I want to offer an alternative form of assessing students' mathematical learning and orientation. Although I have assembled the stories and in essence re-constructed them from my lens, I have been reflexive by making sure that my claims are modest and my reconstruction of students' stories well supported by the data. Notwithstanding, they are still my stories as students would inevitably choose to tell them differently.

I have tried to offer the reader a thick description of the context in previous chapters in which students attended a social justice school and engaged in what I considered a

powerful classroom experience. It is one I would have liked my own son to have participated in.

The conditions for teaching M4SJ were ideal in many ways. The teacher was an experienced (always on a learning trajectory) practitioner of critical mathematics and reform-oriented pedagogy. He had developed relationships with this group of students for 3 years in the context of using mathematics to understand social reality. One-third of the class at some point was an integral part of the crew, presenting and reflecting on their learning in the class all the time reinforcing for themselves the opportunity before them to use mathematics to better understand *their* world. It was a class largely based on generative themes, two of which could not have been more timely—a historical moment in election history of electing the first African-American President and learning about sub-mortgages at the peak of their downfall. Of course, the point of a critical education is to use academic literacy and numeracy to address the social contradictions of reality (Gutstein, 2016). In these ways, the situation was ideal but also complex. It was complex because students had been attending a school of social justice that was grappling with living out the values of the hunger strike within an institutional structure that historically had been oppressive, racist, and elitist. Students were experiencing a contested space with many actors—students, parents, administrators, and district bureaucrats. In this chapter I lay out this experience as manifested within 3 students' mathematical narratives.

8.2 *Mónica, Middle School Math Teacher*

Mónica shared with me how she had always liked math. She liked it in middle school, high school, and at the time of the interview was studying to be an elementary teacher with a math concentration. Mónica was adamant that she wanted to teach in her community of Little Village. Along her academic trajectory, giving back to her community had been an

overarching goal of hers starting as far back as grammar school. For this reason, Sojo was her number one choice. In high school, Mónica continued to consider her career options given her strong desire to both give back to her community and satisfy her appreciation and enjoyment of mathematics.

Well I definitely wanted to do something that I felt was gonna help my community.

And I remember my 3rd year, I wanted to do accounting. I have a family member who's an accountant so it's a lot of math and I liked it. But then after talking to one of my teachers, he said, 'well how are you gonna help your community like that?' and I'm like 'I don't know'. It was more of like a corporation unless I helped non-profit organizations. But I mean, I would still have to pay for housing and stuff like that which would not pay for itself so I figured well, what else could I do? I also wanted to be a teacher or a lawyer. So those were like my 3 things that I wanted to do. And after thinking it through, well, if I still want to go to law school, I still had to do something as an undergrad so and I've heard so many teachers who've gone to law school.⁵²

Mónica always knew that she would go to college. This was an expectation she and her family held. She had cousins attend college and she knew that if she wanted to be a teacher or a lawyer, college would be a requirement. She wanted to be a role model for the young people in her community who perhaps did not have the same outlook for themselves or a college-going network.

I had good and bad teachers...who have helped me be who I am now and I figured I can help students like that, who were maybe in my position when I started

⁵² I was surprised by this statement so I did ask her to elaborate. She could think of at least 2 teachers that she knew of that had gone the route of teaching and then law school.

younger...and help them go into college and inspire them. ‘Look, she’s from the community and she went to college and she was able to do it so why can’t I do it.’

She believed that many of her former teachers had experienced “different opportunities from those issues that we have here” that enabled them to get to college, like middle class backgrounds and/or private education. Mónica’s “whole mission [was] to work here” in Little Village as a role model: to teach her students well so that they could be prepared academically and to offer them hope in attending college.

8.2.1 On Learning Traditional, Reform-oriented, and Math for Social Justice

Mónica had always enjoyed all types of mathematics throughout her academic experiences. At the same time, she described the traditional mathematics work she did in elementary school as “easy” and “busy work”, her impressions and general feelings about doing reform-based mathematics were also positive. In the quote below she reacted to having engaged with IMP, a problem-based curriculum, and also math for social justice.

And then when I went to Sojo I was like ‘what are we doing?’ Like this, that [IMP] wasn’t math to me...it was those word problems. And then you had to figure out how to solve it and the formula. So there was not much help...but it was good. It was challenging so I guess from breaking from traditional math to this other curriculum but then I loved doing math for social justice. I really did. I thought it was just great to see how you can incorporate it to those social justice issues that I, I mean I’m aware of them but I’ve never been really, I’m just like ok, I know they’re there but I guess I never saw how much they affected us as a community until you see the actual data. Oh wow, like the numbers don’t lie so, I like that.

Distinct from a traditional mathematics curriculum, IMP was replete with word problems that “you had to figure out how to solve it and the formula.” From Mónica’s

perspective, students had to solve the problems themselves in IMP. Although she went on to state that they did not receive much help, she found the problems to be challenging and that was a good thing.

In comparing her feelings about IMP to M4SJ, Mónica stated, “I like IMP. I guess this was more real-life problems. So, it’s kind of like the same thing. It’s just a real-life problem that it’s actually affecting you and your community. So it’s different. It’s completely different.” Mónica, hence, understood that IMP and M4SJ were similar in their respect of figuring out real-life problems on your own versus being taught a procedure.

Notwithstanding, Mónica noted the wide gap between real-life (real-like) problems and what I herein refer to as real-to-my-life problems. They are, she reiterated, “completely different”. Understanding how mathematics can help unpack, understand, and transform issues in your community is quite different from exploring some fabricated, potentially removed problem situation. Studying, for example, how your family and neighbors are being misled with balloon mortgages as they did in the M4SJ class is vastly different from calculating profit margins for a fictional baker as they did in IMP. My intention is not to undermine the richness of a curriculum like IMP but rather to underscore the sense of justice that many students of color, like Mónica, embody and the ways in which real-to-my-life problems had more significance.

8.2.2 Where’s the Math in Social Justice?

As a testament to Mónica’s strong mathematical identity, Mónica was initially skeptical of the amount of mathematics instruction or exposure she would actually receive in the M4SJ class. It was almost as if she was checking up on the class to see if this was even going to be possible—that is, to integrate mathematics with social justice issues.

Well my only expectation was that there was gonna be math involved. And I knew it was going to be integrated with those issues [generative themes] which I thought it was great but I kind of, going in, I didn't know how that was gonna happen. So I was more worried about receiving the math content....It [expectations] was completely met. We had all that math content that we needed at the same time we were looking at these issues that were in our community...one of the reasons why I joined it was to see how was that gonna, it was impossible. I'm like, I don't know how that's gonna happen.

Interestingly, Mónica initially doubted the prospect of being able to integrate mathematics and social justice. This is interesting because in their first three years of high school, the students were exposed to at least a dozen social justice math projects averaging about a week long in length. It is unclear why Mónica was uncertain as to how mathematics could in a *substantial* way illuminate a social justice issue given at least some experience with interweaving the two constructs. Perhaps it was the actual topics or the fact that they were going to integrate math and social for a whole year that made her skeptical. In either case, it is safe to state then that her engagement in the M4SJ class was qualitatively different than the “drop in” nature of the previous projects. I share below her shift in seeing mathematics play a critical and indispensable role in unpacking social reality for the units they examined.

In her opening journal to the class (9/6/08), she identified the first unit as the one she felt *least* excited about confirming her doubt about the critical role of the mathematics.

I'm very excited about most of the units except the 1st one which is about the 2004 presidential election. I feel that already passed so what difference does it make now. We should worry about this election & the probability of it being stolen again.

Here Mónica appeared to lack an understanding of the sociopolitical value of being able to connect a statistical analysis of the 2004 election data to the 2008 election. The underlying premise of the Elections Unit was that by analyzing the 2004 data, students would be able to then make a more informed mathematical assessment of then-current data to determine the existence (or not) of foul play. About two-thirds through the unit, students began making this connection through their understanding of the mathematics. Mónica on 10/20/08 wrote:

I think that what we should do about the Obama-McCain election is to record the exit poll as soon as possible. Which would be as soon as the #'s are available. Then when the exit polls [are released] we could predict who is more likely to win. Then we do the same work we did to see if this happened by chance. Once we have the actual recorded vote then we could compare those numbers and see if they are close enough. I think that if in this election something goes wrong...then [we should] go to a bigger crowd....I think that we will be great at arguing that the election didn't happen by chance because the numbers say EVERYTHING! (SJ #6)

Upon completing a significant part of the unit, Mónica (and others) made the connection that understanding the mathematics of the past election was going to come in handy in helping them monitor the current election. Furthermore, they had developed the mathematical knowledge needed to back up any argument should they observe any missteps in the data. Mónica also suggested that if the data indicated foul play, they should use their mathematical knowledge to expose any illegitimacy. In other words, she was making an argument for them to read and write their world with mathematics.

8.2.3 Engagement with Critical Mathematics

Mónica was a strong student in the M4SJ class but tended to be a quiet, reserved participant. At times she was confident about her understanding of the material though it was not without some difficulty. Below are a few of her journals from the class:

I think that in the beginning some things were confusing from sheet #3...what happened is that I had read the question wrong. Then when you and Carmen explain it, I understood it more until it was clear. But I think I'm pretty confident now. (SJ #2, 9/12/08)

I think that there isn't anything too challenging at this point in class. (SJ #4, 10/4/08)

I am understanding the math that we are doing. But, I feel that the problem sometimes is that I don't soak everything in because it's explained really fast. I get most things when I'm given time to analyze everything and make sense out of it. Of course I need to understand the math because if I don't understand it there is no way I'm going to be able to do it. (SJ #12, 2/24/09)

The level of difficulty that Mónica experienced was minimal but in her view, worth the struggle. She felt confidence in her ability to "get most things" related to mathematics provided she was "given time to analyze everything and make sense of it." She went on to underscore the importance of understanding the math as this was critical to her performance. Much like her comments above on her own learning in concert with her reflective interviews, I came to expect Mónica to be thorough, introspective, and meticulous in her reflections.

The teacher situated Mónica as one who typically understood the material despite some occasional prodding or prompting. The following quotes by the teacher illustrate the teacher's views of her mathematical understanding and competence early on:

Mónica is flying w/ this mathematics. She is so sharp and grasps things really well. She is quiet but deep, and I am very impressed by her. (TJ, 9/18/08)

I called on Mónica, who is altogether too quiet in class for the latter answer. She knew it, as I have come to expect (10/9/08)

This is not to imply that Mónica, as she herself indicated in her previous quotes, did not struggle with mathematics as did all students in the class on at least some occasions. Rico's reflection below situated Mónica as struggling with straightforward mathematics indicating to him a serious and widespread gap in students' preparation.

One of the more surprising things to me was that students had a lot of trouble solving the equation for the EV [equilibrium values]. IN fact, Carleton and Mónica couldn't do it, nor Gregory, w/out a good deal of support from me. Why? Are they so out of the habit of solving equations? This was not a hard equation, it was: $E = .8E + 640$. This is 9th grade work...what does it say about IMP? About students' retention of basic ideas? Of learning and internalizing mathematics? Not sure...for those three, and Guillermo, when I kind of took them through a few basic ideas, they remembered without much difficulty. But still...I think this is a reflection that they are not doing much equation solving. In this class, we did little, actually, very little straight algebra and solving equations (let alone quadratics). (3/4/09)

Rico was surprised that even two of the more competent math students in the class, Mónica and Carleton, struggled to solve a straightforward equation but after working with Mónica and those referenced above, Rico indicated that they were able to recall basic principles of algebraic manipulation. A few days later after taking time to get the whole class through the algebra, the class moved onto to solving difference equations, yet another level of struggle for students. The teacher's reflection below documented Mónica walking the class through a problem, again with support.

After they had the three first lines correct, I asked them to create the general difference equations, using $u(n)$, etc....I then asked Mónica to say what the first

equation meant and Antoine to say the second. She worked on it for a while, and was pretty imprecise initially, but I pushed her and pushed her. Of course, she does know it...but she finally put the whole thing together. I have tried to stress repeatedly, through the class, that the precision of mathematical language is really important...in fact, precision of language in general is key. One reason I pushed her so hard is that I surmised that she knew what she was talking about (since I know her to be a strong mathematical thinker and reasoner, and articulate, when I can get her talking aloud. But I also know from one-on-one conversations, that she is). And with the pushing, she did it (and patience). I asked the class to evaluate, and they were cool with it. Antoine then had a much easier time with the second equation (for Milwaukee), since Mónica had already taken the lead. (3/9/09)

Here Rico pushed Mónica on being precise in her language until she was able to express the meaning of the equation. He pushed her in no small part because he figured that she did in fact know what she was talking about but needed to work through being able to accurately express her understanding of the mathematics. I share this example of Mónica to establish her being positioned competently within a productive struggle (Warshauer, 2015).

Mónica positioned herself and was positioned by others as competent. Mid-way through the year the teacher asked students who they would prefer to work with in a group setting and Mónica was one of the two most 'wanted'. Adults and students in the class clearly saw her as competent and helpful. In fact, her very entry into the class was facilitated by the assistant principal. She shared in her interview:

I think he [assistant principal] was the one that told me about it [M4SJ class]. He was like 'You like math. You might like this.' And then he kind of just told me a little bit about it and that's when I signed up.

8.2.4 Humanizing and Empowering Mathematics

Mónica loved doing mathematics with social justice. Although she started off as quiet and reserved, she was nonetheless passionate about sharing their knowledge with the community. She felt it was their “responsibility to share [their] knowledge and understanding that they [community] might not have” (SJ #16, 4/23/09). In particular, she referred to making the “community aware of how mortgages work & how to prevent a foreclosure” (ibid). This was what she saw as the main purpose to the community presentations at the end of the year. She was upset, in fact, upon her return to class that she was put into the group presenting on deportation and NOT mortgages. Below is part of the co-researcher’s account of Mónica’s disapproval:

Mónica was not sure why everyone was split into groups and why she was working on deportation....Mónica said that she really wanted to work on mortgages and there were things she wanted to share in that. I said that she could definitely give input to the people who put the mortgage stuff together, make connections between deportation and mortgages....Mónica was also concerned about how to engage parents because she wanted to make it interactive – she was thinking of having a few different tables where parents circulate from one to the other (I think that is a good idea). At one point I said Mónica “you should ask all the questions you have of Mr. Rico as well” and boy she did. She said Mr. Rico you never asked me if I will be in deportation and Rico had to explain :-). Say that he is pretty sure he did. She then asked him if they could see the video and Rico asked why and Mónica said “because we want to :-).” This is a strong side of Mónica that I am seeing – as I am getting to know her. (CRFN, 5/7/09)

Mónica felt strongly about presenting on the mortgage aspect of the displacement unit and did not stay quiet about it. The co-researcher reflected on Mónica finding her voice and

impressing upon at least the co-researcher and Rico that she was not pleased with how the groups got assigned (field notes indicated she was absent on some of these days).

It is also clear from the field note entry above that Mónica was genuinely impacted by understanding the mathematics of mortgages. In her portfolio reflection on the mortgage unit, Mónica expressed her strong desire to teach her community about the predatory nature of lending as a way to help prevent further loss and housing hardship. She wrote:

What I would like the people in my community to know is that there are different types of loans. I would also like to tell them to read what they are signing including the fine print. If they don't understand it, they should get help. I would like them to learn and teach them about how the balloon mortgage works, the fixed rate 30-year mortgage, and the negative amortization. I think that if my community was more well-informed, they wouldn't get into bad mortgages. I would like to show them the different paid amounts in different types of loans. Then compare and show them how much they save or how much more they would pay.

Mónica's sense of urgency was common across student reflections regarding the major purpose of the community presentations to focus on the various types of mortgage loans. The issue of foreclosure was already in full force as at the time it was rare to walk a few blocks in either neighborhood and not see boarded up homes and foreclosure signs. While this was probably true in many neighborhoods across the country, Mónica (and others) made the connection that residents from both communities risked being displaced.

Mónica wanted people in her community of Little Village to also see that Little Village and North Lawndale were more alike than different. She reflected on this issue in her portfolio.

I want the people in my community to know that we are really similar with these situations [gentrification, foreclosures, and deportation]....If we want to fight the

bigger people out there, the best way is to unite....I think this is something very important our community should know. (emphasis in original)

In her mid-year survey, Mónica felt she now possessed “power to change things in the world with evidence” and that mathematics was “not only about money, investments, and calculating, but also a strong tool to fight against inequalities.” (12/17/08) In her final reflections on the class, she believed to have changed regarding both her views on math and her views on the world. She came to “realize that there [were] a lot of issues out there to still research and fight the bigger enemy” and “realize[d] that when we connect Math to social justice issues you find realities that shock you.” (7/26/09) In the end, Mónica felt empowered in being able to humanize the mathematics allowing her to use her knowledge to read and write the world.

8.2.5 Preparing to Teach Middle School Mathematics

Mónica was studying to be an elementary school teacher with a concentration in math. As a 3rd year university student, she had already taken several mathematics courses. She felt that Sojo and the M4SJ class prepared her well for her college-level math courses. Mónica contributed her ability to unpack the structure of mathematics to the M4SJ class.

I did find I was prepared for it [math] in college too because a lot of the math that I did since I’m in Elementary Ed, I feel is very basic. It’s just that you go more into it...So you have to understand like why, which is something that I completely felt I was used to because of that, the course that we took, the math with social justice which was something that he always told us, ‘why, explain why’ which was very frustrating but yeah that did help.

Mónica claimed that the teacher preparation classes on teaching mathematics “[were] a lot like math for social justice” in the sense that they were asked to think deeply about the mathematics; to understand the structure of mathematics and its associated operations.

Mónica was adamant about being able to teach in Little Village and at the time of this writing, she was completing her 3rd full year as a middle school mathematics teacher in Little Village. During the interview, she reflected thoughtfully and meticulously about her teachers in high school across all subjects as well as in college. She reflected primarily on curriculum, pedagogy, and her engagement and learning across many experiences as a student. She felt challenged to teach, for example, like Rico taught because she recognized that as a new teacher she had a lot to learn and adapt to including the district requirements. She questioned,

How am I gonna meet those standards that they [district] want me to meet and at the same time bring those social justice issues into the math. I mean, I know it’s possible but I feel it’s gonna be so much work and...there are so many other challenges that I’m really worried about being able to integrate that [M4SJ] as a first year teacher.

For Mónica, being a teacher in the community was an amalgamation of being a role model for elementary students to want to go to college and convince them to “want to break those stereotypical” images of the Latino dropout. She spoke intensely about needing to convince students from grammar school that college was in their future and that they could also play an important role in helping their community. This was after all, Mónica’s story.

If they’re able to see where they stand in this society, these percentages, these low expectations...well, I don’t know, I guess that’s how I saw it. I [didn’t] wanna be that percentage. I [didn’t] want to be that statistic so I want them to think like that too. So maybe bringing those issues that affect their community like I said in 6th through 8th grade, they would be filled with more knowledge and just wanna better themselves.

8.3 Calvin, the Scientist

Calvin recalled being a good math student at his middle school in California prior to coming to Chicago as an 8th grader. He shared that “he was really into it [math]” and that he had been one of the top math students in his class. Coming to Chicago he remembered that the 8th grade math classes were doing Geometry and that he felt they were a bit behind in comparison to that which he had already been exposed. He enjoyed mathematics and “really wanted” to attend the STEM-focused school on campus but it was at full capacity so he ended up at Sojo since it was the only school to still have any openings. It was a decision and move he did not regret. He stated that Sojo “didn’t feel like a normal school” given the teachers’ strong caring and supportive attitudes.

Calvin frequently, almost without exception, shared his schooling experiences noting the teachers’ attitude and assistance as central to his experiences. For example, the presence of caring teachers was a notable difference in his experiences at two different colleges. Upon graduating high school, Calvin attended a community college in a nearby suburb, *Suburban Community College*. After a year or so he transferred to one of the city’s community colleges, *City Junior College*, for financial reasons. In commenting on his experiences at the suburban school, he shared:

I didn’t really like Suburban Community College. I don’t know...Teachers didn’t care. They didn’t pay attention to you. They didn’t offer any assistance...It seemed different from City Junior College. I think that teachers at City Junior College are better in some ways. They’re—I don’t know, they seemed like, it reminded me a little bit of

Sojo, that they care. (Interview)⁵³

He evaluated the teachers at the City Junior College as better because like Sojo teachers, they cared.

Whereas for Mónica, for example, her school reflections primarily drew on teachers' effectiveness at teaching, caring student-teacher relationships appeared most prominent for Calvin *in relation* to his facility to learn. He consistently talked about a course concomitantly with the teacher's attitude toward students and/or their passion towards the subject. Calvin took trigonometry twice at City Junior College. This particular class—Plane Trigonometry—was a 3 credit-bearing course that is the pre-cursor to Calculus, a personal goal of Calvin's so when he failed it the first time, he enrolled in it again. He described the teacher he had the first time as “bad” and judgmental. “He just seemed like every time you said an answer, a wrong answer, he would kind of judge you....And then I had another teacher who was really good. He was really nice and helped out.” (interview)

In his brief description of his English experience at the suburban college, he commented, “It was good. Yeah, it was good. The teacher was okay” and in astronomy, “it was good. The teacher was fun but it was good.” In almost all of Calvin's descriptions of his college courses, and class experiences in general, he would volunteer his evaluation of the teacher more so than the course material itself. Having caring teachers that were nice and helpful, was meaningful to Calvin and it is this characteristic that helped facilitate his own success. I believe this feature, also, played itself out quite uniquely for Calvin in learning mathematics in the M4SJ class as well.

⁵³ The interview with Calvin took place at my home on Sunday 2/17/13, four years post the M4SJ class. At the time he believed to have earned about 1.5 years of college credit.

8.3.1 Engagement with Critical Mathematics

I liked the teachers that were passionate about what they did. They cared about their students and they tried to make classes fun as possible and interesting. Like the whole social justice thing didn't really interest me. – (Interview, 2/17/13)

Despite this admission of having little to no interest in the social justice aspect of the school, a unique perspective among my interviewees, Calvin ultimately believed that Sojo turned out to be the best high school for him. When I asked him about the school's thematic focus, he responded accordingly:

P: Did they talk about social justice at SOJO?

C: Well I didn't really pay attention to the whole social justice thing.

P: That didn't really play a role in your experience?

C: No. Like the whole protest thing. Naw, it didn't.

For Calvin, perhaps social justice invoked a particular image in his mind; that of grand protest and rallying crowds. This was certainly an aspect of the Sojo experience as the school participated in several marches and rallies in the first 4 years. So why was he in the M4SJ class? Calvin thought that Rico had asked him but Rico's field notes from the first day of class (9/2/08) indicated that Calvin was programmed in there by mistake along with another student. While the other student's program was corrected, Calvin, for whatever reason, ended up staying and was the only 12th grader to be enrolled in two senior elective mathematics courses. Two reasonable explanations for staying in the M4SJ class beyond a programming mistake could have been Calvin's interest in mathematics and/or his peaked interest by the class conversation that ensued in those first few days.

Calvin shared with me that he felt bad because he knew that Rico was quite passionate about students passing the course and he believed that he did not do so well in the course. While I did not access his mathematical work or grade in the course, the teacher and

co-researcher field notes tell quite a different story about Calvin. Although there were few instances in which Calvin was being playful or distracting, he was consistently described as engaged, curious, and competent.

On 10/7/08, the co-researcher wrote “Calvin asked if exit polls were optional, and wondered if the results were different because some people may not respond (really interesting that he is thinking aloud....a major change from what it was in the first week of class).” She reflected on the change with respect to his acute attention to the unit details (mathematical and socio-political) versus the first weeks when he was described as being distracting to others (TJ, 9/2/08) and playful (CRFN, 9/16/08). Below are three quotes that reflect Calvin’s ownership and commitment to the collective learning in the class:

I also think that doing more of the sitting back and allowing students to scaffold each other’s thinking can happen now, because some of the students (like Carlton, Gema, Calvin etc) have started owning some of these ideas... (CRFN, 9/30/08)

It’s very encouraging and I sense that many people are really liking this [collective student-led work]...Miriam, Ellen,...Calvin, Gregory, to name a few. (TJ, 10/2/08)

There was effort by some students (Gregory, Ann, Roxanne, Calvin, Carlton) to make sense of this...(CRFN, 10/10/08)

At the point when the class was well into its 2nd month of studying the elections unit, both teacher and co-researcher had documented a qualitative change in students learning to grapple with the difficult concepts, learning to connect them across contexts and constructs (socio-political and mathematical), and learning to rely on one another to make meaning of it all. The quotes above indicate the teacher and co-researcher picking up on Calvin’s growing participation in the collective learning of the class. Despite his claim that he was not interested in the social justice aspect of the school, Calvin volunteered on 10/2/08 to take and watch at home one of three copies of *Stealing America Vote by Vote* (Fadiman, 2008) at

Rico's open invitation to the class. Calvin and two others volunteered to watch the videos and report back the following week on what the videos documented. Moreover, Calvin and five other students voluntarily worked with Rico outside of class time on 10/24/08 to learn the final mathematics (confidence intervals) needed to answer the unit question (Was the 2004 Presidential Election Stolen?) and to begin drafting the Op-Ed piece for the Huffington Post website submission *prior* to the election. It appeared that Calvin was, in fact, starting to like the mathematics and the socio-political interconnections as they were playing out in this unit. He was volunteering his personal time outside of school to contribute to the class decision to submit the Op-Ed article as a way to write the world and caution voters to take note of any missteps in the voting process. His journal entry (#6) illustrate his reflections on both reading and writing the world with mathematics.

By all the information that we have been given and all the injustices when it comes down the election of 2004 shows me that we really need to pay close attention to these elections coming up. By paying attention to the exit polls on the oncoming election we can try to figure out who will win the actual election by using the binomial formula. Also we will be able to argue if something is not right by in the end comparing the exit polls and the actual election votes and looking out for injustices. I believe we should get active by actually going to voting polls and making sure everything is going smoothly. (SJ #6, nd)

Calvin made a clear connection above on how to use the mathematics to monitor the upcoming election. He accurately suggested that the binomial formula would allow them to predict (within a certain margin of error) who could be expected to win. Furthermore, once the "actual election votes" were tallied, they would be able to use mathematics to beware of any "injustices" by "comparing the exit polls and the actual election votes." Calvin suggested that they "actually" go to the polling locations to monitor the voting process and make sure

that everything went “smoothly.” This data suggest that Calvin did embody a sense of justice despite his claims of not really paying attention to the “whole social justice thing.”

In the interview, Calvin only recalled the Displacement unit (the mortgages aspect of it to be more precise) and could not recall neither the Elections Unit nor the HIV-AIDS unit despite my efforts to jog his memory. The data certainly support Calvin’s active and consistent engagement in the two units he could not recall. While I suspect Calvin was actively and consistently engaged in all three, the fact that he remembered learning specifically the role of interest in mortgage loans tells me that this learning was more significant. Learning that interest had could “sneakily skyrocket the amount that the loanee actually ends up paying back.” (Minerva, e-communication, 4/11/16) Students overwhelmingly remembered this; to be weary of interest rates and pay back your loans as fast possible to avoid the deleterious effects of only making the minimum payment. This was an important lesson that students reported back.

Nonetheless, what was most striking for me in Calvin’s story was that in the survey and journal data from the class, Calvin spoke about the *caring* aspect as having major significance; not caring on behalf of the teacher, but rather caring on behalf of the students. The following are three of Calvin’s responses to the mid-year and end-of-the year surveys.

Mid-year

T: What did you like in our class?

C: I liked how we all cared about the topics we covered. Everyone had the desire to learn and investigate.

T: What is the most important thing you feel you learned in this class, math or outside of math?

C: I’ve learned to work as a class instead of every person on their own.

End-of-year

T: What were the most important things you feel you learned in our class, and why are they important to you?

C: The most important thing to me wasn't even about math. It was more about passion and caring for issues. I like how we all cared and tried to understand each other.

According to Calvin, there was something special going on in this class where students "all cared and tried to understand each other." Whether students cared about the issues *a priori* or came to care about the issues vis-à-vis the class (there was evidence of both), for Calvin it was significant that all of the students cared about the topics and thus worked collectively towards understanding the issues. In this experience, caring extended to students caring so much about the issues that it impacted the way in which they interacted with one another so as "to understand" one another. Calvin was particularly drawn to a situation in which there was a sense of unity around learning mathematics, learning about injustices, and working together.

His survey responses did reveal several other things about Calvin, in particular the explanatory power of mathematics to inform our understanding of the world and how to change it. Below are three survey responses in his end-of-year survey revealing his views on how the class changed him.

T: If you compare how you thought about mathematics when you came into this class, to how you think about math right now, have your views toward math changed? If so, how?

C: At first I didn't see how math could help us figure out anything about the world and how we could fix it. Now I believe the world could be changed using mathematics we have and will learn.

T: If you compare how you thought about the world when you came into the class, to how you think about the world right now, have your views toward the world changed?

If so, how?

C: As I said in #6 [above] I believe the world can change by using math and that its going to take effort and commitment from people.

T: Besides how your views changed (or not) toward math or the world, are there any ways you feel that being in this class changed you?

C: Yes it taught me how to work with people collective minds helps make a change.

Common to many survey responses, Calvin noted that the M4SJ experience allowed him to see how mathematics could help them understand injustice in the world and “fix it.” It is significant that Calvin stated that the world can be changed with the mathematics they learned and “will learn.” It is significant because the end of the year had approached and the class had ended. Moreover, he added that change was going to happened from a collective commitment from people, much like it did, for him, in the class.

All students interviewed noted in their surveys that learning about mathematics and how it could help them understand injustice (read their world with mathematics) and act upon it (write the world with mathematics) was significant. While this was also true for Calvin as noted in the survey comments above, but it was also significant for him that students could care about issues in a collective, synergistic way that they cared to also “understand each other.”

Interestingly, four years later during our interview, Calvin had little to no memory of the unique way in which they cared. I even probed him about whether the class worked in unique ways or if the way in which students worked to engage in the difficult mathematics (his evaluation of the math) stood out and he could not recall anything special. He kind of remembered that they worked in groups much like his previous math courses in IMP. In any case, in the next section I share Calvin’s thoughts on learning mathematic from multiple standpoints and what did stand out from the M4SJ class, many years later.

8.3.2 On Learning Traditional, Reform-oriented, and Math for Social Justice

I don't understand how does that [unit circle] relate to at all to anything...I don't understand that. It's like we're doing it but I don't understand why are we doing it. What's the point? What does the circle have to do with anything? (Reflecting on College Trig class)

This quote is characteristic of an important quality of Calvin's learning style and underscored why he struggled in his college trigonometry course both times. It was the way in which mathematics was traditionally taught—as a set of abstract, disconnected skills and concepts—that caused Calvin angst. He needed to understand why they were relating, in this case, the unit circle to a set of trigonometric functions. His need to relate and connect concepts to some larger purpose was a common thread that came up for Calvin time and time again. Calvin attributed his understanding of mathematics to the teacher being able to relate the material to something he could imagine as was the case in both IMP and the M4SJ class. In the case of the trigonometry class, he (and his teachers) struggled to accomplish this feat. In fact, Calvin argued that college mathematics courses should incorporate more real-life scenarios into the material so that he could understand the 'why' as well as the 'how'. For him, this made learning the mathematics “seem more interesting” and enabled him as a learner to “relate more to it”. It is the primary reason he enjoyed learning mathematics through IMP and in the M4SJ class.

Nonetheless, there were some stark differences between a class like IMP that incorporated real-like problems and the M4SJ class that used real-to-my-life problems as the core of the curriculum. Calvin recalled initially thinking that the M4SJ class was going to be interesting but he was not expecting it to be as difficult as it actually was. In comparing the M4SJ class to IMP, he described them similar in the sense that students worked in groups and worked on real-world problems. But the real-to-my life nature of the problems they

encountered in the M4SJ class made the learning “harder but easier.”

In IMP, Calvin relayed that he felt the problems were not “connected to things happening right there and then.” In contrast, in the M4SJ class, they investigated real topics “such as the election...and the housing”. For Calvin, the fact that the topics they explored were “real to our, to our lives” was a discerning factor that “made the learning both harder and easier.” For Calvin, he could relate the mathematics to the problem at hand as he did, for example, in the Elections Unit. In understanding how the binomial formula could predict a winner (with certain confidence), Calvin and others inquired about the accuracy of polling, whether voters told the truth, and contextual questions that helped understand the legitimacy of the mathematics. For Calvin, interconnecting the mathematics with the socio-political raised many more questions, involved more information to reconcile and connect, making the mathematics more complex and difficult. It also made the mathematics “easier to relate to.” He went on to share:

Cause I mean like I think if it wasn't for that, I wouldn't be so interested in science as well because I mean like the problems, orbits and planets. I'm really interested in that yet I have no idea how to do it but I would like to learn.

Here Calvin the scientist referred to the mathematics that is involved in understanding the movement of the planets. Interestingly and substantially, Calvin's experience in learning how mathematics can give one insight into real problems in the world contributed to his interest in science and the associated underlying mathematics. He expressed in the interview that the most important thing he learned in the class was, in fact, “looking at the world through mathematics” (i.e. reading the world with mathematics). In the quote above he applied a reading of the world with mathematics to what interested him the most—scientific phenomena. Much like his end-of-year survey where he noted caring as an important takeaway, it was not the mathematics that he remembered learning but some larger principle

beyond the actual mathematics—and that is more confidence in seeing himself capable of engaging rich, complex, real-world mathematical relationships.

I felt like I was less scared of math. Not that I learned more math just less scared to putting it to use. You know, looking at the world through mathematics. I thought that was really important. That's what it [M4SJ class] taught me.

He believed that he felt less intimidated by rigorous mathematics through the M4SJ class experience. This is significant because Calvin was able to experience the mathematics as something within his reach provided certain conditions hold—contextualized problems that are real-to-his-life, imaginable, and relatable. Experiencing rigorous, contextualized mathematics learning encouraged him to take a deeper, more mathematical look at science.

8.3.3 Love for Science

Calvin loved science and mostly wanted to learn the mathematics that could help him engage in deeper ways with scientific phenomenon. He attributed his love for science to Mr. Dario's Chemistry class and his own exploration of science himself—he reported to have gone through two biology text books on his own completing all of the exercises from cover to cover.

Calvin spoke to me about a keen interest he had in astronomy and physics. In his first year of college, he took an astronomy class and, in his free time, enjoyed watching documentaries about astronomy. He was fascinated by the idea that mathematicians were at one time able to determine and produce knowledge about the planets and orbits with little modern-day technology. He wondered how that was even possible. He likened his love for astronomy and physics to things he could imagine:

Physics will probably be funner because then it's like they give examples of about things you can imagine because that's the only way you can do physics, can't you?

Like just imagining?

He was determined to pass trigonometry because it was a precursor for Physics. This is what motivated him to take trigonometry again even after having failed it once. He had wanted to take Physics since his senior year in high school but it was not offered then.

Calvin was confident in being able to learn science but that confidence did not carry over to his confidence in math. He described his college astronomy class as easy precisely because it did not have a lot of math:

It was an easy class...It wasn't like. It didn't do a lot with math. So it was just remembering, knowing the planets, the constellations and stuff like that. And the scientists, the history of scientists...[knowing] the facts and not knowing the math.

Calvin spoke with passion about science and shared that his ideal job was to work at a research lab. He had visited one research lab's website (Fermilab) often fascinated by what they do:

I've been to their website many times... They try to recreate the big bang and I think that's pretty cool...It's a, it's a particle accelerator where they put two particles that go separate ways and they smash them against each other and then...they study them and, to recreate the big bang.

Calvin shared his dreams of being able to work in research lab where he could test out new ideas and be on the cutting edge of the production of scientific knowledge. This was exciting for him.

At the time of the interview, Calvin had been in contact with a representative from Roosevelt University (RU) regarding the needs-based scholarship they had offered Sojo's 1st and 2nd graduating classes. His class of Sojo graduates had the option to transfer into RU in their 3rd year of college and receive free tuition for their final 2 years of undergraduate study. His plan was to make up the few classes he needed to attain 3rd year status and then transfer

to RU. When asked what he would study there, his response was:

I just wanna go and do as much as I can with math and science. Try to apply myself more to get these things in my head. So they don't, I won't forget...Like math like the trig class I already forgot a lot of things. I wanna like really focus and learn it...

He told me he had saved 5 notebooks with all of his notes from both Trigonometry classes.

He had saved them as a resource for his preparation to take Calculus. He did not want to forget what he had learned in class. As he said, he needed to "get these things in [his] head."

Calvin had his heart set on studying and learning as much science and knew that mathematics was going to help him in his future scientific study. He had his doubts about being able to get through the mathematics. He shared with me, "I would love to go for my doctorates but...I think I could do the science fine. It's just the math."

8.4 Marisol, Pharma Advertising

Marisol embraced a strong academic orientation but appearances can sometimes be deceitful. In the M4SJ class, on at least a handful of times, she was distracted trying to complete her work from other classes (TJ and CRFN). At first glance, doing other work in math class might appear to indicate her prioritizing the M4SJ material less or perhaps even, the math material not holding much of her interest. In her mid-year survey, however, she offered a counterpoint to this outward appearance.

Something that I personally dislike about this class is not even the work we do in this...college level class but how all of our other classes stress us out and it sucks to know that we have to sacrifice our class to keep up with the other classes. I feel like we're being put up to a system that brings down students, sets them up for failure. Because instead of us students working out with other teachers, it's either now or nothing.

Here Marisol insinuated that she could put more attention and effort into the math class if her other workload were not so demanding. She also raised a possible solution of working things out with their teachers to perhaps coordinate their deadlines and/or demands on students to avoid this “now or nothing” mentality of schools. On 10/11/08, she wrote in her journal entry (#5) that she was feeling “overwhelmed with all the school work” and stressing about getting into a “college of [her] choice.” She went on to state, “Then I worry that I might not be ready or well prepared for college.” Marisol was overly concerned with passing her classes now and preparing for the next step—college. When I interviewed Marisol, she had just graduated from a highly selective school with a B.S. in Advertising and was to enter graduate school for a Master’s in International Marketing Communications the following Fall.

8.4.1 Signing Up for M4SJ Class

Marisol shared with me that she joined the M4SJ class because of two primary reasons; she wanted to take a college-level *math* course and she wanted to take it because Rico was teaching it. Her comments below suggest that she wanted both a college-level experience in math and to be taught by an experienced mathematics teacher/professor. She lamented on having had experienced a ‘new’ math curriculum with a ‘new’ teacher.

And I think that’s when Mr. Jacobi came and he was a new teacher. And I feel the reason why I didn’t go with Jacobi to take it was because I really didn’t know Jacobi and I was more familiar with Rico since Rico has been there since day one. So I wanted to take Rico’s class not only because I knew him but just because it was gonna be paired up with UIC and I also wanted to get the feel for what a college math class might feel like. So those were the reasons why I took Rico’s class versus Jacobi. And not only that but I was, I feel like everyone speaks so highly of calculus, like it’s

really difficult to be able to be good at it. And if you're good at it, great for you, you know. You're a genius, you're brilliant. And I wasn't just, I, I, for some reason I wasn't a fan of trying to do IMP with calculus⁵⁴. (Interview, 6/1/2013)

Her reason for taking the class appeared to be influenced by the notion that they were going to be in a college-level class with an experienced teacher, unlike Mr. Jacobi who was new to teaching and by default new to teaching a reform-based curriculum. It is clear that there were at least two reasons for choosing the M4SJ over the IMP 4 option. First, she viewed the IMP 4 teacher as new and unfamiliar unlike Rico who she had known since her freshman year (and had more teaching experience). Second, she wanted the experience of being in a math class that was categorized as college-level, a descriptor she used frequently when referring to the class. While IMP 4 was certainly college-prep, taking a college math class with a university professor outweighed all other factors.

Potentially, a third reason she may have opted for the M4SJ class was due to feeling intimidated by the notion of calculus and doubted her mathematical abilities. Marisol did not identify as someone good at high level mathematics such as calculus (or pre-calculus) asserting that it was "really difficult to be good at it" and it was a subject for "brilliant" people. Moreover, Marisol relayed to me in our interview that mathematics as a subject was "not her strongest point."

Marisol's confidence in being able to do the math in the M4SJ class was tenuous. She described the first week of class as "pretty intense but understandable" so long as she "[kept] up with the work" and "[paid] attention and listen[ed]." On 9/20/08, Marisol communicated to Rico vis-à-vis her 2nd journal entry her desire and need for him to slow down.

⁵⁴ IMP 4 was to cover pre-calculus concepts.

In the beginning everything is not clear for me or I might see it hard but after we discuss and talk about the material in class, it was much helpful. I don't really connect the different ideas very well. I guess that's something I'm going to have to work on. I also think you move too fast and I don't think I'm not advanced where I can just pick it up really fast. The way to write math and help us understand it is new. So it's going to take me awhile.

She advocated for time; time to learn how to connect ideas and time to get accustomed to this new way of doing (writing) math. She reiterated this in the next journal (#3) on 9/21/08 when she wrote, "Also I think sometimes you move to[o] quickly which looses me." Marisol also advocated for a fair grading policy that took into account her strengths and less so her deficits.

I want to be graded at the pace that I understand the math that we do in class. I do believe it's very intense math. I feel like I won't be able to understand it. But I'm willing to give it a try but I'm not too comfortable. I want to get graded on how much I understand. (9/21/08)

Marisol wanted the grading policy to reflect her 'pace' for learning. She was concerned that she would not be able to grasp some of the material so in this sense she hoped to be graded on what she was able to grasp.

8.4.2 Fluctuations in Confidence

Rico in his journal reflected on the fact that many students shared Marisol's concern of pacing and needing more time to digest and work with the material (9/23/08). This allowed Marisol to do just that. On 10/5/08, Marisol stated,

I felt like this past week went good. You took your time and explained the material to us. I'm happy to say that I understood it and I feel like I'm capable of doing the work.

I understand the whole concept of “nCr” and how we use it to find distributions.

Something that is interesting about our math class is the idea of having group discussion. I think I get more en[g]aged to the work....I’ve so far have learned that math is linked with real-life problems and situations but I’m still learning so I don’t think I can explain it yet. I think as a class we’re moving well and we understand things because we work together....I think the whole class is challenging but if we work together it’s a class that’s understandable.

According to what she wrote above, she made a shift, albeit tentative, towards seeing herself as more “capable of doing the work” though she went on to say that she was “still learning” and did not yet feel confident in explaining herself. The class as a whole was really starting to gel in terms of their collective work right at this juncture (TJ and CRFN, 10/3/08) and Marisol reflected positively on the group discussions. She went on to state that the class as a whole was understanding the material *because* of their collective work. For this reason, although the work was challenging, the mathematics was within her grasp of comprehension.

Another significant point is in her new awareness of how mathematics was linked to real-world issues. This was new for her. In her mid-year survey she wrote that her views on mathematics changed. “At the beginning, I thought this class was only going to be based on problems. But we are actually digging out the truth about how people are crooked and it affects everyone.” So Marisol was not aware to the extent that they would be looking at injustices, *per se*. Similar to Mónica, she too was beginning to see how mathematics could help reveal fraud.

Throughout the remaining journals, Marisol continued to report on ebbs and flows in her engagement and her confidence. Both of these often went hand in hand. For example, during the mortgage unit she reflected in her journal that “at first the dynamical formula was unclear” but after going over the problems as a class and her presenting on one of the

homework problems “the formula [became] clear and easy to understand.” (1/12/09). A month later, after the students continued working through various interest-bearing scenarios involving predatory practices, Marisol wrote, “Well, at the beginning of the unit I was really confused and not really interested in the unit. But as I started working with [Antoine] I understood this unit and was really engaged and interested.” (SJ #12, 2/20/09)

Interestingly, she came to understand the mathematics more and more through the help of her peers and at the same time became more and more engaged and interested in the unit. She went on to state in this same journal that she found “that learning about mortgages now will help me future wise when I decide to buy a house. This unit is very interesting and I’m glad we’re learning about this [so] we can make a difference.” She made a personal and socio-political connection to the work of mortgages. On the one hand, Marisol welcomed the utilitarian value of understanding how mortgages work as a potential, future home buyer. She later connected this knowledge as valuable to future holders (herself and her peers) of student loans and credit cards. (SJ #17, 4/17/09) Her comments about taking this learning out the community and reactions to the unit, on the other hand, suggest a political stance of helping or advocating for people to understand and defend themselves in the face of the precarious nature of interest. In journal #16, Marisol wrote that the purpose of presenting the work of mortgages was to inform the community that “there’s people that are out to get people that are not well educated or well-informed so they can [get] money of them.” Building on this thread of political action, in her reflections on the community presentation she said, “I was happy to know that our class was helpful to the communities. I learned to be able to think about what am I going to do to further help my community.”

Marisol had a similar trajectory in the elections unit as well. That is, her understanding of the mathematics was initially shaky but over time and collectively with her peers, Marisol’s self-reported understanding of the mathematics improved (Journal Entry #4,

10/03/08). Concomitantly, her mathematical and socio-political engagement grew over the course of the unit as a first-time voter and politically conscientious youth. For example, she reported to Rico and the class on 10/14/08 that she had just canvassed for then Presidential Candidate Obama over that weekend asking people to vote early in two nearby states (CRFN, 10/14/08). She participated as a Democratic judge in her precinct on election day (11/4/08), and described being excited to vote for the first time (SJ #6, 10/17/08). In her reflections about the then-upcoming “big presidential” election of 2008, she stated the following:

I guess when it comes to voting it’s something personal. But it has been proven that the exit polls are fairly close to the actual votes for each candidate. So, I think the best thing to do is watch the news and keep track of the data that is given to the public because we don’t want this election to be stolen....I’m already helping out going to be a democratic judge for November 4th Election Day so I’m going to be alert of the things that go on in my polling place. Making sure people do come and I help them vote and making sure that their vote is heard. Well if something strange was to happen on election and we were to do the math and we got some odd numbers like in Bush situation. Then I believe we should go public and speak of the math we’ve worked on. (10/17/08)

In this journal entry, Marisol connected the role of mathematics (exit poll data) with the class’ role in denouncing any potential wrong-doing. She stated her role of watching out and helping ensure everyone’s “vote is heard” and accounted for. As a class, if the numbers did not add up, they could use the mathematics that they had learned in class to then go public. As a first time voter (poll-watcher and canvasser), Marisol demonstrated a lot of agency and desire to help elect the first African-American President—she was writing the world.

In summary, Marisol was committed to her education: she was concerned about making the grade in high school and being prepared for college. Her confidence in doing mathematics was tenuous but with the right conditions of time and support, she could grasp it. She had a strong justice orientation, enjoyed being a part of change, and came to see mathematics as a relevant, useful practice in understanding her social and political reality. In her end-of-year survey, she wrote that the class experience had changed her in the following way:

Well, in a way yes, because I understand that in order to make things better people need to be involved and teach one another and this was a one time class opportunity that I got to learn math in a different perspective that includes real life issues around the world.

8.4.3 On Learning Traditional, Reform-Oriented, and Math for Social Justice

When I interviewed Marisol, four years after she graduated Sojo, she had just received her B.S. in Media with a focus in Advertising from a very selective⁵⁵ (CCSR, 2008), large public university. She was enrolled in a Master's program for International Marketing Communications for the fall. She hoped to get into account planning where she could create and market advertisements specifically to Latino and African-American communities. Although initially she thought about pursuing law, she found a particular fascination with how advertising campaigns work. Additionally, this was an area where she could be creative and interact with people in a more positive light. In her view, this involved more basic mathematics and at a more peripheral level (eg. cost of purchasing ads). Below I share her

⁵⁵ I use the Chicago Consortium on School Research (CCSR) definition of levels of selectivity with *very selective* being the most and highly competitive among four year colleges.

reflections on her mathematics experiences at the *Very Selective University* in light of her experiences with IMP and M4SJ.

Marisol distinguished between three types of math: math that is just numbers and formulas (traditional school mathematics), math with scenarios (real-world or IMP), and math for social justice. In reflecting on IMP and M4SJ, the latter two, she compared them as follows:

I remember reading problems and what I like about Rico's class was versus IMP was the fact that we got to use math to solve real-life issues. That's what I really liked about the class versus IMP. I remember we had to do something with the pendulum assignment and I was like ok but what I liked about Rico's class, it had the field of social justice issues incorporated with math showing that numbers don't lie and obviously minorities at the end of the day, they tend to be kind of, they get the short end of the stick sometimes, sadly.

Marisol insinuated here that Rico's class (M4SJ) was focused on real issues with real numbers (that don't lie) that exposed the inequities for people of color. Learning about 'minorities' was important to her. In her end-of-year survey she identified the most important learning for her was their work on HIV-AIDS and the mortgages because it "dramatically impacts us as a 'considered minority'". In contrast, the IMP unit on pendulums⁵⁶ did not stir up in her much of a reaction beyond a dispassionate 'ok'. She saw the M4SJ different because "it was really focused on social issues versus learning like people making up

⁵⁶ IMP Year 1 Unit entitled *The Pit and the Pendulum* uses Edgar Allen Poe's story as a backdrop for the mathematics (Algebra and Statistics). Students explore the pendulum period as a function of its length.

scenarios and story lines.” Among the 9+ hours of mathematics⁵⁷ she had to take at the university, she described one course as ‘world math’ in which they created mathematical models for real-world topics but not related to social justice. She described this class in the following way:

Although it was interesting, it really didn’t focus on social issues because I’m pretty sure if a social issue class that was based on math at [*Very Selective University*], I would have totally taken it because I’m familiar with it and I’m sure the topics would have been different and my understanding of how I see the world would have probably changed once again.

In essence, she demarcated here a key difference between real world but “ostensibly apolitical” topics and politically relevant topics (Gutstein, 2006). Whereas she described the ‘world math’ class as interesting, it did not and could not influence her “understanding of how I see the world.” Hence, beyond just being “familiar with” social justice-oriented mathematics, she would have opted to take a like-minded math course because of its perspective-changing power. I interpreted her use of the word *again* to indicate that this was the effect of her M4SJ experience. Certainly, she indicated in her survey reflections (mid-year and end-of-year) that the class changed her view of the world and the role mathematics had in exposing social injustice.

Beyond this ‘world math’ class that involved real world, apolitical contexts, Marisol experienced her remaining math course in a decontextualized, traditional format. She shared

⁵⁷ She told me in the interview that her degree major required 9 hours of mathematics and since the first non-credit bearing course does not count towards this requirement, I assumed that this meant she ended taking over the 9 hours requirement.

with me her struggles with understanding the material when it was only numbers and formulas.

It was more comfortable for me to choose those classes [world math] because that was something that I was familiar with from high school versus when I took the intro. Not even the intro, it was the algebra course that was not even for college level. Um, it was challenging for me cause I knew I'd seen it before...but math was never my strong, my strongest point, so I was definitely there at the TA's like asking them, getting tutored by different type[s] of programs on campus that were offered and it was a struggle. It was a struggle.

She began by comparing the world math, a comparable course to IMP, to the non-credit bearing remedial course of Algebra (not even the intro) that was a real struggle causing her to access multiple avenues for tutoring. She went on to state that she had “never got[ten] a text like that [algebra] in high school so I was kind of like this is gonna be a hard semester for me. Like that one class is gonna make my life unbearable.”

8.4.4 College Struggles with Math

For these reasons of struggle and unfamiliarity, Marisol believed that Sojo should have perhaps taken a traditional route for their math curriculum given that this is how most colleges approach. It was certainly her experience where she attended. Marisol's reflection about IMP was that it was an ‘experiment’. The purpose in her view and appropriately so was that they were “being taught in a different way” to see if the IMP approach was “gonna make students understand math in a different perspective and do well in it; exceed.” Her opinion was that the teachers taught it well but they “were also learning themselves.” It was not until she got to college that she felt a strong disconnect between learning mathematics in context (*with stories and scenarios*) and learning mathematics abstractly with symbols (*numbers and*

formulas only). She could not make that transition from learning in context to the pure mathematical abstractions that permeate college math courses. She felt at a disadvantage in math and recommended that high schools like Sojo emulate similar-type approaches to learning mathematics.

Marisol certainly took it upon herself to seek out the help she needed and despite starting one class behind in college-level mathematics, she managed to push through 9+ hours of mathematics and graduate within 4 years. From non-selective high schools in her district, this represents a small percentage (CCSR, 2008). For her, accessing the resources (tutoring) she needed to get through these courses were critical. Her advice for other students was to “go to office hours, go talk to your professor because it’s crucial if you’re lost...you’re probably gonna fail the class. More than likely, you’re gonna fail.” This particular exchange in which she described the advice she would give present high school students that struggle with mathematics went as follows:

Take those extra [after school] hours and...sit with the teacher until you understand it because it’s not hard; it’s just a matter of understanding the material, understanding what the numbers mean and like proceeding on to the next level and seeing what else you could do with it.

Interestingly, Marisol stated that if one is willing to put in the hard work, “it’s not hard.” This is certainly a different stance than she had about, for example, Calculus where one had to be a genius or brilliant to excel at it. Marisol demonstrated tenacity and perseverance in getting through the required math course. It may be that her determination to get through the courses with sufficient help substantiated on some level her own confidence and capacity to understand abstract mathematics. This narrative, however, was contested throughout the data. It is beyond the scope of this study to have a sense of how much of her mathematics experiences with real-world scenarios and social justice issues played into her

ultimate success in traditional, college-level math courses, if any at all. It could also have been her strong identity as a successful student that carried her through.

It is also striking that she commented about “proceeding on to the next level and seeing what else you could do with it.” Potentially here she meant beyond manipulating numbers and formulas, let’s see what else we can do with the math. Her experiences both with IMP, M4SJ, and the world math would have certainly contributed to her seeing that more can be done with math. This is a contrast to much of the literature expounding students’ views within an acquisitionist pedagogy that math is just rules and procedures.

Although her recommendation for Sojo math teachers to approach their teaching traditionally was based largely on her experiences with IMP, I did ask her if she felt that what she experienced in the M4SJ helped her but again the translation was lost. She contended, “it was more like an experience” because there was no math for social justice correlate at the university. Marisol was of the opinion that while students did take the learning in the M4SJ class seriously, “everyone that was there, was there more to learn what social issues happened around the world” inferring that the socio-political aspect of the class was the real draw for students. Whether or not this is accurate, it represents her perspective which is an indication of how little of the mathematics learning she felt she was able to actually carry over into her college math experiences.

8.5 Summary

My goal in sharing students’ narratives was in part to illustrate students’ mathematics trajectories through their engagement with the M4SJ, through their college math experiences, and then-present and future goals for themselves. I only wish to highlight a few connections (there are many) across these three stories and in relation to the other participants.

For Monica and Calvin, their engagement with the mathematics proved to contribute to their understanding of how mathematics as a disciplinary lens can serve to understand relations of access, inequity, and power. While this was true to some degree for Marisol, Calvin and Monica's future goals (as mathematics middle teacher and research scientist) potentially facilitated not only their stronger engagement with the class but also their disposition towards mathematics as an important disciplinary tool for reading their world with mathematics. While both Marisol and Calvin shared struggles with college-level mathematics, Calvin reconciled his understanding and beliefs around how mathematics should be taught given his learning that mathematics can be connected and his need for it to be connected in relation to his science interest. In other words, in wanting to understand scientific phenomena, engaging with mathematics as a connected fashion helps facilitate his understanding of science. He was not learning mathematics for the sake of learning it but rather because he goals for learning science. Marisol would have preferred the "world math" because, as she stated, she was familiar with it. In confining learning mathematics to a school subject, she reconciled her struggles with college-level math by concluding that high schools should prepare students for being able to learn more math in school. These are different orientations to the subject given their particular interests and career paths.

In addition, as a future teacher, Monica was able to incorporate her learning mathematics conceptually from M4SJ class precisely because her teacher education program called her to re-engage elementary mathematics in a deep, conceptual manner. For Monica, given her desire to teach as a form of giving back to her community, she also saw how mathematics could potentially help her and her future students engage in critical mathematics as well even if not initially as she became more comfortable with the demands of teaching. Particularly for Monica and Calvin, it was significant that they learned mathematics as connected and revelatory for understanding social reality; even though for Monica it was

about the issues it exposed whereas for Calvin it was about experiencing mathematics as meaningful in terms of connecting to something he could see or imagine. I am not suggesting that this connection to the world or social phenomena was not important to Monica as the class data completely supports this as an important feature. However, for Monica, mathematics remained largely a school subject and not something she integrated into her worldview in a dominant way.

It also struck me that for both Calvin and Monica, their entrance into the class was not by way of the teacher but rather through a programming mistake and the assistant principal, respectively. I am not suggesting that Rico did a bad job in recruiting students but rather that students with different socio-political orientations beyond the community protector or hopeful alderman also have a great deal to gain from engaging in a class aimed at using mathematics to examine, critique, and ultimately transform their world.

9 DISCUSSION

In this chapter, I return to my research questions that guided this investigation

1. *How did students experience attending a school focused on social justice? What aspects of this experience were most salient in students' narratives?*
2. *What meaning did students make of their experiences in the M4SJ class? What aspects of the class and their experience held salience for them? This includes reflections on the class learning with respect to experiences after high school including but not limited to post-secondary experiences, career goals and general life events.*

Below I summarize the main findings of this study with respect to the meaningful aspects of a social justice education that 13 study participants identified in their experiences attending a school focused and founded on social justice values and in using mathematics to unpack issues of social and political import for their communities. I then offer implications that the findings suggest are critical for neighborhood schools and teachers, teacher educators and mathematics education research in relation to engaging a humanizing pedagogy and a humanizing mathematics. I conclude with a few final thoughts.

9.1 Critical Care

The number of studies in the literature that speak to the salience of caring teacher-students' relationships for young people of color is growing (Thompson, 1998; Rolon-Dow, 2005; Antrop-Gonzalez & de Jesus, 2006; Pizarro, 2005; Franquiz & Salazar, 2004; Garza, 2009; Valenzuela, 1999; Cammarota & Romero, 2006). Much of the research in critical and authentic care has largely come from researchers' attention and exploration of students' perspectives and reflections on strong models of classrooms and education emanating from their schooling experiences. This study was carried out in a similar vein. The aim of this

study was to explore students' perspectives and reflections of their schooling experiences. If I had chosen to look at only classroom data (surveys, classroom videos, fieldnotes), I would have not discovered the salience that care held for students. The interviews, hence, served as an important methodological tool to place students' voices, perspectives, and experiences at the core of this study.

The concept of developing caring teacher-student relationships begins with building humanizing relationships based on authentic care (Valenzuela, 1999) and mutual trust and respect (Freire, 1970/1999; Franquiz & Salazar, 2004). Students interviewed for this study identified ways in which they experienced teachers *caring* for them. For students, it was significant that teachers invested their personal time to support and motivate them to do well in school and beyond. This study confirms what other Latin@ scholars have documented in the literature—for students of color, it is important for teachers to connect with them in personal and intimate ways. For example, Gema reported this as opening up the path for her to connect with them. As Minerva reported, caring teachers enabled them to create a space in which students were allowed to flourish and be themselves.

I also argue that critical care in this context was very much about the curriculum centered on social justice. Students identified the social justice focus of the school curriculum as making the learning more relatable and interesting. Anecdotally speaking and in my own experience, there can be an initial trepidation to engage students with topics of injustice due to the belief that students will feel disempowered. The data from this study suggest the opposite. Students felt empowered to see themselves as social actors in the world like Ann who believed she actually learned too much in high school. Contrastingly, she felt disempowered when she went to college and learning was disconnected and dull. In Antoinette's case, she was learning about issues that she *really* cared about—issues about race, sexism, and language status. For others like Calvin and Minerva who explicitly stated

little interest in social justice, they too experienced learning as interesting and relatable. Their lived realities were the textbook (largely) and consequently students claimed to have become more aware and more prepared to engage with the world on a socio-political front.

Moreover, the students' voices in this study serve as a counter-narrative to the notion that young people of color do not care about their education. The evidence from this study points to the notion that students are cognizant of whether their teachers are genuine and authentic in relating to them. For many students interviewed in this study, they were convinced that one could not find a more caring staff. For other students, many with a strong justice orientation, saw the social justice mission of the school as carried out by the teachers as a form of care. That is, caring took on the form of caring for students' lives, their families' livelihood, and their communities' survival. For these reasons, many believed this school was the best option for them precisely because of the authentic care they experienced from their teachers.

While students' accounts of having caring teachers were overwhelmingly positive, the students raised significant issues that can contribute to schools' complicity in the socio-cultural reproductive function of schools (eg. Bourdieu & Passeron, 1977) even within the context of a school born out of struggle. These student critiques of the school challenged the notion of caring. For example, Renee challenged the school's decision to suspend some students for engaging in activities (eg. Repeated fighting) that, from her perspective, should be expected and Roxanne questioned the role that caring relationships played in raising/lowering teacher expectations of students. This is not meant as a 'dis' on the school but a challenge for all educators engaged in building strong schools to continue to push ourselves to address all students' needs seeing each one as a human being in which investing has great value and import.

9.1.1 Anti-Black Racism

The students who participated in this study are all Latin@ with the exception of Jenny, an African-American female. However, the particular context of the creation of the school gave rise to an initial student body that was 70% Latin@ and 30% African-American. The M4SJ class demographics mirrored those of the school. I shared in Chapter 4 (School & Community Research Context), several incidents detailing the horrific experiences that many Black students had to confront traveling from their mostly Black neighborhood to attend school in Little Village, a primarily Mexican immigrant community. The school administration and staff tried to address the issue of racial discrimination and tensions that existed between students across racial and ethnic lines in various ways. They were minimally successful although several study participants acknowledged the active role that the school staff played in trying to confront the tension.

It is important to resist a romanticized notion of cross-racial solidarity when there is a lot of work to be done in challenging the existing rifts between the Black and Mexican community. Anti-black sentiment is more than competition for low-paying jobs in a diminishing labor market or misconceptions of the ‘other’ due to lack of interactions (as some students in the study suggested). It is telling though not surprising that even prior to the opening of the school, members from both communities foreshadowed issues between both groups. It is not a *natural* reaction for this to happen but rather symptomatic of the reality that “anti-Black racism...is a pervasive and historically entrenched reality of life in Latin American and the Caribbean” (Hernandez, 2007, p. 38). Hence, Latin@ immigrants often come to the U.S. with racialized notions of African-Americans.

Schools are optimal places to begin addressing anti-Black sentiment. This was most notable in the perspectives of students like Vanessa who saw the plight of Latin@s and African-Americans as a common struggle against capitalism and racism. She came to realize

this through her experiences at Sojo and in the mathematics research crew. In this way, students' experiences at Sojo illustrate some concrete ways in which schools could begin to unpack and tackle racism. It is important and not lost on students when the school day routine gets interrupted to immediately attend to issues impacting students' emotional and psychological well-being. Additionally, the curriculum proved to be a reasonable and powerful avenue for exploring common experiences and cross-community conflict. When students learned about ways in which both of their communities were being displaced at the hands of corporate greed, they saw the power in building alliances across communities. Given the hyper-segregated divisions in a city like Chicago, these evolving perspectives are critical.

9.2 *Rigor and Interdependence*

A second major finding in this study is the degree with which students engaged in the M4SJ class. The M4SJ was for many interviewees a class that stood out among their previous schooling and educational experiences in terms of their rigorous and collective engagement with the mathematics. Students described the class as involving their hearts and their minds implicating a more committed level of engagement that from their perspective was largely facilitated through their interdependent ways of working together and the curricular context. The teacher's role was certainly influential in that he held students to high expectations by calling on students to take responsibility for their learning and insisting that students look to one another as intellectual resources. Concomitantly, students took up the challenge to engage with the class material and with one another in rigorous ways.

Much of the research literature focused on the paradigmatic shifts (Ellis & Berry III, 2005) called for in reform-oriented mathematics classrooms has outlined a similar community of practice (Lave & Wenger, 1999) as the one highlighted in this study. Reform

efforts in mathematics education have called for such shifts in the role of the teacher and student such as the teacher's facilitative role in learning (Clarke, 1997), students' engagement with the conceptual underpinnings of mathematics vis-à-vis problem situations (Hiebert, 2003), and equitable access to rich mathematics through shared responsibility among heterogeneous groupings with group-worthy tasks (Boaler, 2008). Notwithstanding, this is not a call to use socio-political contexts as a prescription to get students to act in ways consistent with NCTM's call for reforming mathematics instruction. While they can certainly support one another—reform pedagogy and socio-political contexts—the goal of learning mathematics in this study facilitated students' understanding about their communities and about the world. The directionality in reform-oriented classrooms differs in that the problem contexts function to facilitate students' understanding of mathematics. This distinction is not insignificant.

9.3 Socio-political and Mathematical Relevance

I shared in Chapter 4, the first generative theme that arose from students' immediate and particular context regarding the then-State Senator's contestation of the schools' boundaries in effect contesting African-American students' rightful place on the school campus. From this issue, our research team (Rico, myself, and two math teachers) came together to create, *The Boundary Project*, which teachers subsequently implemented in all of the 9th grade classes. The driving question of this unit—*What is a fair solution for both communities?*—led students to examine census data and school access in both communities. Without rehashing the details again here, I share a few points about the context to highlight a promising relationship between engagement with mathematics learning and social justice.

During their 9th grade year, students were in math class for 100 minutes a day, four days a week, with one 10-minute break at the mid-way point of the class. On the first day of

the boundary project, for the first time that year (this took place in January of 2007) students continued working through the math project even when it came time to take a break. This indicated to us (Rico, myself, and two math teachers) that there was something more interesting to students about the boundary project than any of the learning that had taken place heretofore. I contend (as we did then) that students were in fact *more* engaged in the project because it attempted to address an issue emanating from their immediate conditions. The project aimed to explore and mathematize the extant realities of Black and Brown students vying for educational access. While the community narrative portrayed Black students taking Mexican students' spots, the students determined that both communities were in dire need of better quality high schools—this issue as a first generative theme demonstrated their common struggle for a quality education. (Gutstein, 2007)

I share this anecdote to situate my findings in documenting students' experiences with using mathematics to investigate their lived reality. From the collection of stories, anecdotes, and data, I found that for the working-class African-American and Latin@ youth in this context, three things mattered—relationships, context, and justice.

As highlighted in Chapter 5 on the salience of teacher care, the M4SJ was no exception. As I mentioned at the end of that chapter, the ways in which students described their teachers as caring could have easily been attributed to Rico's status in the school and class as well. In this way, I contend that the M4SJ class was an instantiation of critical care in that the curriculum was designed by, with, and for students to use mathematics to better understand issues of justice impacting *their* communities. Overwhelmingly students spoke about the uniqueness of the class with respect to having to think through the work themselves as Rico was not going to tell them the answer. In asking them to grapple with the material, he also took responsibility for his role as facilitator, as tutor, and in supporting students to use their knowledge to write their world. Students signed up for the class in large part because, as

they often shared, “it was Rico.” Some students were more explicit about what this meant but in essence it was about his commitment to social justice, his commitment to them and their communities, and for some, it was the fact that they had the opportunity to take a college-level math class.

Students overwhelmingly spoke about the mathematics units being real-to-their-lives. Whereas the goals of many problem-based and reform-oriented curricula try to engage students with realistic problem contexts, the reality is that many of these contexts are far removed from students’ lives (Gutstein, 2006). As Marisol stated in her mid-year survey, she thought the class was “only going to based on problems but we are actually digging out the truth about how people are crooked and it affects everyone.” Hence, she took the class largely because she wanted an experienced teacher and she wanted the experience of being in a college-level math course. To her surprise, they were using mathematics to actually find the truth about situations involving data and mathematical analysis. In the mid-year survey, students were clear about why Rico taught the way he did was many affirmed that they thought he wanted students to see how math can be related to the world. They commented on this approach as being an effective way to *understand* “higher-level” mathematics and experience mathematics as a helpful analytic tool in not only reading the world, but also writing it.

It would be a stretch in my mind to think that as impassioned as students were about sharing their learning about mortgages with their communities, sharing, for example, the best cell phone plan could have incited the same degree of passion and commitment. The data evinced that the mortgage project was about students’ indignation that their community was being duped. (In)justice and the communities collective outrage at the district disrespecting our community was in fact what drove a group of vexed parents to resort to a hunger strike. Housing like education are human rights and should be treated as such. I contend that this is

why the mortgage project was so salient for students. It was a clear and unequivocal sign of injustice. This is what the mortgage unit was able to draw on—students’ strong sense of justice that many of them had even before having experiences at Sojo.

9.4 *Implications for Future Research*

9.4.1 Schools and Teachers

The most important implication for schools and teachers is to create environments that first and foremost build instrumental relationships (Antrop-Gonzalez & de Jesus, 2006) with students—that is, relationships that are based on authentic care (trust, respect and love), high expectations coupled with adequate support systems. Students probably more than any other population are most preoccupied with their education and the ways in which school personnel do and do not support them. This is in stark contrast to the ways in which low-income students of color are typically type-casted by adults as not caring, apathetic, and disinterested in school. Quite the contrary, the participants in this study often (surprisingly) spoke of their school and their teachers in comparison to how they have experienced themselves and have come to understand schools and teachers to not care.

Another implication from this study’s findings, is that low-income students of color are indeed interested in issues of social justice. While this finding was true for these students, I do not claim to know this with certainty for other contexts although there is a growing body of scholarship in critical pedagogy that supports this view. The larger point is that if teachers can focus on building authentic and instrumental relationships with students that move beyond the teacher-subject-student triad to a more humanizing pedagogy placing the human relationship at the center, students will indeed share their deepest felt interests and concerns with respect to education, curriculum, learning, and more.

Study participants pointed to directly and indirectly to the idea that in certain classes and certainly for the M4SJ class, the focus of study was not a textbook but their lives. This was significant for them and I repeat, because it showed them that their lives mattered and their teachers cared enough to put their lives in the curriculum. In this way, schools need to build in structures that enable a humanizing pedagogy to take place despite the obstacles and quite frankly attacks that schools are under. I am not advocating to stop teaching the content. In fact, I agree with Marilyn Frankenstein's insistence on teaching more content! (Frankenstein, 2012)

And finally, schools do not have to be born out of a community struggle to engage values of social justice. Teachers do not have to belong to a cadre of social justice educators (though it would help) to begin learning how to teach mathematics for social justice. There are a number of resources available to start small most notably Rethinking Mathematics and radical.math.org for ideas on short projects. This study and many referenced within mathematics and other disciplines offer pedagogical strategies that can aid in successful implementation of such projects. Change may be small but it will not be insignificant. I end this section with a quote by Freire (1970/1999) on his understanding of how building up students' consciousness occurs implicating that starting small is probably exactly where one needs to begin.

Students, as they are increasingly posed with problems related to themselves in the world and with the world, will feel increasingly challenged and obliged to respond to that challenge.... Their response to the challenge evokes new challenges, followed by new understandings; and gradually the students come to regard themselves as committed. (p. 62)

9.4.2 Teacher Educators

The study participants are correct in stating that teachers in many schools act like they do not care about young people much less about their lives. In my work as a mathematics facilitator, I have come across many kinds of mathematics teachers including the kinds of teachers that the study participants inadvertently admonished in comparing their caring teachers against the norm. I have also come across many mathematics teachers that simply do not understand why they need to change and instead blame young people for their apathy and disinterest. This group also includes well-intentioned, even teachers that students identify as caring but continue to teach to a test that has everyone convinced (including students) that this one score will determine their future probability of success. Now there is a good mathematical unit to investigate and transform because it affects millions of young people, of all races and ethnicity that come from low-income backgrounds.

In thinking about the implications of this work for teachers throughout districts across the country that are in front of students lecturing about factoring polynomials and imaginary numbers, I challenge myself and other teacher educators to consider how to begin to close that gap. How do we change teachers' deeply ingrained belief systems about change, about the nature of mathematics, and toward the multidimensional mathematical classroom (Boaler, 2006) in which students community knowledge and ways of participating are valued in equitable and accessible ways—much like the M4SJ classroom? What types of projects might contribute to teachers' political and ideological clarity around the purpose of school in relation to the wrongs of society and beyond individualistic measures of success?

One implication for teacher educators is to share students' stories about their engagement with rich mathematics in learning to understand inequity and injustice in their communities. In part, this serves to demystify the strong relationship between mathematics and social justice and the notion that this will somehow further alienate students imposing

fatalistic notions of their communities. This intimates a community and students without agency and counter to what this study revealed about students' sense of agency, for some beginning in middle school (perhaps even sooner). Beyond stories, it is also imperative to engage future teachers in exactly the same kind of realization that the students' narratives in Chapter 8 revealed. That is, students saw that mathematics is connected (it does not have to be made up) and that it can serve as a viable and sometimes necessary analytic tool for understanding and fighting oppression. If teachers (future and current) are to see the true formatting power of mathematics (Skovsmose, 1994), they must experience it themselves.

Another critical implication for teacher education is to explore this notion of care and how teacher candidates and practitioners understand care as a function of schools. While critical, it is at the same time a challenge to engage teachers is what at the surface appears to be an emotional sentiment and not socio-political. I found a humanizing pedagogy to be a useful framework that is indeed about our relations of power that exist in the world that create and sustain inequity across the planet. We must continue to create opportunities in preparation programs that evince education as a political act while also incorporating literature on the construct of a critical care and students' perspectives regarding its salience.

9.4.3 Mathematics Education Research

As mentioned in the methodology section, this study as part of a larger collaborative study generated a great deal of data on this one class. My study focused on students' perspectives drawing heavily on interview data and student non-mathematical work (surveys and journals). As a research team, there is so much more to be analyzed and synthesized for varied purposes. For example, investigating the dialectical relationship between socio-political analysis/learning and students' mathematical engagement and development is important future study that would contribute to helping teachers and teacher educators create

mathematics curriculum based on students' generative themes. With 40 class sessions videotaped, this study has the potential to generate more knowledge around the pedagogy of teaching math for social justice and the challenges. Moreover, consistent with students' elevation of the importance of care, analyzing the class dynamics for how care was enacted would be another contribution to a humanizing mathematics. Along this concept of care, I share two end-of-year survey reflections, one by Antoine the aldermanic hopeful and the other by Calvin, the scientist. I share them precisely because of their different explicit stances on care but more curiously, their stances on care in opposition to their justice orientations.

Antoine: The one thing I did not like was how Rico will assume that we should care for the issues.

Calvin: I liked how we all cared about the topics we covered. Everyone had the desire to learn and investigate.

9.5 Final Thoughts

For me, engaging with this project as an educator and researcher has been invigorating and transformative. In my final thoughts, I turn to Skovsmose's call for an excavation of mathematics that makes "explicit the actual use of mathematics hidden in social structures and routines." (Vithal, 2003, p. 8) His argument for revealing the formatting power of mathematics was based on the premise that mathematics "produces new inventions in reality, not only in the sense that new insights may change interpretations, but also in the sense that mathematics colonises part of reality and reorders it." (Skovsmose, 1994, p.42) The hidden nature of mathematics in re-ordering our reality could not be more evident than in the case of the mortgage crisis that students studied. Antoinette, the community protector, called it in her synthesis of the two debt-related equations on home mortgages ($\$150,000 - \$291,000 = \$92,000$) and 3rd world debt ($1 - 6 = 4$) when she noted that in this country, debt is the magic

word. This example was an instantiation of using mathematics to expose the nature of debt and as other students highlighted the ways in which the rich stay rich and the poor stay poor. For reasons of exposing the formatting power of mathematics and the ways in which it serves to re-order reality, I agree wholeheartedly with Gutstein (2016) that “it is insufficient to *just* teach and learn mathematics in mathematics class, given where humanity finds itself.” (p. 34) In this manner, I cannot teach students mathematics nor teach educators to teach mathematics. I am inspired and re-invigorated to join critical pedagogues in our collective struggle to survive with dignity.

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APPENDICES

APPENDIX A

INTERVIEW PROTOCOL

Main Questions and Probes

1. How would you describe your high school, in general?

Probes

In reflecting about your experience at Sojo, are there aspects that were particularly strong (academically, socially, personally).

Would you recommend the school to a neighbor or a sibling? Why or why not?

Are there aspects of the Sojo program and your high school experience that you are most proud of? Provide examples.

Are there particular departments or teachers that you believe were exemplar? Explain (identify students' criteria for rationale).

Are there aspects of the Sojo program that you believe should be improved upon and/or completely rethought? Explain (identify students' criteria for rationale).

2. What role does mathematics play in society?

Probes

What kinds of mathematics do you use in your daily life?

Describe a situation outside of school where you needed mathematics that you didn't understand?

Describe a situation(s) outside of school where mathematics was helpful?

Do you think mathematics is necessary to lead a successful life? Explain.

For what kinds of things is mathematics useful? (make sure to move beyond career-related responses)

What kind of mathematical knowledge do you think is important for children in NL and LV to possess and why?

Is there power in learning and knowing mathematics? Clarify how you define power.

3. How would you describe your mathematics experiences prior to engaging in M4SJ?

Probes

What kinds of content did you study?

How did you engage in mathematics? What did it mean to learn and know mathematics?

Describe a couple of activities and/or instances that stand out for you from these classes (positive and/or negative).

Did you feel you were learning important mathematics? Explain. Provide some examples.

What would you say is the most important thing you think you did and/or learned in the mathematics that you still carry with you today? Explain.

How well do you think the math program/dept (IMP) prepared you for your future/present goals? Explain with specific examples and detail.

APPENDIX A (continued)

4. How would you describe your experiences in learning mathematics for social justice?

Probes

What kinds of content did you study?

How did you engage in mathematics? What did it mean to learn mathematics?

Why did you choose to enroll in the Math for Social Justice class over the other choice of Pre-Calculus? What were your expectations of this class? How well were these expectations met or not?

Describe a couple of activities and/or instances that stand out for you from these classes (positive and/or negative).

Did you feel you were learning important mathematics? Explain. Provide some examples.

What would you say is the most important thing you think you did and/or learned in the mathematics that you still carry with you today? Explain.

How well do you think the math program/dept (M4SJ) prepared you for your future/present goals? Explain with specific examples and detail.

5. What is your vision for school mathematics?

Probes

What is the purpose of mathematics in schools?

Should the purpose of mathematics be the same in all schools (across class and race)?

Are certain students better than others at mathematics?

Does gender, class or race have anything to do with how well a student is at mathematics?

Is mathematics an important subject for *everyone* to learn? If so, what would it take for all students to be successful at mathematics?

Are there certain things that a teacher should and shouldn't do to support a student in mathematics?

Is there a role that other people (other than school personnel) can play in making school mathematics accessible and worthwhile?

APPENDIX B

Sample Journal

Mathematics for Social Justice—Sojo, 2008-09—Mr. Rico, HW, Journal #12, Due

2/24/09

Ok, you haven't had a journal HW for a while, and, in fact, the only HW you've been doing is the project. So I'm giving you a journal, due on Tuesday.

I'm asking you to do two parts here. Neither will take that long, but I really want you to take both parts seriously and put your mind/hearts into them. What you say/write is extremely important to our collective learning. As I've said more than once—we are trying to “make the road while walking.” That is, we are trying to learn about reading and writing the world with mathematics, while we are doing it in class! There are no “books” like IMP to teach us how to do this—in fact, we are writing the book, collectively, as a class. We are creating knowledge about this, as we work together, doing it.

Part I.

Read the article about what people are doing to resist foreclosure evictions. Connect it to our unit and project. What connections do you see? What are your questions? Where and how are you reading the world with mathematics in this project/unit, and how do you use math to read this newspaper article?

Part II.

As you know—a big emphasis in this class is on your understanding of the math. Are you understanding what we're doing? Why or why not? Do you think you need to understand the math to be able to do it? What should we/I be doing to better support your understanding of the math?

VITA

PATRICIA M. BUENROSTRO

EDUCATION

- 2016** University of Illinois, Chicago, IL
PhD in Curriculum & Instruction, Mathematics Education
Dissertation Title: *Humanizing Mathematics: Students' Perspectives on Learning Math for Social Justice*
Committee Members: Eric (Rico) Gutstein (chair), Danny B. Martin, Nilda-Flores Gonzalez, Joshua Radinsky, Erin E. Turner (University of Arizona)
- 1997** University of Illinois, Urbana-Champaign, IL
B.S. in Mechanical Engineering

TEACHING & SUPERVISORY EXPERIENCE – POST-SECONDARY

- 2013-2017** Teacher Preparation Program - Northwestern University - Evanston, IL
University Supervisor
Supervise teacher candidates in secondary mathematics during their Field Experience; Participate in local assessment of licensure portfolios (edTPA)
- Fall 2012** College of Education - University of Illinois at Chicago - Chicago, IL
Graduate Assistanship – CI 342: Teaching & Learning Mathematics
Methods course in teaching mathematics for elementary education pre-service teachers with corresponding field experience.
- 2009 – 2014** College of Education - University of Illinois at Chicago - Chicago, IL
Graduate Assistanship – ED 194: Special Topics in Education
Reform-based Mathematics class designed for pre-service elementary teachers with low math scores (Fall 2009, Fall 2010, Fall 2014)
- College of Education - University of Illinois at Chicago - Chicago, IL
Graduate Assistanship – CI 507: Teaching & Learning Mathematics
Graduate-level methods course for practitioners

TEACHING EXPERIENCE –SECONDARY

- 2012-2013** Rudy Lozano Leadership Academy - Chicago, IL
Mathematics Instructor
Algebra I and Financial Literacy Courses
- Spring 2012** UIC College Prep - Chicago, IL
Mathematics Instructor
Freshman Algebra Recovery Course
- 2008-2009** North Lawndale College Prep High School - Chicago, IL
Mathematics Instructor
Algebra I & II and Geometry

- 2001-2005** Young Women's Leadership Charter School - Chicago, IL
Mathematics Instructor
 Taught mathematics courses (8-12), established Family Advisory Council, Mentor Teacher, Professional Development Coordinator for staff of 30+
- 1997-2000** Nuestra America Charter School - Chicago, IL
Mathematics Instructor
 Taught reform-based mathematics curriculum in grades 9-11
- 1993-1995** Latino Youth Alternative High School - Chicago, IL
Mathematics Instructor
 Taught pre-algebra, algebra, and geometry courses

TEACHING EXPERIENCE – COMMUNITY-BASED ORGANIZATIONS

- 2014-Present** The Fellowship Initiative – Chicago, IL
Mathematics Instructor
 Facilitate Problem-solving mathematics activities for 40 male youth from low-income communities of color
- 2011-2012** Instituto del Progreso Latino - Chicago, IL
Citizenship Instructor
 Civics & ESL for adults preparing for the USCIS Citizenship Interview
- 1996-1997** Erie Neighborhood House - Chicago, IL
Parent Organizer
 Facilitated leadership training for parent groups at 6 elementary schools
- 1996** Erie Neighborhood House - Chicago, IL
Math & GED Instructor
 Basic Math to adults in Banking Program and GED classes to young adults

PROFESSIONAL DEVELOPMENT EXPERIENCE

- 2013-Present** Network for College Success – University of Chicago - Chicago, IL
Mathematics Educator Consultant/Coach
 Facilitate implementation of Common Core Mathematics Standards in non-selective enrollment, neighborhood schools within Chicago Public Schools
- 2013** Network for College Success – University of Chicago - Chicago, IL
Practice-Based Inquiry Educator-Participant
 Data-driven investigation of teaching and learning at host school
- 2006-2008** Chicago High School Redesign Initiative – Chicago, IL
Mathematics Lead Facilitator – Authentic Intellectual Work Project
 Facilitated mathematics teachers through development/use of authentic instruction-based rubrics

- 2000-2001 Council for Teacher Education - University of Illinois at Chicago - Chicago, IL
Mathematics Facilitator/Coach
 Worked with math and special education teachers to implement inquiry-based curriculum and integrate reading and writing strategies
- 1998-2007 Interactive Mathematics Program (IMP) - Chicago, IL
IMP Curriculum Facilitator
 Coordinated and facilitated professional development workshops to high school teachers including Chicago Public Schools Step-Up program (2004-2006)
- 2006-2008 National Council of La Raza (NCLR)– Early College Project - Milwaukee, WI
School Facilitator
 Facilitated in-service workshops for participating schools
- 2003 National Council of La Raza (NCLR)– New Teacher Professional Development Institute - Pomona, CA
Curriculum Facilitator
 Facilitated curriculum development workshops for participating teachers

CONFERENCE PRESENTATIONS AND PAPERS

Buenrostro, P., Full, M.C., & Harper, F. (2015, April). *Toward Social Justice in Mathematics Education: Bridging Multiple Perspectives to Advance Critical Mathematics Praxis*. Paper Presentation: American Educational Research Association, Chicago, IL.

Buenrostro, P. (2014, October). *Reading and Writing My World with Mathematics*. Paper Presentation: University of Illinois at Chicago College of Education Research Day, Chicago, IL.

Gutstein, E. & Buenrostro, P. (2014, April). *Mathematics for Social Justice: Possibilities and Challenges*. Presentation at National Council of Teachers of Mathematics Research Pre-Session, New Orleans, LA.

Buenrostro, P., Gregson, S., Gutierrez, R.J., & Gutstein, E. (2014, April). *Student Perspectives on Learning in Critical Mathematics Classrooms*. Presentation at National Council of Teachers of Mathematics Research Pre-Session, New Orleans, LA.

Buenrostro, P. (2013, April). *Learning Math with a Purpose & Learning the Purpose of Math: In Search of Student Meaning*. Paper Presentation: American Educational Research Association, San Francisco, CA.

Buenrostro, P., Balasubramanian, A., & Gutstein, E. (2011, April). *Analyzing Video from an Urban 'Math for Social Justice' Classroom*. Presentation at National Council of Teachers of Mathematics Research Pre-Session, Indianapolis, IN.

Gutstein, E., Balasubramanian, A., & Buenrostro, P. (2011, April). *Developing and Teaching Critical and Culturally-Relevant Mathematics in Urban Schools*. Presentation at National Council of Teachers of Mathematics Research Pre-Session, Indianapolis, IN.

Gutstein, E., & Buenrostro, P. (2010, October). *Using Mathematics as a Weapon in the Struggle: Challenges and Possibilities in the Classroom*. Presentation: Creating Balance in an Unjust World Conference, Brooklyn, NY.

Gutstein, E., Balasubramanian, A., & Buenrostro, P. (2010, April). *Experiences of Urban High School Students of Color with Critical Mathematics*. Presentation at National Council of Teachers of Mathematics Research Pre-Session, San Diego, CA.

Gutstein, E., Blunt, A., Buenrostro, P., Gonzalez, V., Hill, D., Rivera, R., & Sia, J. (2007, April). *Developing Social Justice Mathematics Curriculum in a Chicago Public School*. Paper Presentation: American Educational Research Association, Chicago, IL.

Aguirre, J., Buenrostro, P., Diez, J., Gutstein, E., Simic, K., Turner, E. & Varley, M.. (2007, April). *Examining the Promises and Complexities of Teaching Mathematics for Social Justice in Latino/a Contexts*. Paper Presentation: American Educational Research Association, Chicago, IL.

Buenrostro, P., Frankenstein, M., Gutstein, E., Moses, R., Wilkerson, C., & Yang, W. (2007, April). Invited Panelists: Creating Balance in an Unjust World Radical Math Conference, Brooklyn, NY.

Brantlinger, A., Buenrostro, P., & Gutstein, E. (2007, April). *Teaching Mathematics for Social Justice: Where is the Mathematics?* Paper Presentation: National Council of Teachers of Mathematics Research Pre-Session, Atlanta, GA.

Buenrostro, P. (2006, February). *Community Issue Gives Rise to Mathematical Problem: Teaching Mathematics for Social Justice in a Latina/o Context*. Poster Presentation: NSF-sponsored Centers for Learning and Teaching Network Conference, Washington, D.C.

FELLOWSHIPS

- | | |
|-----------|--|
| 2007-2011 | Diversifying Faculty in Illinois (DFI) Fellow, UIC
Tuition Waiver plus \$14,000 annual stipend awarded to graduate students working towards doctoral degree In Illinois. |
| 2007 | Collaborative for Equity and Justice in Education (CEJE) Fellow, UIC
Tuition Waiver plus \$14,000 annual stipend awarded to graduate students working on justice-related issues in education. |

- 2005-2006 Center for Mathematics Education of Latinos (CEMELA) Fellow, UIC
Tuition Waiver plus \$19,000 annual stipend awarded to graduate students
working on mathematics-related project.
- 1999-2000 Council for Basic Education, Interdisciplinary Studies Fellow

ACTIVE MEMBERSHIPS

National Council of Teachers of Mathematics (NCTM)
American Educational Research Association (AERA)

IRB Approval

UNIVERSITY OF ILLINOIS AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
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Chicago, Illinois 60612-7227

Approval Notice Continuing Review

January 19, 2016

Eric Gutstein, PhD
Curriculum and Instruction
1040 W Harrison
3420 EPASW, M/C 147
Chicago, IL 60607
Phone: (312) 413-2410 / Fax: (312) 996-8134

RE: Protocol # 2006-0201
“Teaching and Learning Mathematics for Social Justice”

Dear Dr.. Gutstein:

Please note that the training credits for Patricia Buenrostro will expired February 11, 2016; and for Anita Balasubramanian will expire February 16, 2016. All UIC investigators and key research personnel involved in human subject research must complete a minimum of two hours of continuing education in human subject protection every two years. For further information, please see the OPRS website:
<http://research.uic.edu/compliance/irb/education-training>.

Your Continuing Review was reviewed and approved by the Expedited review process on January 16, 2016. You may now continue your research.

Please note the following information about your approved research protocol:

<u>Protocol Approval Period:</u>	February 7, 2016 - February 6, 2017
	<u>Approved Subject Enrollment #:</u> 103 (limited to data analysis from 52 enrolled subjects)
<u>Additional Determinations for Research Involving Minors:</u>	The Board determined that this research satisfies 45CFR46.404 ', research not involving greater than minimal risk.
<u>Performance Sites:</u>	UIC
<u>Sponsor:</u>	National Science Foundation
<u>PAF#:</u>	2005-01583

Grant/Contract No:

0424983

Grant/Contract Title:

Center for the Mathematics Education of

Latino/as

Research Protocol(s):

- a) Teaching and Learning Mathematics for Social Justice; Version 2; 02/01/2012

Recruitment Material(s):

- a) N/A: Limited to data analysis only

Informed Consent(s):

- a) N/A: Limited to data analysis only

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category(ies):

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis)., (6) Collection of data from voice, video, digital, or image recordings made for research purposes., (7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
01/05/2016	Continuing Review	Expedited	01/16/2016	Approved

Please remember to:

→ Use your **research protocol number** (2006-0201) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the OPRS website at,
"UIC Investigator Responsibilities, Protection of Human Research Subjects"
(<http://tiger.uic.edu/depts/ovcr/research/protocolreview/irb/policies/0924.pdf>)

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 355-0816. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Alison Santiago, MSW, MJ
Assistant Director, IRB # 2
Office for the Protection of Research Subjects

Enclosure(s): None

cc: Danny B. Martin, Curriculum and Instruction, M/C 147
OVCR Administration, M/C 672