# Counting the Experiences and Beliefs of Secondary Mathematics Teachers Committed to Teaching Mathematics for Social Justice in Urban Schools

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## Abstract

*This article contributes a deeper understanding of practicing teachers' experiences with and beliefs about teaching mathematics for social justice in urban schools. In-depth, phenomenological interviews were conducted with fifteen secondary mathematics teachers from across the United States. Findings identify five overarching commitments of social justice mathematics teachers, the challenges they face, and what they envision for the future of urban mathematics education. Utilizing a critical grounded classroom approach, this study uncovers how social justice mathematics teachers have "on the ground" experiences and perspectives that can help us build upon Freire's (1970) notion of education for liberation.*

**Key Words:** Equity, Urban mathematics education, Teaching mathematics for social justice, Critical grounded classroom approach, Teacher voice

## Introduction

"For every $20,000 more a family makes, the average student's SAT math score is higher by 14 points," my ninth grade Algebra 1 student, Jazmin, observed as she studied a graph of the linear relationship between family income and student SAT scores. Later that class period, Jazmin's eyes turned to the bookshelf in our classroom. "Ms. Candace, the math textbooks don't have graphs like the one we're analyzing. The math [state standardized] tests don't ask questions about injustice." I asked Jazmin why she thought this was the case. "Maybe they don't care if we know about that… But I want to know what's not right, not fair in the world. Math is important for that!"

I was a founding teacher of a public, pilot high school in a working class, Latina/o neighborhood in East Los Angeles – a school fought for and created by teachers, youth, families, and community organizations. This day's Algebra 1 lesson was on slope. Most of my students "failed" Algebra 1 in middle school the year before and recalled that slope had something to do with a "$y_2$" and a "$x_1$" – elements of one way to write the formula for slope – but did not have conceptual understanding of slope or know that it can be essential in constructing arguments about real-world data.

Joining a growing number of educators across the nation, I attempted to create a social justice mathematics class to empower my students to read and write the world with mathematics (Freire, 1970; Gutstein, 2003). Teaching mathematics for social justice (TMfSJ) seeks to engage students in critical quantitative thinking around issues of social (in)justice that are relevant to students' lives and daily experiences, to prepare students "to investigate and critique injustice, and to challenge in words and actions, oppressive

structures and acts" (Gutstein, 2006a, p. 4). As I taught, I wondered about the experiences and beliefs of other teachers. How were other teachers' experiences similar to and different from my own? How do various school and district contexts, as well as larger social and political contexts, intersect for teachers at different urban schools as they strive to teach mathematics for social justice?

In the last decade especially, scholars have explored what TMfSJ in urban schools embodies (Bacon, 2012; Bartell, 2013; Brantlinger, 2013; Gonzalez, 2009; Gregson, 2013; Gutstien, 2003; Gutstein, 2006a; Gutstein & Peterson, Eds, 2005; Terry, 2011; Yang, 2009; Wager & Stinson, 2012). Notably absent from this scholarship are the voices of fulltime teachers. Scholarship that centers these voices is essential for deepening our understandings of opportunities, challenges, and new directions for TMfSJ in urban schools. The research questions of this study are: 1) What are teachers who strive to teach mathematics for social justice committed to?; 2) What do they experience as the greatest challenges in their work?; and 3) What do they envision (and fight for) for the future of urban mathematics education? There is now a critical mass of teachers across the country - some who have been teaching more than a decade and many beginning teachers - who can speak to their perspectives and experiences building and enacting critical mathematics.

## Conceptual Framework

### *Equity, social justice, and urban mathematics education*

Urban mathematics education research includes: investigations of innovative and mathematically rigorous instructional practice in urban schools, such as the Algebra Project (Moses & Cobb, 2001), students' funds of knowledge in mathematics (Moll, 2001), ethnomathematics (D'Ambrosio, 1985); culturally relevant pedagogy (Tate, 1995; Ladson-Billings, 1995; Nasir, 2008; Rubel & Chu, 2011); and criticalmathematics (Frankenstein, 1983), or now often referred to as teaching mathematics for social justice (Gutstein, 2003; Gutstein, 2006; Wager & Stinson, 2012; Gregson, 2013; Gonzalez, 2009). Doing urban mathematics research does not simply imply focusing on the teaching and learning of mathematics in urban schools, but on bringing critical perspectives to the gate-keeping role of mathematics (Martin, Gholson, & Leonard, 2010; Moses and Cobb, 2001) and ways to push back against that role by understanding, supporting, and developing emancipatory pedagogies (Matthews, 2008). Urban mathematics education research aims to both understand *and* offer possibilities for transforming classrooms for greater equity (Martin & Larnell, 2014). While social justice and equity for Students of Color and economically marginalized students is at the core of urban mathematics education research, the field has tremendous room to grow. Theories and methodologies can be expanded to further develop a "critical equity lens" (Gutstein et. al, 2005). TMfSJ has been identified as a critical, emancipatory approach to teaching mathematics, but how it comes alive for teachers and students in various urban mathematics classrooms is understudied (Martin & Larnell, 2014).

*Teaching Mathematics for Social Justice*

Critiques of unjust schooling should be coupled with action to make schools more socially justice (Ayers, Michie, & Rome, 2004). The goal of teaching for social justice is not to prepare students to live in society as it is but to be a part solutions to make it more just (Bartell, 2013; Gutstein, 2003). The definition of teaching for social justice is contested and by no means universal (Apple, 1995 as cited by Bartell 2013); however, it is useful to draw from various working definitions to understand how it has been conceptualized. Sleeter (2015) argues that, despite the wide usage of the term "social justice" in the education field, it *does* mean certain things. She draws on a number of studies to name four components of what it means to engage in social justice education:

1. Situate Families and Communities within an Analysis of Structural Inequities
2. Develop Relationships of Reciprocity with Students, Families, and Communities
3. Teach to High Academic Expectations by Building on Students' Culture, Language, Experience, and Identity
4. Create and Teach an Inclusive Curriculum that Integrates Marginalized Perspectives and Explicitly Addresses Issues of Inequity and Power

According to Katsarou, Picower, and Stovall (2010), social justice education can refer to the "day-to-day processes and actions utilized in classrooms and communities centered in critical analysis, action, and reflection (praxis) […] with the goal of creating tangible change in their communities, cities, states, nation, and the larger world […] Teaching, in this sense, becomes part of the broader political project of identifying and eliminating oppression. It is liberatory because it operates under the premise of tapping into the under-utilized expertise of students, parents, and families combined with academic skills to address their conditions" (p. 139). Embedded in social justice or anti-oppressive education is the belief that young people can creatively imagine new possibilities and directions for resisting social crisis (Kumashiro, 2001). Giroux (1988) coined the term *transformative intellectuals* to describe a role that teachers can take on to "treat students as critical agents, question how knowledge is produced and distributed, utilize dialogue, and make knowledge meaningful, critical, and ultimately emancipatory" (p. 175). Educators need to see our society's future in our youth, who are indeed "actors in the struggle for justice" (Gutstein, 2007b, p. 424).

Supporting and building on the work of critical pedagogues is essential for confronting the inequities in education and more broadly in society because students can further develop literacies of power in critical classrooms and develop as agents themselves in challenging urban educational failure (Duncan-Andrade & Morrell, 2008). Continuing to examine, expand, and support efforts to teach for social justice, employing critical approaches in the classroom, is crucial because for students and teachers alike, classrooms can be spaces to build solidarity, develop political clarity, and integrate that with knowledge of oneself (Katsarou, Picower, & Stovall, 2010). "The next

generation of critical scholarship will need to push the theoretical parameters of our work […] To develop a complete and grounded theory of critical pedagogy in urban education, we will need many more examples of the possibilities and dilemmas that accompany the transition from theory to practice" (p. 131). This study builds on practicing teachers' experiences and beliefs as they develop and implement critical pedagogy in urban mathematics, an under-explore discipline.

Freire (1970) offers a problem-posing pedagogy to education as in opposition to a banking model (depositing knowledge from teacher to student) as key to liberation and humanization of oppressed peoples and their oppressors. Students may co-create knowledge with their teachers because they bring valuable life expertise from their own experiences and backgrounds. Practice informed by theory, or praxis, will achieve freedom. The oppressed must perceived oppressive conditions not as the reality of the world, but as a limiting situations that they can change as agents of transformation. Further theory and research can work towards understanding teachers' implementation of critical pedagogy, especially in understudied subjects, such as mathematics.

We do mathematics in the "real world," which does not just have to do with cognition but with contexts and culture (Lave, 1988). One of the first to bring critical theory and critical pedagogy, specifically Freire's (1970) problem-posing pedagogy to doing "real world" criticalmathematics, Frankenstein (1983) argues that an understanding of math and statistics is important for gaining power in our society – for control over economic, political, and social structures. Math and statistics are not only for "experts," and they are not value-free. She reinvents Freire's (1970) critical education theory in a mathematics context, as she argues that struggle for liberatory social change requires mathematical literacy. Tate (1995) argues for a culturally relevant approach to mathematics education for African American students, challenging a daily pattern of whole class instruction where students follow along passively, copying problems the teacher solves, and then working on a set of similar problems alone following the lecture. As he examines a case study of one mathematics teacher using a culturally relevant approach, he notes how her overarching teaching goal is to "develop students into active participants in the democracy," (p. 170) which includes connecting mathematics to social issues – or social issues to mathematics, rather, as she asked students to think about what was negatively impacting their community, how they can research the problem, and what they can do about it. Tate challenges us to critique how we think about "traditional" academics coming up in the classroom – that " it is within the context of social change and community problem solving that "traditional" academic subjects emerge" (p. 171).

Stinson and Wager (2012), citing Wager (2008), offer a lens for understanding how we can theorize ideas of mathematics education and social justice: "Teaching math *about* social justice refers to the context of lessons that explore critical (and oftentimes controversial) social issues using mathematics. Teaching math *with* social justice refers to the pedagogical practices that encourage 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 math to challenge injustices

of the status quo as they learn to read and write their world" (p. 6). Gutstein (2003, 2006a) argues that liberation from oppression and the (re)humanization of all people as fundamental purposed of teaching for social justice. He offers a framework for understanding "teaching mathematics for social justice," that this entails social justice pedagogical goals (reading the world with math, writing the world with math, and developing positive cultural and social identities) as well as mathematics pedagogical goals (reading the mathematical word, succeeding academically in the traditional sense, and changing one's orientation towards mathematics). Social justice mathematics classrooms can bring together community, critical, and classical knowledge (Gutstien, 2007a). Students can engage in a wide array of curricular activities, such as data analysis, discussions of media of all kinds, modeling situations, and internet searches (Garii & Rule, 2009).

A primary goal of TMfSJ is student empowerment (Aslan Tutak, Bondy, & Adams, 2011; Skovsmose, 1994; Gutstein, 2003; Gutiérrez, 2013). This empowerment comes from the intersection of mathematical and critical consciousness, as students develop conceptual mathematical understandings and social-historical-political understandings of their own lives and the world around them (Gutstein, 2007a). Using the work of Paulo Freire to define the goals of TMfSJ, Gutiérrez (2010) argues:

> Two of the main goals of critical mathematics are to (1) develop within learners "conscientizacao" (a kind of political awareness) that allows an individual to recognize her or his position in society and as a part of history (Freire, 1987) and (2) motivate individuals to action. Conscientizacao is produced through one's ability to analyze society from a political point of view, incorporating that view into one's identity, and being able to identify injustices in the world. In mathematics, this has translated into learners being able to make sense of data in ways that help them see the humanity behind the numbers and to use mathematics as a tool for exposing and analyzing injustices in society and as a means for convincing others of a particular (often nondominant) point of view (p. 5).

Stinson (2014) calls on the mathematics education community to consider moral imperatives of teaching for social justice, mathematics classrooms being no exception. He poses questions such as: "Given the profusion of injustices and children's increasing awareness of those injustices, why has there not been a collective effort to integrate teaching mathematics for social justice throughout mathematics curricula (e.g., similar to integrating technology throughout mathematics curricula)?" (Stinson, 2014, p. 4). While this is not a simple question to address, the social-political climate of decision-making in mathematics education policy and practice influences what is centered in the teaching of mathematics (i.e. high stakes reform and testing greatly influence what teachers do) as well as the long history of mathematics being centered as an objective, value-free discipline (Gutstein, 2003); but I also argue that we do not know enough yet about how teachers are taking up ideas of mathematics and social justice in their classrooms to know how TMfSJ can be more widespread. Teachers can teach us

valuable lessons about what supports them in their work, what makes it challenging, and what new directions we can take. Perhaps hearing from those in classrooms more can help us more deeply understand why, in times of great societal injustices *and* large-scale organizing against such injustices (e.g., the Occupy Movement against economic inequality and the Black Lives Matter Movement in response to the murders of Black people by police), we have not called on mathematics as a discipline to contribute in greater ways to understanding and changing society.

While not systematically ingrained in mathematics education, the field of critical mathematics education is growing (Gutiérrez, 2013). In addition to recent research studies, the first volume of *Rethinking Mathematics* was published in 2005 and a second volume in 2013, in which teachers as well as academics and teacher educators share curriculum they have taught in their own classrooms and schools – lessons, units, projects, and other innovations such as a "social justice data fair" that connect mathematics with real-world social justice issues (Gutstein & Peterson, Eds). These volumes serve not only as concrete examples for classroom teachers to use and modify themselves, but as models so that pre-service and in-service teachers can learn about what is possible and develop their own curricula. In the preface of *Rethinking Mathematics*, Gutstein and Peterson (2013) push back on common misconceptions about TMfSJ as it has become a part of greater discourse in mathematics education – that social justice mathematics should only be taught to marginalized students (all students should develop a social consciousness in school), that social justice mathematics is watered down mathematics (while not easy, the intent is to thoughtfully and thoroughly incorporate the social issues and the mathematics), and that social justice mathematics asserts that marginalized students cannot learn math without this kind of teaching (on the contrary, students are capable, and mathematics should tap into who people are and the world around them).

The "Creating Balance in an Unjust World" social justice and mathematics conference hosted in New York City, San Francisco, and Los Angeles during the last decade has also provided a space for educators to come together to discuss various issues related to mathematics and equity, including teaching social issue-related curricula. Especially over the last ten years, examples of TMfSJ are surfacing and being shared with wider audiences.

Gutstein (2003, 2006a, 2007) documents a two-year case study with Latino students in an honors-track mathematics classroom in middle school. He was the primary teacher of the class and implemented seventeen real-world social justice units with the students, integrating NCTM Standards-based teaching. Throughout the two years, data supported that "students began to *read the world* (understand complex issues involving justice and equity) using mathematics, to develop mathematical power, and to change their orientation toward mathematics" (Gutstein, 2003, p. 37). Additionally, the parents of these students felt that their children were empowered in this classroom (Gutstein, 2006b). Brantlinger (2013) presents a practitioner research study of his teaching of critical mathematics to "low-income" students of color, who he identifies as only wanting to do minimal work and unconcerned with learning mathematics. Brantlinger taught one remedial high school mathematics course for nine weeks and

concludes that there are "serious barriers" making it next-to-impossible to engage students in social justice mathematics at the high school level and that the effort it takes to create social issue-related math lessons is unrealistic, as he shares he spent over 120 hours preparing the lessons for the course. Furthermore, he states he failed to design lessons that captured important Geometry topics that should have been taught. Brantlinger began the study with an initial perception that real-world scenarios and mathematics could be synthesized and that critical mathematics is empowering; as the study went on, he identified problems with the pedagogy. Missing from this study is the voice of fulltime teacher(s)' experiences with critical mathematics who have been developing as teachers of this pedagogy for years. The study does not leave room for the possibility that teachers with pedagogical strengths other than the author or teachers in differing schooling contexts over time could successfully implement this approach.

Gutstein (2003, 2006a, 2007) and Braintlinger (2013) are both university professors, as Gregson (2013) notes. They examine their own efforts to teach mathematics for social justice; further research including the stories of fulltime teachers – and their students – may present a deeper and perhaps more nuanced understanding of the possibilities and challenges of TMfSJ. Teachers may take up TMfSJ differently than university researchers (Gregson, 2013). Secondary math teachers in urban schools often have over one-hundred students each year and many students who are English Language Learners and students with special needs, and many students who are experiencing traumas. Furthermore, they make curricular decisions, in part, based on the district and school contexts in which they teach. Critical pedagogy may be welcome or supported to differing degrees in these contexts; some teachers need to negotiate their commitments to TMfSJ with remaining in their jobs, something that researchers teaching social justice math units do not experience in the same way. Even if a teacher would not necessarily get fired for implementing social justice mathematics units and even if a teacher is at a school where many departments, including math, seek to tie lessons to social issues, they are still operating within a larger educational context that sends teachers the message from many directions that they need to produce results in the form of test scores. Most teachers experience various pressures from high stakes reform, most namely high stakes standardized tests. Whether they are mandated state tests, district or charter school management benchmark exams, high school exit exams, or the SAT, just to name a few, most teachers are making curricular decisions within the context of feeling tremendous pressure to support students to perform well on these exams.

Particular attention in recent groundbreaking studies has been given to how teachers can learn to teach mathematics for social justice, either as part of their teacher education program or once teachers are in the classroom – with an understanding that learning to teach is a life-long process and never really done (Bartell, 2013; Gonzalez, 2009; Garii & Appoya, 2013; Garii & Rule, 2009; Stinson, Bidwell, & Powell, 2012). Leonard, Brooks, Barnes-Johnson, & Berry (2010) designed a graduate-level course that began with an overview of critical theory, moved into looking at critical pedagogy theory, and finally looked at the work of critical mathematics pedagogues. Bartell (2013)

utilizes Linda Darling-Hammond's (2002) framework of equity pedagogy, which calls on teachers to develop knowledge of self, society, students, and schools as she looks at how teachers wrestle with the idea of TMfSJ as they are entering the profession. Bartell (2013) found that the pre-service teachers in her class, all of whom were White, tended to focus more on the social justice aspects of the curriculum and that it was difficult for teachers to navigate social justice goals and mathematical goals. Garii & Appoya (2013) had similar findings but assert that this was due to teachers' lacking understanding of social justice as well as the mathematics itself – that teachers' attempts to integrate mathematics and social justice was "inadequate" and "flawed." It is important to identify what assets future teachers bring with them to teach mathematics for equity and social justice and how they can be further supported to do so. It is not surprising that this work is challenging for future teachers or novice teachers who have never taught mathematics or social issues before separately, let alone together. There is not sufficient research to claim that teachers struggle TMfSJ because of their own deficits (Gregson, 2013).

Teachers should be exposed to many models and examples of TMfSJ so that they may reflect and plan, as there are many complexities and nuances in creating curriculum and teaching a critical, culturally relevant pedagogy in mathematics (Leonard, Brooks, Barnes-Johnson, & Berry, 2010). Gonzalez (2009) engaged teachers from a mathematics department at one urban high school in a "community of practice" to explore ideas about social justice mathematics and what it might look like to design and implement the curriculum, while attending to the standards. The teachers had seen overtime the ways in which their students were oppressed. This insight, combined with a love for teaching mathematics, motivated them to participate in the study. They identified key ways in which mathematics is important for social awareness and empowerment and committed themselves to TMfSJ as worthwhile, even though it was a long-term challenge to try to teach in this way with rigid pacing plans and standardized tests. Leonard, Brooks, Barnes-Johnson, & Berry (2010) also found that teachers were committed to choosing to work towards a pedagogy that would not accept the status quo. These findings also suggest that teachers do not view their teacher learning as ever being done but rather something that will continue to grow over time.

Two cases studies have each looked at one teacher's experiences with TMfSJ. In an autoethnographic study of his novice mathematics teaching, Bacon (2012) details his challenges TMfSJ in a standards-based era. He had to prepare students for quarterly benchmark tests and felt pressured to cover material before each test, thus presenting a challenge to him to include social justice issues that can sometimes take longer as lessons or units to implement than curriculum devoid of social context. However, he offers that drawing on project-based learning can open more room for social justice curriculum, and it is possible to review for exams while giving social context to mathematics problems. Gregson (2013) studies one mathematics teacher's conception of TMfSJ, the tension in that teacher's work, and how the teacher negotiates them. She found that dominant mathematics was both a necessity and an obstacle for TMfSJ, but argues that this can be a place for growth. She also found that the teacher's need to

focus on high stakes testing did not necessarily help students master mathematics concepts or build social justice understandings. Gregson suggests that teachers form inquiry groups to further explore TMfSJ together and reminds us that TMfSJ is a long-term endeavor, not a short-term goal.

These individual case studies show the power of teacher voice in understanding TMfSJ and call for us to hear from many more teachers about their daily practice, to put their stories together because, "at the secondary level, research has not examined full-time teachers who are not primarily researchers working independently to teach mathematics for social justice in public schools. Hence, we know little about such practice or whether teachers can maintain such teaching alone in a sustained climate of high-stakes education" (Gregson, 2013, p. 2). Furthermore, "mathematics educators and researchers should consider the difficulty of teaching for social justice under real-world conditions and spend more time seeking sites where social justice mathematics teaching is developing organically […] Mathematics educators must spend more time collaborating with teachers in their local contexts and do more to support research partnerships with classroom teachers interested in social justice" (Gregson, 2013, p. 31).

Researchers and teachers have also begun connecting TMfSJ to other critical pedagogical methods, such as critical pedagogy of place or teaching mathematics for *spatial* justice by integrating community mapping software into critical mathematics curriculum (Rubel, Lim, Full, & Hall-Wieckert, 2015) and Youth Participatory Action Research or YPAR (Terry, 2011; Yang, 2009). Drawing on Critical Race Theory, Terry (2011) argues that YPAR in mathematics can support students to engage in a mathematical counterstory. As he engaged Black male youth in an quantitative examination of policing in South Los Angeles where they lived and went to school, he found that utilizing counterstorytelling helps students to identify the dominant narrative, contradict the dominant narrative, and frame access to freedom. Constructing and telling mathematical counterstories can support students to identify as doers of mathematics and ultimately involve more transformative forms of resistance. Yang (2009) also discusses a YPAR study in which he supported thirty high school youth, engaged in three years of critical research, in an urban school in Oakland, California to create their own School Accountability Report Card (SARC), thus repossessing it. The students in this action-research project identified what matters most for their school to be accountable to and how their school meets or does not meet those marks. Yang argues that students critically consumed texts and critically produced texts, thus reading and writing the world with mathematics. In a study on a YPAR project in my classroom with Latina/o students in Algebra 1 in East Los Angeles, I found that students' perceptions of the importance of mathematics grew, they changed their ideas about the meaning of research – that they themselves could conduct original research, and their sense of empowerment grew as leaders at the school (Full, 2011). Further research could explore the possibility of action-research projects to be conducted within mathematics classrooms.

In summary, studies on TMfSJ that center teacher voice and experiences are limited; but mathematics education research shows that there is reason to be optimistic about the potential and promise of TMfSJ – and that there is still new ground to break

(Gutstein, 2007a). Gutstein argued in 2003, which is still true today, that "although mathematics educators have worked in various ways to promote equity, little literature exists that documents efforts to teach mathematics as a specific tool for equity and social justice" (p. 39).

### *New Directions in Teaching Mathematics for Social Justice: A Critical Grounded Classroom Approach*

Teachers have powerful stories to tell about their journey becoming teachers, how they seek to enact equitable and democratic teaching, and what keeps them going (Michie, 2005; Nieto, 2003). Multiple scholars recognize the need to value teachers' voices and experiences - from those who are "on the ground" in schools. In the National Council of Teachers of English presidential address to teachers, Ernest Morrell stated: "The best-kept secret in English education is the daily genius in our classrooms that we sit on top of because we don't know how to share it! […] It is powerful inside the doors, but it is revolutionary when it is shared." (2015). Research can support teachers to share their critical pedagogies, especially because critical classrooms - with teachers committed to their classroom practice, school, community - are not often documented and shared. We must do studies that seek to investigate the work of the busy teachers doing good work in our classrooms. This study builds on the argument that Morrell articulates, and asserts that we can humbly learn from teachers and that they have great capacity to do and share critical work and enact change.

Critical mathematics educators launched TMfSJ as a critical pedagogy, and now people in classrooms are drawing on those understanding of TMfSJ, redefining it, and expanding it (Wager & Stinson, 2012). Further research is needed to bring social justice pedagogy "from the fringes to the center of mathematics education" (Leonard, Brooks, Barnes-Johnson, & Berry, 2010, p. 268). Unfortunately, "it's easy to stand on the outside and sneer at the work of classroom teachers who are trying to teach against the grain, and to dismiss their efforts as watered down or accommodationist. What's harder is to actually do something different, to enact a pedagogy that is deep and critical and engaging to kids" (Ayers, Michie, & Rome, 2004, p. 128). Through research, we need to acknowledge the effort of teachers, and that largely has to do with giving credit to their voices, which first means we need to hear more of their stories. While it is important to hear the stories of teachers with all kinds of approaches to working with students, it is important to be sure to investigate teachers engaging in critical pedagogy. Critical pedagogy is a demanding, political endeavor for educators to pursue because not only does striving to teach in a critical way involve complex individual choices to strive to enact justice and democracy but because critical pedagogy is shaped by institutional contexts, including the politics of the school, which requires knowledge that extends far beyond standards and textbooks (Kincheloe, 2005; Gutiérrez, 2012). The work of teachers is particularly challenging when they do not work under conditions where they have resources they need and their critical pedagogy development is supported (Nieto, Gordon, & Yearwood, 2010). Especially being in a time in which teachers are disempowered and tend to have less and less professional autonomy in their teaching,

largely due to high stakes reform and the standardized tests that come with it, makes it "a necessary theoretical precondition for teachers to organize effectively and establish a collective voice in the current debate" (Giroux, 1988. p. 122). Researchers do not have to leave this work only to teachers, as we can support teachers in building a collective voice so that they may further develop as transformative intellectuals.

Matthews (2008) notes that there is an invisibility with respect to centering mathematics success, even though there are many examples of this success, and that there is "hidden wisdom" found in classrooms. This invisibility and wisdom applies to urban mathematics teachers and specifically teachers who are striving to teach mathematics for social justice. The institutional contexts in which teachers teach is relevant to what is important to them, what they are called to focus on, what the needs of their students are, and more. In studies that focus on one institutional context, situating the research within that context should be included in the investigation; and in studies that focus on many contexts, we should seek to explore how those contexts influence teachers and students. In social justice mathematics education research, little attention has been paid to what it means to develop this critical pedagogy in different places, with students of different backgrounds, and school and district contexts with varying levels of support.

Educational researchers are focusing more and more on the challenge of translating theory to practice in urban schools. Gutiérrez (2013) identifies for things that urban mathematics teachers committed to equity must do:

> (a) negotiate their practice with colleagues, students, parents, administrators, colleges, and members of for-profit organizations who may not agree with their definitions of "mathematics," "education," or "learning"; (b) work with fewer material and human resources than teachers in more wealthy school districts; (c) support their students to compete on an unfair playing field that constantly changes; and (d) buffer themselves from images of students as unmotivated, not having the proper amount of "grit," lacking role models in their community, and having cultural and linguistic obstacles to overcome, as well as images of urban teachers as slackers, saviors, or people who simply could not obtain work elsewhere (p. 7).

It is essential to understand how these negotiations intersect with striving to make social justice mathematics come alive in their context. We do not know yet what in-service math teachers have to say about translating theoretical ideas of critical pedagogy in math into practice in urban schools – only arguments for what can be powerful or challenging about social justice math and mostly how pre-service teachers wrestle with it. We cannot advance critical mathematics pedagogy without the teacher pioneers of it. We have to take their experiences and beliefs and return back to theory to further build a theory of TMfSJ. If we know what teachers experience and believe, we can learn more about how to support teachers to bridge theory and practice, interpreting practice in a more nuanced way than looking at the curricular plans teachers develop.

TMfSJ does not occur in a critical classroom vacuum, as teachers navigate their commitments with opportunities and challenges they face to develop critical pedagogy – and no one teacher likely experiences the intersection of these in the same way. Scholarship that centers the voices of fulltime teachers is essential for deepening our understandings of opportunities, challenges, and new directions for TMfSJ in urban schools. What do those who are "on the ground" daily in schools have to say about TMfSJ? How do they experience striving to translate principles of critical pedagogy and theories about educational equity into action? As Gregson (2013) names it, we need to highlight more social justice mathematics teacher voices "from the trenches." We should investigate how teachers who have been "on the ground" in classrooms over time think about, understand, and experience their work – especially teachers from diverse backgrounds who may bring various perspectives and assets to their classrooms and varying school types and school and district contexts. With time teaching comes a wisdom that cannot be achieved from the shoes of people other than teachers themselves.

We are now in a time where there is a critical mass of teachers in the classroom who can speak to their fulltime experiences over years of doing this work. As teacher education is increasingly including coursework on diversity, equity, and social justice for mathematics teachers (Gutiérrez, 2002), we are in a unique time to study how teachers who have come out of such programs are taking up such ideas in their classrooms – and to learn from them what needs to be considered as we advance this work. We can now start to answer: What is this group committed to? What do they care about? What are the tensions of this work from their eyes? This will explode possibilities for understanding how we can support future teachers and address challenges for pre-service teachers. Teacher education programs are increasingly including issues of diversity and equity in their courses of study. Now we can really be going into classrooms and see how teachers are taking this up. What about being in the classroom over time supports teachers to navigate and bridge social justice and mathematical goals? What can pre-service teachers learn from in-service teachers about TMfSJ? Can social justice mathematics mentor teachers educate novice teachers? What would a social justice mathematics teacher residency apprenticeship model of teacher education look like – where future teachers are mentored by social justice mathematics teachers at the schools where they will ultimately teach at? This study attempts to tell the critical mathematics teaching stories from range of people who are trying this work in different contexts and with different students, with different community histories.

The present study draws on what I will refer to as a critical grounded classroom approach, centering the voices and experiences of just one group of people who are "on the ground" in schools, fighting for social and educational justice. Going beyond documenting, researchers utilizing this approach operate in solidarity with those they study, bringing together "*writing about* and *working with* activists" (Fine & Weis, 1996, p. 263). A growing number of scholars are using such an approach (for just some examples, see Camangian, 2013; Duncan-Andrade & Morrell, 2008; Picower, 2012; Theoharis, 2007). We need to continue and expand this work at a time when the voices and experiences of those "on the ground" are often neglected in research, policy, and reform.

A critical grounded classroom approach is informed by grounded theory (Corbin & Strauss, 2014; Glaser, 2011) but also builds on existing theory challenging the inequitable status quo of schools, such as critical theory (Kincheloe & McLaren, 2002), feminist theory (Fine, 1994), Critical Race Theory (Ladson-Billings, 1999), and humanizing methodological approaches (Paris & Winn, 2013; Bartolome, 1994). The positioned subject approach (Conrad, Haworth, & Millar, 2001), influences my choice to utilize and name a critical grounded classroom approach as it asserts that people in particular positions offer unique and specific insights into their own daily lives and experiences. Instead of incorrectly placing blame on teachers for educational injustice (Kumashiro, 2012), choosing to build on teachers' strengths, "we advance an alternative vision of what is worth cherishing in public school education" (Nieto, Gordon, & Yearwood, 2010, p. 353). Anyon (2005) also notes the importance of teachers as an essential group in the struggle to preserve public education.

Bringing this approach specifically to critical mathematics teachers allows for their stories to "shape discourse about urban mathematics education" (Bullock, 2014, p. 7). Urban mathematics teachers striving to teach math for social justice can help us to understand how they negotiate and navigate the many facets of what we know can create more equitable, responsive, and socially just schools and classrooms. Since mathematics education policies often do not take into account the realities of students and teachers in classrooms, especially urban mathematics classrooms (Bullock, 2014), we need spaces where their voices are centered so we can learn from them. Understanding "ground up movements" of educators is essential, as "capturing the excellence of local groups as they author change has the potential to connect mathematics education scholarship to the very communities it intends to serve" (Matthews, 2008, p. 4). Apple (1992) identified this need to learn from progressive mathematics educators over two decades ago, and it remains a need today:

> There are organizations and groups of practicing educators who are now engaged in the difficult and time-consuming efforts to build considerably more progressive and community-based approaches to curriculum, teaching, and evaluation in schools throughout this country. What they do, how they deal with the crisis in resources and time, how they build a different kind of coalition that aims at progressive ends, this can tell mathematics educators-and all of us- what might succeed in a time of conservative reaction (p. 429).

He asserts that we must not just observe teachers but participate *with* them to create reform. By choosing to focus this particular research study on TMfSJ on teacher voice, I am not asserting that their voices are superior to those of others for understanding promises and challenges of TMfSJ. Other very essential voices to build critical grounded classroom research are of course the youth who make up our classes and offer their daily brilliance and persistence, their families, and the communities in which schools exist. Each of these groups of people have important perspectives for making sense of social justice coming alive in classrooms. Centering students and teachers and communities to understand social justice in schools becomes more and

more important as education reform is increasingly defined by voices outside of schools. However, I do seek to position teachers at the center of this investigation to address the ways that they articulate playing a pivotal role in managing both the resources and social-political climate that their students and they participate in together. Further research is needed that centers the voices of all of the groups that are in urban schools daily, as "the work of urban mathematics education is not exclusively an academic exercise; it belongs equally to mathematics education researchers, teachers, students, administrators, parents, and community members" (Bullock, 2014, p. 6).

Teaching for social justice is taking place in many classrooms, but we need to find ways to better identify what is working and support teachers to do more of this work (Kumashiro, 2004). As Gutstein (2006a) puts it, and what has motivated me in conducting this study, "we need reports from teachers who theorize their practice as they try to create conditions for students to read and write the world with mathematics" (p. 209).

**Researcher Positionality**

As a former teacher who taught mathematics in an urban school and connected mathematics to social (in)justice issues, it is essential to reflect on my teacher-researcher positionality. I entered teaching with an understanding that being a continual learner is an essential aspect of critical pedagogy and TMfSJ. In my teaching of mathematics to Latina/o students, I sought to interrupt power, privilege, and oppression (Amidon, 2013); develop a "critical care praxis," challenging a colorblind approach of caring for students (Rolón-Dow, 2005 as cited by Bartell, 2011); and express to my students a political and radicalized love (Darder, 2002). As a White, middle class, heterosexual woman, I designed this study keeping in mind that too often "researchers privilege the experiences, needs, and interests of White teachers, and teachers of color are often ignored" (Milner, 2007, p. 394). I interviewed teachers from diverse backgrounds, particularly mathematics Teachers of Color; I sought to pose questions in such a way that would support participants to speak to and make sense of their own beliefs, stories, perspectives, opportunities, and challenges.

In many aspects, I am an "insider" to understanding how social justice mathematics teachers experience creating lessons, building relationships with students and colleagues, and being involved in challenging the status quo within and outside of the classroom. During interviews, I felt this was a methodological advantage for building rapport with teachers and posing questions. In many instances, teachers made comments such as, "You know how it is." Even though the majority of interviews were conducted over Skype due to living cities or states apart, the interviews transcended the "distant" virtual connection, as it was not uncommon for tears of love for the work (from the teacher participants) and tears of inspiration (on my end) to fall during the interviews.

Like all educational research, mathematics education research is political and non-neutral (D'Ambrosio et al, 2013; Gutstein, 2003), which is reflected in my choice to

be a part of social justice mathematics communities of educators. I believe that educational research can and should be transformative, in the name of social justice.

## Study Design

The research questions guiding this investigation were inspired by Picower's (2012) study of teacher activists and Theoharis' (2007) study of school principals committed to social justice. They are: 1) What are teachers who strive to teach mathematics for social justice committed to?; 2) What do they experience as the greatest challenges in their work?; and 3) What do they envision (and fight for) for the future of urban mathematics education?

To address the research questions, I utilized a critical, qualitative approach (Steinberg & Cannella, 2012; Kincheloe & McLaren, 2002). I conducted in-depth, phenomenological interviews with a sample of social justice mathematics teachers to make meaning of this particular group's experiences and beliefs, centering their stories "because they are of worth" (Seidman, 2013, p. 9). I drew on Seidman's three-part approach to interviews: focused life history, details of experience with the phenomenon under study, and reflection on the meaning of those experiences. Due to feasibility issues, I addressed all three parts in one interview sitting. I also modified Seidman's approach to allow for focused questions that gave participants an opportunity to make connections so that I would not have to make inferences for them. The majority of interviews were conducted over videoconference online. Each interview was audio-recorded and took between 48 minutes and 1.75 hours. I followed my interview protocol for all interviews, deviating in order somewhat and asking some additional follow-up questions. See Table 1 below for sample questions.

TABLE 1
Sample Interview Questions

| Interview Segment | Sample Question |
|---|---|
| Details of experience | How do you feel your school context supports or presents challenges to your social justice math pedagogy? |
| Reflections on meaning | Teachers are often asked why they chose the profession. Why do you teach, and is your social justice math teacher identity related to the reasons why you teach? |
| Focused life history | Do you think the pathway you took to become a teacher played a role in how you're now a teacher of social justice mathematics? |

To recruit participants, I networked one-on-one with teachers who attended and presented at the only national conference dedicated specifically to mathematics and social justice. I also contacted teacher-authors of publications related to TMfSJ. Some participants I met years earlier as a teacher. Finally, I utilized snowball sampling as some teachers pointed me to colleagues at other schools, sometimes even in other states. I selected participants for this study who identify as teaching mathematics *about*, *with*, and, *for* social justice (Wager, 2008). I do not assert that teachers outside of this criterion are not advancing social justice goals in mathematics education, nor do I assert that the teaching experiences and perspectives of teachers who meet the criteria for this study are of greater importance to capture than other teachers'.

I interviewed fifteen secondary mathematics teachers working at urban schools in six states across eight cities, geographically dispersed on the West coast, Pacific northwest, East coast, and Midwest. Thirteen teachers are at schools with almost all economically marginalized Students of Color, and two teachers are at schools with a racially and economically diverse student body. I intentionally recruited teachers from diverse backgrounds, at various school types, teaching various mathematics classes, including one teacher who teaches Algebra 1 Special Day Classes. See Table 2 below for participant diversity.

TABLE 2
Participants

| Teacher[1] | Years Teaching | School Type | Race/Ethnicity[2] | Sex/Gender | Currently math teacher of… |
|---|---|---|---|---|---|
| Lena | 5 | Charter | White/Eastern European | Female | Special Day Class Algebra 1 |
| Aminah | 4 | Public (project-based learning) | Middle Eastern /Arab | Female | Geometry |
| Ryan | 11 | Public | White/Caucasian | Genderqueer Female | 9th Grade Statistics |
| Cindy | 5 | Public | White/Jewish | Female | Algebra 1 |
| Elizabeth | 11 | Private (independent) | White | Female | 7th Grade Math, Math Special Events Coordinator |
| Rosa | 4 | Charter | Latina | Female | Integrated Algebra |
| Lillian | 12 | Public (alternative) | White | Female | Foundation Math |
| Juana | 2 | Charter (ages 16-24) | Latino | Female | All Levels |
| Brenda | 8 | Charter (ages 16-24) | White | Female | All Levels |
| James | 1 | Charter | Black | Male | 9th Grade Integrated Math |
| Sarah | 4 | Charter | ½ Filipina, ½ White | Female | Algebra 2, Geometry |
| Maria | 4 | Private (Catholic) | Latin@ | Female | Pre-Calculus |
| Brian | 10 | Public | White | Male | Geometry, Algebra Regents Preparation |
| Alejandro | 5 | Public | Sicilian American | Male | 9th Grade Integrated Math |
| Jaya | 9 | Public | West Indian | Female | AP Statistics, Algebra 2 and Trigonometry |

The data analysis process involved a constant comparative method (Bogdan & Biklen, 1982) of looking for patterns throughout the data collection process and sharpening and building on themes, looking for confirming and disconfirming evidence (Erickson, 1986). As I conducted interviews, I drafted analytic memos with vignettes that embodied salient points the participants spoke to and took note emerging themes. I began to notice saturation of themes (Padgett, 2008) after ten interviews but continued

[1] All names are pseudonyms.
[2] Race/Ethnicity and Sex/Gender are reported as teachers self-identified.

on to interview five more teachers so that I could ensure a range of diverse teachers from different types of schools were represented. I developed a coding scheme, utilizing descriptive, In Vivo, and values coding (Saldaña, 2013), so that I could build ideas and facilitate posing questions from my data (Bazeley, 2013). I then organized the data into eight meta-codes. To preserve the voices of teachers, my analytic process used their verbatim language, because "teachers are as individual and diverse as the students they teach, and the reasons for the resilience of the best and most committed among them are varied." (Nieto, Gordon, & Yearwood, 2010). Throughout the reporting of study findings, while I identity themes and bring social justice mathematics teachers' collective voice together to tell a story, I use many direct quotes from teachers.

## Findings

### *Commitments of Teachers Striving to Teach Mathematics for Social Justice*

Every teacher expressed an unwavering love of teaching, specifically teaching in urban schools *and* teaching mathematics, a subject that is commonly students' least favorite. Many teachers used the word "calling" to describe their work and shared they would never leave the profession. Mathematics Teachers of Color in particular spoke to their own identities and experiences contributing to why they strive to teach mathematics for social justice to students who they see themselves in. Rosa and Maria spoke to wanting to give their students a socially conscious and equitable education they themselves did not receive. James explained, "I want to help raise boys and girls like me. This is my life, and this is what I do." Sarah linked her love of mathematics with her love of teaching and her own identity as she said:

> I feel alive, at home. I feel right. I love curiosity, and I love seeing the light bulb go off. I love math, so I love teaching it. […] I just can't *not* do it. You're forming people's lives. I'd like to be one of the compassionate people who teaches them to love something they're taught to hate. And I want to be a brown female math teacher.

When I asked Ryan what keeps her going as a teacher, she said:

> I try really hard to bring in contexts that engage students who are not traditionally seen as likely to excel in mathematics…the social justice is what is keeping me going. If I didn't feel incredibly called to do this work, if I didn't feel that it's my duty to continue working in high need schools, teaching something that is socially acceptable for people to say they're bad at - which is embarrassing across the nation, but whatever, that's a whole 'nother conversation - there's no way I could do it, it's too hard. And I'd be lying if I didn't say that there are many days that I wonder how long I can do it. I don't know what else I would do. I've been doing this for 10 years. It is, it is who I am.

As she wiped away tears, Ryan said, "Yeah, anyway, you hit something there." Her emotion exemplifies the love, energy, and passion teachers bring to TMfSJ.

My analysis revealed that, while teachers have individual variations in what their goals are and how they seek to achieve them, there are common threads that weave together as commitments. To answer my first research question, I identified five commitments of teachers striving to teach mathematics for social justice.

**Commitment #1: Empowering urban youth as mathematics students *and* social change agents**

As Cindy proudly described her students and how she is "excited every morning" to teach and learn from them, she said, "They are incredible people who will change the world." Social justice mathematics teachers seek to develop students as justice-oriented youth (Westheimer & Kahne, 2004). Similar to Duncan-Andrade's (2007) study on effective teachers in urban schools, these mathematics teachers view their students as social change agents who can and will change the world. Teachers spoke in a way that demonstrated their concern for students' lives and livelihood beyond being able to do mathematics well.

Bringing in relevant social issues to their mathematics classrooms is central for teachers as they strive to center their students' assets and voices and empower them in mathematics and life. They believe students should be able to use mathematics as a lens to critically analyze the world, make judgments, and question the status quo so that they can have agency in making personal decisions and participating in social change. Elizabeth explained, "People make decisions for them all the time…in class, we look at a graph and recognize that someone made choices to make sure that graph told a story and that it's manipulating the information that's available. It's my job to make sure my kids can think about that." Ryan named this as "critically speaking back to data."

Social justice mathematics teachers seek to create equitable and empowering classrooms for Students of Color and from low-socioeconomic backgrounds in high-need urban schools, challenging deficit perspectives of their students. Cindy explained that her Black and Latina/o students are viewed negatively and criminalized in society as "*those* kids." Her experiences working with youth have convinced her that such views are based in ignorance. Brenda, who teaches transitional age youth, explained:

> Especially for my students who have dropped out, math and school in general has been a negative place and told them that they're "less than" or they weren't capable of making big changes in the world, they weren't academic, math isn't their thing. The idea that you can use math as tool to say things about the world, reflect on injustices, and then take that information and do something is so powerful. Students say, "I can do this."

Brenda spoke to the belief that TMfSJ positions urban youth as capable of making change *and* capable of doing mathematics. Like most teachers, Brenda stressed how important it is to her to communicate to her students that what they traditionally

experience as math at school is "only a narrow vision of what math is," that young people do math and think mathematically all the time.

All teachers discussed how their students most often come to their classrooms feeling incapable of doing mathematics, so they seek to create norms for talking about everyone being able to do mathematics. For example, Rosa shared that she does not let her students say, "I can't do it," but instead they must say, "This is confusing." Teachers identified developing students' confidence and habits doing mathematics as part of social justice teaching. Lena, who teaches Special Day Class Algebra 1, explained that part of her goal in teaching is to "break the stereotype" that students with disabilities, especially Students of Color, cannot do math because too often for them "school is like a nightmare." All teachers shared that their students feel more capable mathematically when the math is related to critiquing the world because they bring personal expertise to that exploration.

**Commitment #2: Teaching mathematics conceptually with relevance to students' lives and daily experiences**

Lena said, "I would really like to see us thinking about math *as way of living and thinking* as opposed to just a skill." Instead of giving students formulas or telling them routine procedures to follow to solve problems devoid of context, the social justice mathematics teachers expressed a commitment to reform mathematics (Boaler, 2002), as Gregson (2013) found in her case study of one social justice mathematics teacher. At the center of teachers' beliefs about teaching mathematics is the importance of engaging students in critical and creative thinking and wrestling with problems that do not have one right answer. Jordan was exposed to research on why traditional teaching methods for mathematics were not effective, and this led to him shifting his beliefs.

Social justice mathematics teachers identified a natural connection between teaching mathematics conceptually and mathematics that is about social issues. Ryan explained, "I think there needs to be a shift away from learning skills and processes of math that are applied in these predictable ways, and it needs to move into the idea of math as a tool or a lens for thinking about the world, which I think using a social justice math context just lends itself to more automatically." James and Elizabeth noted that students are much more likely to recall mathematics concepts they discussed long ago when those concepts were taught within a real-world context. Other teachers spoke to how a social justice pedagogy involves students getting to ask *and* answer their own questions - that students are an integral part of the direction of how the class evolves.

In addition to conceptual teaching lending itself to an exploration of social contexts, it brings relevance to the mathematics classroom, or, in Jaya's words, "highlights the meaning and use of mathematics." Teachers argue that mathematics students should not be asking, "Why does this apply to my life?" as students so often do in classrooms across the country, but instead be asking questions such as, "Is there injustice here?" Ryan expressed that it is not enough to give students any kind of context to achieve relevance as she said, "You need to understand the magnitude of

your responsibility and don't just give them a project where they're drawing their bedrooms […] you need to do something *that means something*."

Teachers are deeply concerned with ensuring their classrooms connect to the students in their classrooms, going beyond lessons or units that may be more broadly relevant to urban youth living in different areas. They strive to have the "grasp of community" Gutstein identifies as essential to TMfSJ (2007a). For example, when Cindy moved from one metropolitan area to another, she took time to change a unit she created on racial profiling by law enforcement, to tailor it more to the new city and community where she teaches. This exemplifies teachers' careful attention to making their curriculum relevant to the students in their classrooms.

Teachers say that bringing in meaningful social issues: helps them build more meaningful relationships with their students, breaks down barriers of who can hold mathematical knowledge, and makes students feel that mathematics is not just an abstract field they need to be successful on tests. Finally, they feel social justice mathematics becomes a "source of pride" for students and builds their self-esteem and morale around math.

**Commitment #3: Building mathematically rigorous social justice lessons and units over time**

None of the participating teachers do an entire course of social issue-related units, nor do they choose to ignore a wide range of standards to instead address social issues. As Elizabeth explained, "we're going in and out of moments that are connecting to [social justice]." Teachers spoke to teaching conceptually throughout the school year, using practices and standards that align with the National Council of Teachers of Mathematics Standards throughout the school year, as they prioritize teaching dominant mathematics that students need to be successful on tests and advance to higher education. Teachers in this study challenged the assumption that social justice mathematics is not mathematically rigorous, that dominant mathematics cannot be thoroughly addressed in social-issue related units. Lena shared that she believes social justice math lessons can be "even more rigorous [than lessons not connected to social issues] because you're using critical thinking skills to analyze the context in society and why things are the way they are, plus you're still having to solve these math problems." She expressed frustration with those who have a "granola mentality" of teaching for social justice, assuming that academic rigor is not important to teachers like herself when it is. Aminah and James spoke to beginning project-based learning units with an entry document related to the social issue, then turning to the mathematics needed to analyze the social issue, and returning to the issue to apply the mathematics. Maria said she was able to create summative assessments that were community projects instead of tests in which she was able to see students' dominant mathematics knowledge. Bartell (2013) addresses how mathematics goals can suffer in pursuit of social justice goals for teachers learning to teach mathematics for social justice, but fulltime teachers committed to this work over time express devotion to social justice and mathematical goals and hold a belief that one does not have to suffer for the other.

Teachers explained that the orientation to mathematics that social issue-related units offer carries over to their classrooms when they are not teaching such units. Elizabeth noted that when she is not teaching a social-issue related unit, students trust her more that the math she is teaching them *matters* because she has shown them how math can connect to their own lives and inequality more broadly. She feels her students are more accepting of wrestling with abstract mathematical ideas because of that trust, citing that parents tell her their children are talking more at home about math being fun and creative.

Teachers challenge themselves to build rigorous, project-based learning social justice units *over time*. Several teachers expressed being patient with themselves, building just one new social issue-related unit each year. Sarah said, "I do some projects that are really cool, but it's not what I do on a daily basis. It's what I aspire to do. I've given myself a ten-year timeline to figure out how to do these types of things." And Maria shared, "If you can do one thing a year and share with somebody else, at the end of the day you'll have all these things. It's not realistic as a teacher that you'll come up with a powerful unit for everything of your course. Or maybe some people can." Teachers attempt to make thoughtful, concerted efforts to integrate mathematics with social issues in a rigorous way. Brenda shared that doing this work can make a teacher feel like they are a first year teacher again, but that it is important to "bite off manageable pieces." While Gutstein (2006a) demonstrates how it is possible to connect entire school years of mathematics standards to social issue-driven units, teachers do not address that this is their immediate goal. Some teachers say they would eventually like to get there but that they recognize the real barriers they are up against (which are referenced in the next findings section), that the work to build this curriculum and figuring out how to teach it is time consuming, and they know that they are pioneers in this critical pedagogy who do not need to already have all the answers. While every teacher identified the commitment of teaching rigorous units and building those over time as difficult, no one expressed feeling that it is not worthwhile to keep pursuing how social justice math can come to greater fruition in their classrooms and other classrooms, as Braintlinger (2013), university professor, concluded for his teaching.

Teachers weave in units related to social justice issues where they feel prepared to. Cindy said that she does not want social issue-related units to feel "contrived;" she wants to authentically integrate mathematics. Ryan expressed similar sentiments as she explained, "When I do teach social justice, I try and make sure that I am infusing academic skills to help my students. I advocate for them as critical thinkers and outspoken people, and if I can do that in the context of social justice, great, but I can also teach skills sometimes within a slightly less heavy unit." The other "less heavy" units she referred to still connect mathematics to real-world subjects such as architecture, but may not always have a particular social critique embedded in them.

**Commitment #4: Developing an interdisciplinary approach to teaching**

I did not ask teachers specifically about interdisciplinary teaching, but the topic came up from all teachers. TMfSJ is instrumental for teachers to connect math to other

subjects. Teachers believe it is important to show students how all learning is connected. Common subjects that teachers connect what they do within their classrooms to were various social studies classes, English, and art.

Some teachers have interdisciplinary teaching teams at their schools so that social justice mathematics units transcend single school subjects. Aminah co-teaches geometry with a design teacher; in a community asset mapping unit, they supported students to display their data on the community by creating infographics and drawing on their knowledge of circles. Lillian designed an interdisciplinary class on criminal justice that incorporated English, social studies, and math; and she collaborated with a teacher to incorporate mathematics into Facing History units. At James' and Ryan's school, teachers are encourage to collaborate across subjects. James explained at his school, which centers around Paulo Freire's philosophy of education, teachers begin units with the social issue. He chooses to look at historical issues and connect them to what is happening today in the community. Ryan designed a unit on examining the way Fox news presents data in graphs (i.e. truncating the y-axis). Juana and Brenda teach students who have mostly dropped out of traditional schools and who need to take various levels of math to catch up. They both find that thematic units across disciplines engage students who have been disengaged with their schooling. Elizabeth, who teaches middle grades at a Pre-school through Grade 8 school, led a school-wide, week-long social justice data fair, which encouraged teachers of other subjects to get involved:

> Science and history teachers connect data to their curriculum during the time of the data fair. My colleagues who don't even teach math thought, 'How can I have more conversations around data and justice in my classroom?' The third grade teacher runs a school store every year. Their proceeds go to a pizza party and a cause they care about. The class made a graph of how much goes to the pizza and how much goes to the cause. They realized it was a lot for the pizza and freaked out and then changed their plan.

Elizabeth fostered interdisciplinary teaching around math and social justice within the social justice data fair and pushed other teachers at her school to consider mathematics in their interdisciplinary teaching.

Most teachers have social science backgrounds, either as their primary area of study in their undergraduate education, as a double major with mathematics, or involvement in social issues and politics prior to coming to teaching. Only three teachers of the fifteen majored in only mathematics. Other majors and minors include: African American Studies; ethics, politics, and economics; history; mathematics education; sociology; Spanish; and studio art. Lena, who studied sociology, explained, "I think having the background of social science, I wanted to teach the social justice component and apply that to math...I thought there must be a way this subject can be taught. So I researched and found all this stuff and I was like, yes, this is totally doable! I would've been so much more engaged in my own schooling had math teachers done

this!" The resources she was referring to include radicalmath.org, *Rethinking Mathematics*, and Robert Moses' book.

**Commitment #5: Learning from and building with others**

No participant discussed enacting their commitment to TMfSJ in isolation. When I asked teachers about advice they would give to novice teachers interested in TMfSJ or inservice teachers who want to incorporate TMfSJ into their curriculum, teachers stressed doing this work in solidary with others – to build curriculum together, to learn from others' teaching, to read about what people have done, to attend conferences, and more. Their emphasis on and desire for collaboration was not only because they believed it would improve curriculum but also because they see TMfSJ as solidary work.

Supporting Picower's (2012) findings of teacher activists, the social justice mathematics teachers discussed learning from and building with others at three levels: 1) Drawing on the work of and creating curriculum with other critical mathematics teachers – within and outside of their schools, 2) Working with others to shift their schools for greater social justice, and 3) Joining and sometimes co-leading community organizations that struggle for educational and social justice. For the first level, Rosa explained:

> You have to look for a support system, have to find groups, join a professional learning team, find other teachers interested in teaching math for social justice. It's not going to be perfect, sometimes it won't work; but the more people you have to support you, the more likely you'll be successful. Those people can be in school or online. Look at blogs. Look for different networks. Find people you know in your heart have the same goals as you do. You're not alone, you just have to find those people.

Rosa emphasized how teachers interested in TMfSJ need to be especially proactive in forming communities of support. Lena mentioned creating a shared online folder of curriculum that she and her colleagues contribute to, and Ryan said she meets with the other statistics teacher at her school who is not as social justice-oriented as she is. Teachers noted how challenging it is to do background research, finding data and articles on social issues, that will translate into units, so they suggest dividing up this work with another teacher. Brenda noted that collaborating with "other people who are thinking about math as a cultural construct and broadening the definition of math" is "refreshing" and "exciting," sustaining her in her work.

Even the teachers who expressed feeling isolated within their schools talked about working with, learning from, and building with other educators. Most teachers collaborate on critical mathematics with educators who are not within their schools. They are eager to find mentors, mentor others, and network; but they all wish there were more people to reach out to. Some ways in which teachers connect with others is to: attend conferences dedicated to teaching for social justice, read texts such as

*Rethinking Mathematics* and reach out to teacher authors of that text, join (or be invited to join) university professors' working curriculum groups, start teacher inquiry groups with others in their city, and the teachers who have taught longer take on student teachers.

Teachers' social justice commitments carry over from their classrooms to their schools, as they strive to collaborate in shifting their schools to be more equitable and just. Cindy said, "Your ally could be […] the teacher next door." The ways in which teachers seek to create change within their schools varies greatly depending on school context. Elizabeth explained that her administration constantly asks her, "'What are your dreams, and how can we support you?'" so she proposed to create and take on a Math Special Events Coordinator position. Brian makes shifts by sharing about critical mathematics with his math teacher colleagues to "get them on board." Other teachers have more challenging experiences shifting their schools. Jaya shared that she attempted to make shifts similar to Brian's but that other teachers did not feel they could change their curriculum because of being bound to prepare students for standardized tests. Lillian's school shifts were related to encouraging faculty to talk about race and understand it is impossible to "not see color." Rosa's recent efforts were related to convincing her administration to let teachers seat students in groups as opposed to rows. She shared, "I had my ideas about what a good teacher was, and my school had other ideas. My kids say to me, 'You're teaching everybody! You're teaching the teachers!' Cause now they do the stuff you do.' It's cool I've been able to have that influence at my little school. I try, fail, and try again."

Finally, several teachers in the study also spoke to being involved in community organizing in the urban cities in which they teach, seeking to shift the education system more broadly. Gregson (2013) discovered that one social justice mathematics teacher's work was an extension of her community organizing and activism; this study supports that finding.

Ryan explained that collaborating sustains her as a teacher: "Every year you teach, it gets better. You are more confident, you know the system - good or bad - and how to work around it, and you build alliances with other teachers and parents that allow you to do the kind of work that you set out to do as a teacher."

### *Challenges of Teaching Mathematics for Social Justice in Urban Schools*

I identified three ways in which teachers experienced barriers to TMfSJ. These barriers affect teachers across subjects are striving to teach for social justice and urban mathematics teachers more broadly, but it is important to hear from the small but growing group of mathematics teachers how these barriers surface as obstacles for them, teaching in a discipline that is often seen as an objective field of study and where critical pedagogy is relatively new.

#### #1 High stakes reform: increasing high stakes testing, decreasing teaching autonomy and curricular control

Picower (2011) argues, "current educational policies such as high-stakes testing and mandated curriculum create schooling environments hostile to social justice education" (p. 1105). According to urban mathematics teachers participating in this study, social justice mathematics education is no exception. Teachers express they face day-to-day challenges due to the tensions and contradictions between high-stakes reform and TMfSJ. Every teacher shared that the greatest barrier to implementing their critical pedagogy is a high-pressure, test-centered culture in education, driving schooling further and further away from social justice goals in general. Ryan's instant response to my question about the biggest deterrent to her developing a critical mathematics pedagogy was: "Obviously high-stakes testing […] I teach at a Title 1 school *shackled* by AYP. You know how it is. I feel I'm coming up for air in between the testing and such." Similarly, Rosa said, "The first thing I want to say is less standardized testing. I want there to be less of an emphasis on testing." Cindy made a clear distinction between her social justice values as a teacher and the standards and test-driven mandates she must answer to, as she explained, "You have a set of values, and then you also have another set of things you're responsible for." When I asked her about the strongest deterrents she faces in TMfSJ, similar to Ryan and Rosa, with little hesitation, she shared, "I think the climate of fear in schools is probably the biggest one ... and the fact that everyone feels, *all the time,* this pressure around test scores. In some cases, people will come in and say 'You can't teach this way.' But it's more like if I'm doing something different from everyone else and my kids' test scores are terrible, I'm out here by myself." Some teachers said that their "freedom" to address social justice issues in mathematics at their schools is conditional on proving to their districts or school administration that their test scores are adequate, which is especially challenging to do given the breadth of mathematics topics the tests cover. All teachers shared deep disagreement and disappointment with test-driven pressures and structures in schools and ultimately feel that this direction does not foster an environment for students to explore mathematics conceptually or to connect mathematics to the world around them.

To illustrate how the tests sometimes address arbitrary concepts that do not get at students' wealth of knowledge, several teachers independently brought up how box-and-whisker plots have a large presence on state tests. Cindy explained, "Box-and-whisker plots are NOT my favorite data representation. I don't think they're very intuitive and I don't think they're the best way to look at data." Even though Elizabeth's students learn a multitude of data representations and the computer programs to create them during the social justice data fair, she expressed their test scores may not reflect this because of how heavily box-and-whisker plots are represented on the tests.

School, district, charter, and/or state contexts create a range of experiences for teachers with high stakes reform and testing. Cindy spoke to how the large urban public high school where she teaches embodies a central focus around high stakes testing and evaluation: "The thing that's frustrating is that the conversation is not about what are our values, what do we care about, what do we think is important – it's about how we're being evaluated […] it's about 'Are kinds gonna do well on the tests?' *So that's the context!*" Sarah described teaching within similar pressures, but shared the great consequences performance on standardized tests has for the charter school where

she teaches: "I have to get x, y, and z in before the test […] our school will close if we don't have significant improvement on our API. You could easily teach solving [equations] in four days, but not if you want it to be more fun, interactive, and relevant." Aminah, at a project-based learning public school, also feels the pressure of covering material before the state test, but for her it's from her administrator who told her that she takes too much time addressing the social part of social justice mathematics. Rosa shared that she is completely restricted from implementing social justice math units she's designed because of her charter administration's intense focus on test scores and their frequent monitoring of her classroom. While Lillian's school supports portfolio-based assessments, she feels it is challenging to discuss social justice education in general, so social justice mathematics is a far reach to bring up as something that should be more present. Even Maria who teachers in a private school not bound to standardized tests said that she feels her work is evaluated by how students do on the SATs. Lena, who does not give traditional state exams as she teaches special day math, said her charter organization has frequent evaluations related to teaching to the standards, but she said at least her administrators understand the work she is trying to do. Brenda, also not bound by state standardized tests said, "I have to spend a lot of time teaching to the GED test, and I wish I could spend that time having a richer curriculum."

Several teachers brought up that their districts, charter organizations, or schools often bring in new books and curriculum and select all kinds of areas of focus, with the hope that there will some fix to improve test scores, but that none of these make any systemic shifts. This barrage of new things teachers have to try year-to-year makes it feel nearly impossible for some teachers to create, reflect on, and refine their critical pedagogies because so much time is spent chasing different solutions.

Elizabeth was the only teacher who did not express feeling restricted by standardized tests within her school, at least at her current school. She teaches at a diverse private school founded in the 1960s with no racial majority in any classroom that has a commitment to social and environmental justice. She feels that teaching with freedom from tests for a period of time has made her feel that when she goes back to a public school she will have enough curriculum and ideas to sustain the work there, even in the face of tests.

Across the board, teachers expressed that their students have negative experiences with testing, even to the extent of crying during them, but that doing units in their classrooms that connect to students' lives helps them "build confidence and more positive identities," as Juana put it. Teachers gave mixed responses to my question of if they see TMfSJ improving students' test scores. Lena answered, "They're inherently going to succeed at a higher level on the tests because they have those problem solving skills and they can apply it to different things." Aminah had a different perspective as she shared, "What improves is their self-confidence, viewing their own efficacy in the classroom. I'm not training them to take multiple-choice tests but to read a graph and create their own. They *could* be better test takers, but I work on how well they can work in groups and share ideas." Aminah said that some teachers say, "Screw the tests," but this issue is not so cut and dry for her. While Aminah works at a school

that does not emphasize test scores but rather traits such as students' critical thinking and presentation skills, she still feels guilt for not preparing students more directly for tests because the scores have such great meaning from external sources, such as the district and colleges; and the students know it, too: "I have some students who are into their test scores and other students who say they don't see the point of school; I need to develop a curriculum that is going to tap into all of their interests. How do I connect with my students who are so test-driven? How do I break that? How can I help them value other skills that are important?"

When Ryan spoke to the impact of the "testing world," she shared how incredibly challenging it is to try to teach with equity and justice in mind at this time but said, tears in her eyes, "I gotta believe that things are going to get better. It's the only way." Brenda exclaimed, "The system has failed students and we are testing them on how they were failed!" And Lillian said her students are "incredibly burned by increasing demands."

While high stakes reform makes teachers feel bogged down and sometimes puts them in positions of having little curricular control, they push back using "creative insubordination" (Gutiérrez, 2010). One of the most fascinating examples of this was from Lena, a special education mathematics teacher. She explained, "I have legally binding documents - the students' IEPs. I can write in the IEP: 'Joseph will learn how to solve equations and be able to apply the logic of solving equations to three real-world problems.' In this way, Lena is *writing social justice math into the law*. Another example is when Rosa realized her administrators were demanding teaching practices that were in direct opposition with what the research says on cooperative learning (i.e. requiring teachers give students thirty minutes a day of silent problem solving time), she invited a professor who was at a local university who does work on mathematics equity to come to her classroom. She explained that this move was "definitely protection," as she could share the professor's evaluations with her school. A final example is from Elizabeth's earlier years teaching at a public school. When writing a grant to her school board to get busses for a field trip to a reservoir during an environmental justice unit, she strategically framed her mathematics project to be around "service learning" rather than social justice activism, because she felt that would be "less threatening" to the school board. Teachers are persistent and creative as they strive to implement social justice mathematics in high stakes schooling contexts.

The community organizing teachers are involved in (discussed in the previous findings section on their commitments) is often related to challenging the injustice of high stakes reform. They resist test-centered teaching in their own practice *and* outside of their classrooms. Jaya explained, "It takes time, but over time, the changes will compound." As Michie (2012) found, "Even in the face of attacks on teachers' dignity and policies that hinder their work, they keep taking steps, they walk on."

**#2 A lack of curricular examples, resources, and time to develop this pedagogy**

"I'm waiting for the critical mass moment, when it starts entering more mainstream schools, and I think it'll happen, on a more grassroots level," Brenda

explained, as she spoke of the challenge of critical mathematics curricula and resources currently being so sparse and the implementation of such curriculum still being quite rare. Many teachers addressed how it would be easier for them to develop their critical mathematics pedagogy if there were more existing resources to draw from and if critical mathematics pedagogy were more normalized across schools. Ryan said, "just knowing that there are people out there, that's refreshing." Some teachers brought up that there is a wide range of social justice-oriented social studies curriculum and organizations supporting the teaching of such curriculum. *Rethinking Mathematics*, radicalmath.org, and the Creating Balance in an Unjust World conference offer some curricular examples and entry points for teachers, but every teacher expressed a desire for critical mathematics to grow and for more spaces for teachers to share with one another. Elizabeth started an inquiry-to-action group for social justice mathematics teachers from different schools in her city, but with four members it did not take them long to share all the ideas they had already developed for social justice mathematics units.

It is a challenge for teachers to develop units oftentimes completely "from scratch." Gregson (2013) found this to be true for the social justice mathematics teacher in her case study. Brenda explained that social justice math units are, "almost entirely generated by me, or things I've gotten from other work or been inspired by at a conference. I can't just make these copies and here's my lesson." Teachers spoke of getting ideas from an article or book unrelated to math, doing intensive research on the social, political, or economic issue, and spending the most time looking at how mathematics concepts in their courses could connect to those issues - sometimes for students to analyze existing data and sometimes to gather it themselves. Juana admitted that she would do much more with social justice in mathematics if more curricula existed, and Ryan shared that she believed having more resources would make it easier to bring her coworkers into social justice mathematics.

Teachers are not asking for ready-made, easy-to-implement units, but they feel that with a wealth of examples it will be much easier for them to get ideas and model off of other people's work. They do not want to give up on being social justice curriculum creators; they just want environments that make it easier to do that. It takes a great deal of additional work to create a lesson or adapt a lesson to meet the needs of their students and be relevant for their students' contexts. Time is required to develop social justice curriculum to build up to the "critical mass" (of materials and people) Brenda referred to. Teachers say they need more time to develop curriculum and collaborate with others. James explained that when thinking about lessons, he takes time to think, "How does math help us create a situation where this injustice will fade out?" This is a heavy charge, which requires time. The challenge of time is highly related to high stakes reform pressures discussed above. Ryan asked, "How do we work on skills they'll need for a lifetime *and* make sure they master the content for a standardized exam? I want to find a way to do both. I worry that there's not enough time." Teachers want to be viewed as capable professionals, which in part means being give time to create rigorous social justice mathematics curriculum. The challenge of time makes the process more challenging for teachers, but it does not deter them.

**#3 Beyond mathematics, beyond education: poverty and other systemic inequalities affecting urban youth**

Many social justice mathematics teachers spoke to larger systemic barriers such as poverty as affecting their students' lives, and consequently their classrooms as teachers committed to TMfSJ. Lillian argued that we need to have more conversations about how students are "disenfranchised by the school system before we keep being surprised about outcomes." Across the board, teachers argued that we cannot only focus on furthering critical pedagogy without simultaneously addressing larger barriers that affect students' education, as Noguera (2011) and Anyon (2005) argue. Ryan explained, "[In education] we always have a new quick fix to poverty, but really it's poverty which is the problem. It's really jarring for students […] which interferes with any kind of learning, social justice learning included." She was the only teacher to bring up how her school was taking action to address poverty, including building an advisory program that brings in multiple community partners who address students' social-emotional growth. Teachers feel that students "should not be worried about their own basic survival needs," as Cindy put it.

Mathematics teachers can develop a unit to build students' critical consciousness about economic inequality, which they believe will empower students to become consciousness members of society and make change, but they argue we urgently need allies in all societal positions to work towards eliminating poverty. When I asked Maria what she would want to say to education reformers if she could say one thing, like many teachers, she did not narrow in on mathematics education: "We need to change healthcare, immigration, economic development. You can change all the standards you want but injustices will still be there. The kids in low-income neighborhoods have other things in mind than passing *your* tests." She noted the intersection of many systemic inequities and called out the focus on testing when the education system and other systems are starkly inequitable, which echoes Ladson-Billings' (2006) and Gutiérrez' (2008) arguments about how we should focus more on opportunity gaps as opposed to achievement gaps.

While systemic barriers make TMfSJ and all kinds of teaching challenging, having great societal inequity makes TMfSJ all the more necessary. Teachers discussed how addressing and pushing back on inequity both empowers students *and* inspires them to keep teaching. Brenda noted that doing these units makes students aware of systemic injustice, that there are faults with the system.

***Social Justice Mathematics Teachers' Visions for Urban Mathematics Education***

I structured interviews to provide multiple opportunities for the social justice mathematics teachers to share their perspectives on what they envision for the future of urban mathematics education; teachers should be treated as "professionals and intellectuals" whose daily experiences with critical pedagogy provide them with an on-the-ground expertise (Nieto, Gordon, & Yearwood's , 2010, p. 352).

First, it is important to note that most of the teachers, at some point during the interview, discussed how no one asks them for their opinion on social justice mathematics or, more broadly, on urban mathematics education practices and policies. After posing questions, teachers often proclaimed statements such as, "No one ever asks me this!" and excitedly shared their thoughts. Central to what teachers envision for the future of urban mathematics education is having their voices, as well as student and parent voices, included in the directions of it. In response to my question about what message teachers would like to send to education reformers, Cindy said:

> I would tell them to listen a bit more, ask more questions. Listen to students, teachers, parents. Maybe you have great ideas and expertise, but people know what they need for themselves. More listening to what we need in our classrooms. Maybe you'd be able to provide better supports for what people actually want and need. […] I wish someone would ask my advice. It's frustrating to be told a lot how things should be done; and I feel like *nobody ever asks,* or if they do ask it is in a really superficial way.

Overwhelmingly, teachers feel that the people who shape what happens in classrooms daily are left out of decision-making. Their critique referred to mathematics education policy and scholarly research but also their districts and schools. Ryan, who was verbose throughout the interview, began laughing when I asked her about what she feels we need more of or less of in math education and said, "I'm not often asked to express these opinions! So I don't know what to say!" After thinking a moment, she did have a lot to say; but her initial reaction shows how taken aback she was that there was a forum where someone wanted to sincerely know what she envisions for the future. We cannot further social justice educational research and transformation when the very people committed to this work in schools feel silenced and treated as if their ideas are unimportant.

One hope that teachers have for the future of urban mathematics education is that teachers across all grades levels will be supported to teach mathematics conceptually and within interdisciplinary units that connect to the real word, including how mathematics can be used to understand and challenge inequality. They feel it is immensely important that critical, culturally relevant teaching in mathematics start early, yet social justice mathematics is mainly focused around secondary teaching. Ryan expressed she is interested in working alongside elementary teachers in her community to further envision what social justice mathematics can look like in elementary school.

Social justice mathematics teachers hope for alternate ways of understanding and assessing what students know. The believe the purpose of educational assessment should be to inform future instruction and support students to improve over time as well-rounded young people. They feel that mathematics standardized tests miss important gains their marginalized students' make because of participating in social justice mathematics, such as their growing self-confidence in mathematics, the mathematical connections they make to social issues, and their empowerment as social change agents. Teachers proposed that in mathematics assessments can include

culminating activities of project-based learning social justice units and portfolios that students put together across time to demonstrate their self-improvement. Teachers feel that lifting pressure from standardized assessments will also help in the process of mobilizing other urban mathematics teachers who they think would be interested in TMfSJ but feel too restricted by tests to try. Teachers no longer want to be made to feel that TMfSJ is a "distraction" from test-centered learning, as they feel it is the tests that are the distraction. Ryan explained, "I'm hoping in another ten years there might be more opportunity for everything: joy, thinking, art, project-based learning, music […] that would really, really help social justice education and especially social justice goals in general." Ryan lamented how high stakes testing has shifted education away from what she feels really matters in schools.

Social justice mathematics teachers see the Common Core State Standards (CCSS) as offering potential promise for social justice mathematics, but at the same time express great concern. Teachers felt that, as a set of mathematical standards, the CCSS implies that mathematics should be taught conceptually and that the kinds of exercises suggested by the CCSS align with reading, writing, and making arguments with mathematics that social justice mathematics calls for. Teachers' concern is in two areas: 1) that they will not be supported to implement the CCSS, and 2) that the assessments connected to CCSS will be
"more of the same" high stakes testing. Elizabeth explained, "The way that the standards have been implemented through testing have really under-minded the good aspects of the standards. I don't think standards are bad, but what do we do with them? Memorize every little tiny part for the test, or are they a guiding force with big questions?" Teachers challenged those who think the CCSS are "the answer," as they argued in addition to standards we need smaller classes, more time to build curriculum, peer-to-peer professional development, and more resources of all forms. Cindy explained that social justice mathematics is about empathy, and to support students to create that type of class environment we need all of the above in mathematics classrooms. She concluded, "I don't hate the Common Core but I think there's a lot of attention paid to it as if it's gonna fix everything."

Finally, SJM teachers also proposed changes to teacher education. Elizabeth brought up that teacher education programs can more comprehensively address (in)justice issues in the city or even communities in which teachers will teach in as well as around the world - that this should be part of what future urban mathematics teachers experience in their teacher education curriculum. How can teachers begin to deign social justice mathematics units if they are not familiar with the (in)justice issues their school community cares most about? Mathematics teacher education programs have great potential to be powerful sites for diving into what TMfSJ can look like in urban schools.

**Discussion**

In this work, I highlight social justice mathematics teachers' experiences TMfSJ and their perspectives on how urban mathematics education should change for greater equity and justice. Social justice mathematics teachers view TMfSJ in urban schools as

part of a larger project to alleviate the "education debt" for Students of Color and economically marginalized, under-served students. Urban mathematics teachers who strive to TMfSJ implement a variety of lessons and have various experiences within their contexts, but they are unwavering across the five commitments detailed in this study.

This study demonstrates how urban mathematics teachers have "on the ground" experiences that can help us build upon Freire's (1970) notion of education for liberation, including mathematics as a space where social transformation can be studied and fought for. This research reveals that teachers who engage in TMfSJ have powerful stories and feel their beliefs and experiences are not often centered in mathematics education practice and policy about what it means to create more equitable, social justice-focused mathematics classrooms. Social justice mathematics teachers call for a voice at the table. We turn to new standards, new tests, new technology - often implemented in the name of closing achievement gaps - but we can do more to turn to the classroom teachers doing critical, cutting-edge work in their classrooms to learn about closing opportunity gaps in urban mathematics education and how to make it more relevant. Positioning teachers' voices as central to investigating teaching for social justice allows us to understand how their commitments and challenges collide and vary within particular school, district, or charter contexts and larger social and political contexts; the more we understand these intersections for teachers, the better we can prepare and support teachers to teach for social justice. I suggest, as the teachers of this study do, that educational leaders and decision-makers listen to what equity-driven, social justice-minded teachers have to say about what urban mathematics education can and should look like. It is not enough to imagine what TMfSJ *can* be; we need to understand what it looks like for teachers and students in classrooms.

The fulltime teachers who have been striving to enact critical mathematics pedagogy over time confirm and expand on the challenges that Bartell (2013) and Gonzalez (2009) detail for teachers who are learning to teach mathematics for social justice, but teachers speak back to critiques of TMfSJ. Social justice mathematics teachers seek to create rigorous mathematics classes where social justice units can be incorporated when possible and they can be implemented in a way where students can find joy in learning about something that is meaningful to them. We cannot come to conclusions about a lack of possibility for or rigor of TMfSJ without understanding fulltime teachers' experiences with this pedagogy, as well as studying their classroom practice. Brantlinger (2013) concludes that he would not include a significant critical mathematics component were he to return to a mathematics classroom, but this study does not support that finding for fulltime classroom teachers committed to TMfSJ. They persist as they gradually, over the years, build critical curriculum and express they would never consider abandoning the work. The fifteen teachers in this study did not report the student disengagement and resistance that Brantlinger found. What teachers shared in this study supports Gutstein's (2007b) theory that it is possible to teach mathematics for social justice and Gregson's (2013) observations of the challenges of one social justice mathematics teacher. While Gustein acknowledges that we can learn from diverse educators who have been doing this work over time, we still have a long

way to go. We need to hear out and better understand urban mathematics teachers committed to TMfSJ so that we can prepare and support teachers better to do the work they care about. Bartell (2013) found that teachers learning to teach mathematics for social justice had trouble negotiating mathematical and social justice goals. While my findings suggest that teachers feel this is no easy task, they are committed to not giving it up because they work over time and collaborate with others to merge these goals. Picower's (2012) finding in her study of teacher activists holds true for social justice mathematics teachers as well: "They are willing to continue the fight even in the face of loss, because they are committed to realizing their vision for justice. They recognize that their vision may not be realized in their lifetime, but they commit to pushing back against the forces of oppression, rather than sitting back and doing nothing" (pp. 572-573). As Gutstein (2007b) notes is important, teachers push for a sense of agency in their work, even in conditions that do not foster such agency.

**Implications**

The implications of this study are truly what the teachers themselves shared. This study has implications for many involved in urban education: mathematics educational policymakers and reformers, teacher education programs, current teachers who are interested in TMfSJ, and future mathematics teachers. For the purpose of this paper, I focus on teacher education.

Teacher education can contribute to the promise of greater equity and democracy in schools, politics, and society (Giroux & McLaren, 1986). Teacher education program faculty can learn more about what is necessary to prepare urban mathematics teachers entering the classroom and support them once they get there. If teacher educators understand the commitments of urban mathematics teachers TMfSJ, they can support those teachers and others to enact them. Mathematics teachers need content knowledge, pedagogical knowledge, racial and cultural knowledge (Howard & Milner, 2014), political knowledge (Gutiérrez, 2013), and knowledge of social movements and sociopolitical forces that affect their students (Gutstein, 2006a). All of these areas can and should be addressed in teacher education. In Theoharis' (2007) study of social justice principals, he argues: "It is irresponsible to prepare leaders to take on enormous challenges and face significant resistance without understandings of how to weather the storms that will result" (p. 250). Teachers need support to develop critical mathematics pedagogies, enact them, and learn how to push back on barriers, as the teachers in this study are learning to do creatively over time. Teachers striving to teach mathematics for social justice need more than being exposed to *Rethinking Mathematics* in teacher education; they need to learn about the commitments and challenges of teachers in various classrooms who are TMfSJ to understand how critical mathematics pedagogy may "come alive" in their own classroom contexts. The Common Core State Standards present a unique time for teachers and teacher education programs alike to further look into how TMfSJ can be actualized.

The teachers in this study argue that there should be more spaces for collaboration, both within their own schools and more broadly in coalitions of critical

mathematics teachers, to "develop working networks with other educators who share their emancipatory visions" (Gutiérrez, 2010, p. 26). They need time to develop their work, build on it, reflect on it, and ultimately expand it. Teachers should be able to do this without feeling overwhelming pressure (Gutstien, 2006a).

To continue to build theory and understand praxis of TMfSJ in urban schools, future research must document the ways in which teachers are taking up critical mathematics in their classrooms and seek to understand how schools can further support their growth. While an advantage of this study is the inclusion of teachers from across the country, a drawback of this study is that it does not involve classroom observations or student interviews. For building a theory of TMfSJ, we can learn more from being inside classrooms in different city and school contexts, learning from teachers and their students how to name and capture various student outcomes of engaging in social justice mathematics that standardized tests do not capture. As we seek to understand the translation of critical pedagogical theory to practice in urban schools, it is essential to do so within various contexts that represent the daily realities of teachers and students.

It is essential to continue to uncover teachers' experiences and classroom practices for the purpose of advancing research as well as building solidarity in the struggle to teach for social justice. Teachers are too often missing from conversations that ultimately shape what is possible or supported in their classrooms. Utilizing a critical grounded classroom approach, we can position teachers as experts who wrestle daily with many elements of teaching to create socially just, equitable classrooms. It is their voices, along with student, family and community voices, that best understand the "radical possibilities" of education (Anyon, 2005).

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