# NARRATIVES OF EQUITY IN EDUCATION: THE SOCIOPOLITICAL MICROSTANCES OF SECONDARY MATHEMATICS TEACHERS

by

DANIEL LUIS RAMIREZ

A DISSERTATION

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Student: Daniel Luis Ramirez

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This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Philosophy degree in the Department of Education Studies by:

| | |
|---|---|
| Jerry Rosiek | Chairperson |
| Jill Baxter | Core Member |
| Joanna Goode | Core Member |
| Colin Koopman | Institutional Representative |

and

| | |
|---|---|
| Scott L. Pratt | Dean of the Graduate School |

Original approval signatures are on file with the University of Oregon Graduate School.

Degree awarded March 2016

DISSERTATION ABSTRACT

Daniel Luis Ramirez

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Title: Narratives of Equity in Education: The Sociopolitical Microstances of Secondary Mathematics Teachers

This sonata-form case study investigates the sociopolitical microstances of three secondary mathematics teachers in an urban, comprehensive high school. The study is framed by three questions: 1) How can philosophical pragmatism add a purposive, action focused piece to the sociopolitical framework? 2) What sociopolitical microstances – focused on the practice of teaching – can we identify from the narratives of mathematics teachers? 3) What inhibitions can we identify that are preventing teachers from further transformation in their classrooms? To address the first question both historical and contemporary pragmatist philosophy as well as a bridge between poststructuralism and philosophical pragmatism was used to augment the current sociopolitical theory in mathematics education research. Sociopolitical microstances were identified within the three sonata-form case study narratives – connecting broader social, cultural, and political implications, past and present framings of teacher knowledge, and narrative inquiry with equitable mathematics teaching. The microstances identified in the narratives include: anti-racist, deconstructing ability, community, *conocimiento, Napantla,* and being more than a teacher. Inhibitions were also identified from the narratives, and these include: time and emotional energy, local/state/national requirements, college course requirements,

disconnect from academic scholarship, and having to confront the whiteness in others.

# CURRICULUM VITAE

NAME OF AUTHOR: Daniel Luis Ramirez

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
Willamette University, Salem, Oregon

DEGREES AWARDED:

Doctor of Philosophy, Education, 2016, University of Oregon
Master of Arts, Teaching, 2007, Willamette University
Bachelor of Arts, Biology and Spanish, 2003, Willamette University

AREAS OF SPECIAL INTEREST:

Mathematics Education
Narrative Research

PROFESSIONAL EXPERIENCE:

High School Mathematics Teacher and Instructional Coach. Roosevelt High School, Portland, OR 2013-Present

Adjunct Faculty. University of Oregon School of Education, Eugene, OR 2013

Graduate Teaching Fellow. University of Oregon, Eugene, OR 2009-2014

High School Science, Math, Spanish Teacher. Academy of Arts and Academics, Springfield, OR 2007-2013

Middle School Science Teacher. George Washington Middle School, Alexandria, VA 2006-2007

Student Teacher. Claggett Creek Middle School, Keizer, OR January to June, 2006

GRANTS, AWARDS, AND HONORS:

University of Oregon Diversity Scholar
Silvy Kraus Presidential Fellowship In Education
Excellence in Education Nominee, Alexandria School District
OTEN Grant Recipient
Mary Stewart Rogers Award
Science Teacher of the Year, Madison Middle School
Willamette Summer Collaborative Research Award
Multicultural Achievement Scholar

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This is dedicated to my family. To my mom and dad who endlessly support and encourage me on all of my adventures. To my sister and her family for always reminding me what is important in life. To my beautiful, creative, and brilliant children – Xavier and Ethan – who help me find the joy and love in life. And, finally, I dedicate this to my partner Lindsay; it would take a thousand dissertations to capture my love for you.

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# AN INTRODUCTION

The very practices that are taken up in the classroom and the meaning of doing mathematics are inextricably tied to the constellation of other identities that students bring to the classroom. Such an acknowledgement opens the doors for us to see that holding an equity stance means recognizing that as a mathematics teacher, one teaches mathematics and so much more than mathematics that influences students' development (Gutiérrez, 2008c, 2009).

It is a good day. Students are sitting together, diligently 'experimenting' with natural selection, and leaning into the experience. Thirty-five kids intently scoop beans from their desks into Styrofoam cups using kitchen instruments, exploring how different physical adaptations affect the likelihood of beans 'surviving' iterative passes through a makeshift strainer. I wander around the room, gently probing, redirecting, and facilitating the experiment. It is March, so the moderate dry season is slowly transforming back into the oppressive, sweaty, steam room that this city calls summer. The loud whir of the enormous air conditioner drowns out the lively chatter of students.

Ironically, the blast of hot, moist, air also signals the impending suffocation of state testing. Everyone feels the pressure. District leadership feels pressure from the state to demonstrate improved test results; teachers feel burdened by the media, parents, and administration; and students feel the stress from every direction. I'm a teacher in a 'failing school.' We have been labeled 'failing' for the last three years and our prospects this year do not look promising. My students are finishing up their eighth grade year, meaning that they have been tested in mathematics and language arts every year since the

third grade. They've taken at least ten high-stakes tests over the past five years, in addition to numerous other national and international tests. In two years, a standardized test will determine whether they graduate from high school. One test will open or close the door to significant opportunities for my students.

As I survey the room, I am again struck by kids' engagement in the activity at hand, a hard-won improvement in my own teaching after twelve months of failures and misunderstandings as a first-year teacher. Today, in contrast, students are starting to understand the abstract concept of natural selection as they work through the iterative experiment. They are connecting what they are doing in class – a real and meaningful experience – with a blandly defined term in their outdated textbook. Everyone is "doing" learning and it feels incredible.

As I circulate around the back of the room I hear a loud, authoritative knock on my door and quickly shuffle back so as to not disturb the students' diligent work. I have learned quickly that teaching at this school can be isolating, at best, so it's rare that anyone visits our classroom. I open the door with eyebrows raised in surprise – secretly hoping that I might get to show off the students' great work – to find a district official tasked with 'fixing' our school standing solidly in front of me, a man that I'll call Mr. District.

Mr. District always dresses in elegant, tailored suits so he stands out against the backdrop of our mandatory uniforms; a sea of red and khaki punctuated with the smiles and laughter of black and brown faces. Our school is a majority minority school. Nearly ninety-eight percent of our students identify as Black or Latin@ and ninety-six percent are on free and reduced lunch. There are a few good teachers, but students typically face

low expectations, inexperienced teachers, and rote, teacher-led learning. Segregation, institutional racism, marginalization, and oppression are omnipresent.

It is within this context that Mr. District pops his head into my room and says with a pointed look on his face, 'What are you doing right now?' I am a bit taken aback by the judgment in his tone so my response is stuttering and apprehensive. *We are learning about natural selection. The students are doing an experiment that shows what happens to animals with certain traits over time.* He quietly scans the room and responds, 'You should be doing a mathematics review.'

Confused, I stare blankly at Mr. District unable to respond in a reasonable time. He takes advantage of the silence and says sharply 'the state test is in a few weeks and the students need as much review as they can get. You need to figure out what they need to know in mathematics and review.' He does an about face, walks out of the classroom, and I am left, stunned, at the door. A wave of confusion, anger, and frustration washes over my naïve, optimistic vision of education. Some students look up to see what is going on but quickly get back to work. Beans fall to the ground, students talk and laugh, and the air conditioning drones a steady accompaniment. I quietly close the door, smile at the group closest to me, and ask them if they are seeing any patterns in their data.

**The Importance of Stories**

I recount this story to offer a snapshot of what I have experienced over the last twelve years and to provide an introduction to the framework of this dissertation. I have had the privilege of teaching in several schools across the country in a series of interconnected – yet unique – stories involving students, content, pedagogy, colleagues, administration, district interventions, standardization, high-stakes testing, and various

other aspects of education. I say unique because each story represents knowledge(s) that have influenced who I am as a teacher, but these individual knowledge(s) cannot be disconnected from each other or my experiences beyond school institutions. These stories/experiences/knowledge(s) are rhizomatic (Deleuze & Gutarri, 1980). They are interconnected, interrelated, and resist classification or organization. To be truly rhizomatic they must also be discontinuous, without a start or end. Because I am still teaching, I believe this system of knowledge(s) is still spreading, connecting, and growing. However, there is a definite chronology to my understandings of teaching and learning. There is a stark difference between my first day on the job – an idealistic, energetic, naïve twenty-one year old – and now – a more experienced, thoughtful, and purposeful educator. These understandings have developed slowly and noticeably within a storied cycle of dissonance, experimentation, and new understanding. As a result, my stories/experiences/knowledge(s) are also pragmatic. That is, as I interact with the world around me and try to solve problems with my teaching practice, I engage in a process of inquiry that leads to new understandings through my actions (Dewey, 1998).

As I reflect on my experiences and stories, I wonder what we might learn – what rhizomes might spread or connect – if we hear or read stories from other teachers. Stories have the power to make us question our assumptions while also providing insight into new possibilities (Barone, 2007). As a teacher retells their personal and professional history, stories emerge that intimate my own journey as a teacher. We see problems that they face and their (re)action. We feel the emotion behind a challenging situation and the resultant personal and professional shift after this moment. We hear the pain, uncertainty, and joy in their voice as they navigate student relationships, try new things in

the classroom, and deal with institutional adversity. We understand what it's like to work tirelessly for a cause while continuously facing obstacles and limitations. As we listen, the stories begin to destabilize our own notions of teaching and learning; our assumptions are shaken, our preconceptions are (re)conceptualized, and our ideals are transformed. Through these moments of tension and release, stories provide possibility in the face of incongruity. They challenge our current understandings, a vibrational dissonance that opens new ways of approaching education. Our rhizome spreads and makes new connections. In essence, stories are the catalyst the helps us reflect, grow, and transform our practice as teachers.

Stories are also a place for hope. In a world that castigates teachers – blaming them for all that ails education – there is a desperate need for optimism. Although many narratives in education recount conflicts, tensions, or frustrations, there is also an undercurrent of hope. Ayers and Ayers (2011) sum up the need for this hope, saying "if society cannot be changed under any circumstances, if there is nothing to be done, not even small and humble gestures toward something better, well, that ends the conversation (p. 12)." Teachers want the conversation to continue. They want their students to succeed and (re)invest – socially, culturally, politically, economically – in their communities. Many teachers work tirelessly through the day and well into the evening thinking hard about their practice, and how they might better meet their students' needs. How can they encourage more focused group discussion? How can they honor every voice in the classroom? How can they create a safe space for students to take risks on challenging problems? What are ways they can honor and include more difference within my practice and curricula? What are different ways they can assess students'

understanding? All of these questions are predicated on creating something better, and this disposition is evident in the challenges they face and the resulting stories they tell. Difficult situations are common in teaching but dedicated, critical teachers keep trying new things, deploying different tactics, and reflecting on the results. The inquiry process needs hope in order to continue and stories capture this process. Hope is rarely a behemoth; instead it masquerades in a constellation of small moments: a brief interaction with a student, the moment when a lesson finally clicks, laughter that ripples through every last student. And, ultimately, I believe that the culmination of these micromoments offers a more comprehensive picture of *what could be*.

*What could be* is a large focus of this dissertation. By presenting narratives of teachers who face continued and far-reaching barriers in education, it is the goal of this dissertation to not only trouble our understandings of what it means to teach mathematics in a high poverty, diverse, urban, comprehensive high school but also to provide a sense of optimism regarding what proactive strategies teachers adopt and what they could do if given enough room and support. Through teachers' stories we are immersed in their histories, the experience that they face on a daily basis, how they react when faced with challenges, and their visions of what education could be. More simply, narratives are a place to read, feel, hear, and better understand **who** mathematics teachers are and **what** they do in the classroom.

Too often these stories are overshadowed by authoritarian perceptions of knowledge (Cochran-Smith & Lytle, 1999) and the undiminished skepticism of teachers as producers of knowledge. The narratives in this dissertation are intended to trouble our current understandings of what is required to teach mathematics, re-center who gets to

produce knowledge for teaching, and expand contemporary framings of sociopolitical mathematics teaching. The sociopolitical turn in mathematics education has been a powerful theoretical push – troubling narrow conversations and flipping traditional narratives in mathematics education research. But, how does this translate into a teachers practice and everyday experience? What are other ways we might frame 'political' beyond the social justice and critical framework **(**Gutierrez, 2013; Gutstein, 2006)? How do we include the stories of teachers as important sources of knowledge in this conversation? How do we question 'authority' in the sociopolitical turn – which aims to trouble who has authority – and privilege the stories of educators in the classroom? How can we expand what knowledge(s) are included in this conversation? These questions are important to keep in mind throughout this dissertation and it should be emphasized that central to this work is the tireless efforts of everyday teachers and their courage and selflessness to share their experiences.

**Whose Knowledge 'Counts' in Education Research**

It's important to first consider the development of 'knowledge production' in education in order to better understand one of the primary goals of this dissertation. By focusing on the narratives of teachers and transformative moments in their practice, this dissertation aims to proliferate what counts as knowledge in mathematics education as it augments the sociopolitical research movement. This dissertation is not intended to be an 'ethnographic' account or a quantitative interpretation of teaching, and instead focuses on teachers as producers of knowledge. As a result, this dissertation frames teachers as the experts within their field – essential producers of educational knowledge – and asks how we can learn from their voices. For almost a century, teachers were not included in most

conversations within the academe, and as a result, educational knowledge was framed by a handful of important academics who were distanced in varying degrees to their subject matter. This research seeks to help in correcting that oversight.

Education research emerged in the U.S. during the late 1890's and early 1900's in conjunction with a more established, concentrated, and standardized education system. During the mid 1880's there was a shift – especially in urban centers – towards creating a "one best system" in education (Tyak, 1974). The dramatic change from a more distributed 'village system' towards a more uniform system of education was propagated by a stark increase in students attending schools and a desire to produce more homogeneous workforce. In response to this vision, research expanded in order to support these educational efforts. Most of the initial research was historical – focusing on the emergence of formal education in the U.S. and other systems of education around the world. However, at the turn of the century the approach shifted, in part owing to a general optimism towards the application of the scientific method in efforts to ameliorate social problems.

The first major study involving real-time data was driven by a Professor of Education at Harvard and another Professor of Educational Administration affiliated with the Teachers College. With adequate funding, the researchers began what transformed into a thirty-year school survey study that investigated everything from supply purchases to classroom practices. The switch to – and eventual reliance on – quantitative data as the ultimate source of validity was spurred by the publication of Thorndike's *An Introduction to the Theory of Mental and Social Measurements* (1904), which provided methods for statistical collection and analysis. Late empiricists and early positivists who

maintained that knowledge was derived from our sensory experiences and, more explicitly, through the use of the scientific method drove this epistemology. As a result of this foundation in educational research, white, male, privileged, and often religious professors at flagship institutions such as Harvard, Yale, Chicago, Stanford, and the Teachers College framed what knowledge counted in education (Lagemann, 1997). Ironically, many of the initial educational research communities were shunned by more established academic research organizations (physics, chemistry, biology, psychology); in many spheres, education scholars and the knowledge they were producing were not considered legitimate science. There was also an apprehension to accept scholarship from educational researchers within the burgeoning school systems, based on the perception – in many cases the reality – that researchers were removed from the local context. Concerns were raised regarding the alleged egotism and sexism of then researchers and their desire to establish patriarchal, hierarchal systems within schools. Education programs focused on producing administrators who would relay their research to the mostly female teaching staff. Few, if any, education programs trained teachers.

Because of their rejection from the larger research community and educators in the field, educational scholars began to realize that they would have to invest back into the communities that they studied in order for their work to be effective. Around the late 1920's, educational scholars began to transition to curriculum studies in an effort to offer solutions to problems within schools. Instead of simply diagnosing problems, scholars had a desire to fix the problems. This move was propelled – again – by a drastic increase in students attending high schools and a desire to better prepare students for college and career. It was also supported by John Bobbit's (1918) book that outlined how to study

curricula using the scientific method. The use of the scientific method and the focus on curricula continued well into the 1940's, although there were some isolated efforts to include educators in the production of knowledge. In Ellen Lagemann's (1997) history of research in education, Lagemann puts quotes around 'cooperative research' because, although there was an increased focus on including educators in the development of curricula, these efforts were not widespread and many school districts either did not have the resources or opted out entirely. At the same moment, these broad strokes in education research were split between a more progressive child-centered view of education – project-based, integrated learning – and a society-centered perspective that wanted to train students to become better citizens, focusing on life and social skills. So, even though there were efforts to distribute knowledge, most research or the design of the research and knowledge production was guided by a few powerful, privileged, white scholars at premier institutions.

After World War II and at the start of the Cold War, there was an increased focus on content-specific research. Up until this point, most scholarship had focused on the broad intentions of education (child centered versus society based) rather than specific pieces of academic information that students should know. As the tides turned socially and politically, so too did educational research. More parties got involved in the process, including the government, which became fully vested in educational research. Determining that education was of national and military interest, the government began to fund educational research, especially in the fields of mathematics and science. The National Science Foundation and the U.S. Department of Education began investing large amounts of money in national projects to establish mathematics and science curricula.

Especially after Sputniks launch in 1957, the government was keenly aware of and directly involved in educational research. This time was characterized by a proliferation of researchers involved in education scholarship. No longer was research in education relegated to education departments. Harvard, in particular, popularized the trend of employing professors in other departments (sociology, anthropology, and psychology) to assist educational research. This was also the point at which mathematics and science professors began to include education as part of their purpose. As different people became involved in education research, new methods for conducting research – and as a result new knowledge(s) – became more prevalent. This distribution of research into other fields also extended, literally, into the field. Many university and government sponsored laboratories and research centers were established to develop stronger ties with local schools and help translate research into practice. The purpose of these context-specific centers was to ensure that education research focused on issues such as urban education and administration, but a key side effect was the dissemination of new ways of doing research in education. So, on the one hand education research had more voices in the conversation – by involving new researchers and locations – but much of the funding was controlled by one or two governmental organizations and participation in knowledge production was still controlled exclusively from academia.

With a promising start, discipline-based research quickly waned and was replaced by more structural and organizationally-focused evaluation and policy studies in education. This move was precipitated by several studies that came out in the late 1960's that pointed to the infectiveness of current educational practices, which in turn pushed research towards evaluation rather than more practical applications like curriculum

design or instructional practice. Coleman (1966), in particular, painted a picture of vast inequities among school districts and continued educational disparity among minority and socioeconomically disenfranchised students. That study spurred other similar evaluations of Title I, Headstart, and other government sponsored educational programs, all of which elicited similar conclusions from researchers: even though there had been some localized growth in education there remained large systemic disparities in certain populations of students and research was not addressing this issue. Knowledge and research during this time was produced almost exclusively from a broad, institutional level. Admittedly, there were some researchers still engaged in the schools doing work around curriculum and instruction, but most of the funding and university support was focused on district, state, and national systems. These were large, data driven studies that attempted to paint a comprehensive picture of what was actually happening in the U.S. education system at the time. As a result, there was a vacuum of contextual, practical work being done on the ground and teachers were growing increasingly desperate for meaningful and useful interventions (Lagemann, 1997).

As the disparaging conclusions began to make waves in the halls of decision-making and funding institutions, education research and knowledge production went through another dramatic shift in the early 1970's that continued on through the early 1980's. Researchers began to once again reestablish their efforts in the classrooms and schools. With a large increase in the number of educational scholars, there was a renewed sense of purpose in education research, a focus framed largely by behaviorist psychology and quantitative, postpositive influences. The research of the time repositioned the teacher as the main arbiter of knowledge in the classroom and looked for

ways to increase teachers' effectiveness. This era of research is widely known as the process-product time, when researchers attempted to document what instructional practices were most effective for students and then prescribe those practices as what was needed to produce certain results – literacy, mathematics, writing, etc. During this time, instructional practices became universalized and the assumption was that student learning could occur regardless of context by employing certain instructional practices. Researchers provided professional development focused on these 'best' practices and, in conjunction with this research, there was a national curricular movement focused on mastering the basics. Whether the topic was arithmetic or spelling, teachers emphasized the need to understand the basic parts of academic content before moving on to something more comprehensive. This movement was partially a reaction to the abstraction of content from the previous two decades and because researchers were heavily influenced by Skinner's (1953) behaviorism. Again, knowledge was redistributed towards the context of educators – doing research in schools and focusing on teaching – but much of the research still centered on white, male, privileged scholars documenting 'best' practices and creating the knowledge that was needed to be a 'good' teacher. Knowledge was filtered through a particular lens that created a particular outcome. The actual lives of teachers, their students, and the communities in which they lived were not considered knowledge important enough to be worthy of consideration.

In 1983 another transformational moment in education research occurred with the government publication of *A Nation at Risk*, a report that destabilized previous education research efforts and helped expand what was considered legitimate knowledge in education research. Even prior to this publication, pressure had been building from

theories of knowledge outside of education (philosophy, anthropology, sociology, gender studies, African American studies, Latin@/Chican@ studies, etc.) that questioned the ultimate goal of research, who decided what counted as knowledge, and what methods research used to produce this knowledge. Marcus and Fischer (1986) coined the term "crisis of representation" to describe this changing tide in social sciences that aimed to better describe and understand the world we live in.

In the late 1970's and through the 1980's philosophers and researchers such as Michael Foucault, Paolo Freire, Sandra Harding, Chela Sandoval, Gloria Anzaldua, Angela Davis, Judith Butler, and Patti Lather critiqued, deconstructed, and proliferated new, different, and transformative ways of doing, interpreting, and representing the world we live in. As a result of these efforts to expand what counts as knowledge, Lather (2006) notes, "the move is, rather, toward a recognition that we all do our work within a crisis of authority and legitimization, proliferation and fragmentation of centers, and blurred genres" (p. 47). As Lather also posits, we are in a time that we need to "say yes to the messiness" of education research and not conform to the limitations of traditional and, often, legitimized science-based research.

Because of these efforts, research and what counts as knowledge in research in recent years has refracted in multitudinous directions and forms. Queer (Pinar, 2003), Decolonizing (Smith, 1999), Third World Feminist (Sandoval, 1991), Arts-Based (Barone & Eisner, 1997), Postcolonial Indigenous (Chilisa, 2012), and Transgender (Valentine, 2007) methodologies are just a small sample of what has emerged out of this turbulent but productive stage in social science research. Although some of these methodologies are not directly located in the field of education, their efforts have heavily

influenced educational researchers and the framing of what counts as knowledge in education. Unlike previous 'eras' in educational research that depended almost entirely on quantitative, positivist 'science,' the question of what is knowledge, how we document and publish this knowledge, and who produces knowledge is continuously questioned, contested, subverted, and (re)envisioned. Yet, even amid these efforts, there remain large institutions (governments, universities, and educational associations) and unwavering political initiatives (No Child Left Behind, Race to the Top) that aim to recapture the pure scientific method as the metaphorical czar of all knowledge in education (Hodkinson, 2004). Perhaps, these movements are inspired by a fear of "messy" research or a belief that only through unadulterated science we can better understand what is going on in schools and, as a result, find answers to these problems. Whatever the reasons, it seems illogical to narrow the focus of education research to only those topics that readily lend themselves to quantitative methods, in a time when many – if not all – would readily admit to the complexity of education and the need for more ways of producing useful knowledge in response to questions and problems in education.

This research project aims to embrace the messiness of educational research, proliferate what counts as knowledge, and (re)center teachers as legitimate producers of knowledge. More specifically, the goals of this dissertation are to trouble narrowed conceptions of 'sociopolitical' mathematics teaching by (re)framing research through philosophical pragmatism and narrative inquiry, compliment the sociopolitical turn in mathematics education research by expanding the concept of knowledge through the narratives of mathematics teachers, and (re)place knowledge in the voices of the teachers doing the work.

**Why Mathematics Education?**

Formal mathematics education has – in some ways – changed drastically over the last century, but in other respects it remains largely stagnant. From the 1900's to present day there has been dramatic shifts in the philosophy of and practical approach to teaching mathematics in the United States (Kilpatrick, 2014). Theoretically, mathematics education has transformed from a paradigm of individualism and behaviorism to a subject that is undeniably and deeply connected to the social and cultural experiences of students and teachers (Lerman, 2000). More recent efforts within mathematics education research aim inject a sociopolitical paradigm through poststructural, critical, and postcolonial frameworks (Gutierrez, 2013). On the practical side, mathematics education in public schools has shifted from the individual as the source of knowledge and understanding – both the teacher and the student – to a more collaborative endeavor in which knowledge is distributed and different ways of doing mathematics are explored. These practical efforts vary widely by teacher, and the transition from theory to practice remains slow and disconnected. So, even though educational theorists are writing and discussing the sociopolitical implications of mathematics education – specifically looking at power, agency, identity, equity, etc. – these ideas are often not translating into significant changes in traditional teaching practices.

Part of this problem can be attributed to larger school structures that inhibit teachers from fully embracing the sociopolitical message. It is well documented that mathematics education has and continues to face an onslaught of increasingly restrictive standards and testing (Apple, 1992; Ravitch, 2011**).** This restriction and standardization inevitably forces many teachers to narrow both curricula and pedagogy (Au, 2011;

Crocco & Costigan, 2007; Milner, 2014). These confines are especially apparent in low-income, urban, and diverse schools, environments in which many teachers end up lowering their expectations and teaching to the test (Davis & Martin, 2008). Too often there is a tension between 'training' students to be compliant to the dominant forms of mathematics and pushing for a more critical, social justice focused mathematics experience (Gregson, 2012; Gutierrez, 2009).

This tension often plays out in a dialectic argument of a "pedagogy of access" versus a "pedagogy of dissent" (Gutstein, 2007). Teachers feel compelled to teach students how to navigate the dominant forms of mathematics that are often disconnected from students' lived experience. Understandably, this stance comes from a very real belief that minority students need to be able to access abstracted concepts in order to be successful on mandated standardized tests and college mathematics requirements. Furthermore, many teachers believe that in order to change the system there needs to be more critical voices within the system, giving potentially more credence to the "pedagogy of access" perspective. However, both Gutstein (2007) and Gutierrez (2009) propose that teachers must attend to both forms of mathematics. Gutierrez proposes that teachers need to help students *"play the game*" of mathematics education, which is largely framed by society's traditional view of mathematics as "the high priestess of modernity" (Popkewitz, 2004, p. 251). In essence, the knowledge of mathematics itself legitimizes someone's place in society, so teachers must attend to this reality as part of equity. Yet Gutierrez (2009) also claims that teachers need to help students "*change the game*" of mathematics by examining, critiquing, and rewriting traditional systems of mathematics that are disconnected from lived experiences, marginalize large groups of students, and

reinforce a hierarchy both in and out of school. Much like Gutierrez, Gutstein (2007) posits that both pedagogies must exist together if our goal is to create a more humanizing and emancipatory form of mathematics education. Students who have been marginalized by education need the skills to be able play within the system and also to critique and transform the system.

What does it take for a mathematics teacher to help marginalized students access and succeed in more traditional forms of mathematics? Although Gutierrez (2007) helps us frame equity in mathematics as a tension between *playing* and *changing*, I would posit that most sociopolitical mathematics education research premises social justice or critical mathematics as the end goal of equity in mathematics education. But, what happens if a teacher creates a social justice project but fails to connect with their students or build a strong community of learners? How does a teacher truly connect with students or create a powerful community of support, understanding, and growth? In what ways do these instructional practices represent a political stance in mathematics education? I propose that the relationship between access and dissent are complicated, and that within the framework of 'access' or 'playing the game' we need to carefully consider what political and community knowledge(s) are necessary for mathematics teachers to best serve their students.

The sociopolitical turn in mathematics education research (Gutierrez, 2013) has been undeniably productive in destabilizing taken-for-granted norms, treacherous assumptions, and oppressive structures in our current practices. This developing framework of mathematics education research has focused on the often-overlooked 'politics' of mathematics education, pushing against the assumptions that the teaching

and learning of mathematics is separate from larger social, cultural, political, and historical discourses. The sociopolitical turn has been influential as a source of critique, especially in regards to dominant educational discourses such as the achievement gap, institutional whiteness, development as a form of gender oppression, and the capitalist undertones of modern mathematics education (Gutierrez, 2013; Chronaki 2012; Martin, 2011; Pais & Valero, 2011). Scholars have problematized current conceptions of what it means to *do* and *know* mathematics; asking if there are different ways of approaching, connecting, contextualizing, politicizing, teaching, and understanding mathematics. This group of theorists has also focused on how power and identity are inseparable from mathematics teaching and learning: directly addressing race/culture, gender, sexuality, ableness, and class as it collides with overarching discourses in mathematics education.

However, even with highly critical and liberatory proposals by sociopolitical theorists, mathematics education continues to marginalize and stratify large groups of students (DiME, 2007; Gutierrez, 2008; Gutstein, 2003; Martin, 2009a, 2009b; Stinson, 2008; Tate, 1997). Additionally, racially, culturally, and linguistically diverse students continue to face disparities in mathematics teaching, expectations, and opportunities (Davis & Martin, 2008; Ladson-Billings, 1997; Lipman, 2004).

Both of these realities beg the question, what is preventing teachers from embracing a more liberatory, social-justice-focused mathematics classroom? If teachers make a curricular change towards a "pedagogy of dissent," will such a move fix issues of continued stratification and low expectations? But, what else is preventing teachers from transforming their classrooms?

Theoretically, there are a number of potential answers to this question. Part of the problem may have to do with the inherent tension regarding "equity" in mathematics education, namely *playing* versus *changing the game*. Another issue may be a disconnect between the academe and the classroom. A third answer relates to the highly abstract and hyperfocused examples offered by sociopolitical literature. While there are good examples of what a politicized mathematics classroom could look like (Graven & Buytenhuys, 2011; Gregson, 2012; Gutstein, 2006, 2009) many address unique environments (social justice focused high schools, university partnerships, etc.) and focus only on curricula. For a mathematics teachers lacking support, training, energy, materials, and time these 'one size fits none' examples may place the very concept of sociopolitical out of reach. Finally, there is a noticeable absence of mathematics teachers as producers of knowledge within current sociopolitical literature. Much of the work has been highly theoretical or produced entirely from academics without a significant focus on teachers' voice as an important piece of this work. As a result, lacking from much of this scholarship is the stories of teachers in comprehensive, traditional schools, navigating the daily challenges their students face, living in the tension of equity in mathematics, and trying to meld a highly regulated and traditional subject with the context of their students. This omission may have real-world implications. For busy mathematics teachers there is little incentive to read literature on transforming a classroom if it's highly abstracted, difficult to interpret, and excludes the voice of your peers.

**Research Focus and Questions**

There are four major goals for this dissertation. The first is to broaden the theoretical framework of the sociopolitical turn in mathematics education research to include philosophical pragmatism. The goal is to augment the sociopolitical focus on problematization with a theoretical framework that also supports action. Philosophical pragmatism allows for both critique and purposive solutions. The second goal is to broaden our understanding of what sociopolitical knowledge(s) are needed to be a good mathematics teacher. This knowledge will namely look at teaching practices – I term these practices "microstances" – that help students find success within a mathematics classroom. The third goal of this dissertation is to (re)center teacher's personal practical knowledge as an important voice in the mathematics education research conversation. A majority of the research in mathematics education ignores the voices of teachers and I believe their experiences are crucial as we look to problematize and identify what works in the mathematics classroom. Lastly, this dissertation will look to teacher's stories to identify personal and structural barriers for greater transformation within the classroom. What is holding teachers back from using more transformative curricula or practices within their classrooms?

More practically, this dissertation provides a social, cultural, and political illustration of experienced mathematics educators as they face challenges in their personal and professional lives. It demonstrates the complexities of teaching mathematics in an urban, diverse, and socioeconomically depressed comprehensive high school and shows how mathematics teachers navigate the challenges of their own dispositions and understandings, the context of their students, and greater structures that

may inhibit larger transformations in education. In essence, the stories presented in this dissertation attempt to embrace the messiness of teaching while identifying some important instructional practices for teaching mathematics within this context.

The narratives start with a decisive moment in the teachers' career, followed by their early interactions with education. The narratives return to their professional experiences to highlight how a teacher's personal practical knowledge influences how they approach teaching and what they consider when facing the complexities, politics, and possibilities in mathematics education. The stories focus on dynamic moments in people's teaching that shifted their perspective on mathematics education. For better or worse, these moments helped shape who these teachers are and what they prioritize in education.

The main questions this dissertation aims to address are as follows:

- How can philosophical pragmatism add a purposive, action focused piece to the sociopolitical theoretical framework?
- What sociopolitical microstances – focused on the practice of teaching – can we identify from the narratives of mathematics teachers?
- What inhibitions can we identify that are preventing teachers from further transformation in their classroom?[1]

[1] For this dissertation I will define a 'different', 'shifted', or a 'transformed' mathematics classroom as one that "creates a counter-narrative to the achievement gap discourse; questions the forms of mathematics presented in school; highlights the humanity and uncertainty of mathematics; positions students as authors of mathematics; challenges deficit narratives of students of color in need of mathematics; and recognizes that not all students aspire to (or should) become research mathematicians or scientists" (Gutierrez, 2013).

The first question is addressed in my literature review as I draw on the sociopolitical, philosophical pragmatism, teacher knowledge, and narrative inquiry literature to support my research. The second question will be addressed within the narratives themselves and my cross-case analysis. Lastly, the final question will be addressed within the conclusion followed by suggestions for next steps to address these inhibitions.

**Chapter Outline**

Chapter II starts by tracking the last twenty-five years of mathematics education research, focusing primarily on the sociocultural and sociopolitical turn. I then highlight where the sociopolitical framework – because it is grounded in poststructuralism – lacks theoretical support for making claims about practice. Drawing from Colin Koopman's work, I show that there is a connection between the problematization in poststructuralism and the purposive, contextualized, and tentative action found in philosophical pragmatism. I then turn to philosophical pragmatism as a potential theoretical framework that the sociopolitical turn can draw from in order to make proposals in mathematics education. I then draw from the teacher knowledge literature to support my efforts to document teachers' experiences in narrative form and extract sociopolitical microstances from these stories.

In Chapter III, I provide a brief introduction to narrative methodology, drawing a connection between philosophical pragmatism and my choice of narrative inquiry. I then specify how I conducted my research – focusing on both my formal and informal interactions with teachers. I also address how working with the teachers presented its own dynamic to this research: it provided unrivaled access to the teachers and their stories but also presented challenges as to how I ultimately documented these stories.

Chapters IV through VI are the narratives of the teachers presented in a semi-fictionalized sonata-case form. Drawn from two years of individual interviews, professional collaboration, and general conversation, each narrative starts with a significant moment in the teacher's career; an interaction that changed the way they think about teaching. This interaction is followed by a chronological history of the teacher's major experiences in education. Starting at their earliest recollections, the stories aim to highlight key moments that shifted that person's thinking about race, mathematics, power, knowledge, identity, gender, schooling, etc. Each narrative concludes with the end of the story that was started at the beginning. The 'conclusion' of each story may or may not have a resolution but – again – its main purpose is to provoke more questions and provide insight regarding different possibilities of teaching mathematics.

In Chapter VII, I conduct a cross case analysis and identify six microstances that were evident in teachers' narratives. Drawn from the work of Cochran-Smith and Lytle (1999) these sociopolitical 'microstances' are both thoughts and actions that translate to more inclusive classrooms that supports students' mathematical learning. These microstances aim to broaden the sociopolitical conception of teacher knowledge and support those that have already been identified.

In the last chapter of this dissertation, I summarize the research project and outline the implications of this work. I also identify six inhibitions that are preventing teachers from further transformation towards a more sociopolitical classroom. Mostly this transformation would be curricular but the overarching idea is that there are structures – both internal and external – that block mathematics teachers from employing more radical changes in their practice and curricula. The final implications section

focuses on teacher education, teacher continuing education, academic connections and educational research.

# CHAPTER II

# LOOKING AT THE LITERATURE

## Recent Developments in Mathematics Education

During the 1970's mathematics education research began to more proactively assert its scholarship on the educational community. It was primarily focused on process-product quantitative studies that developed and implemented intervention strategies for the classroom, looking to document the pedagogical 'moves' teachers made in order to produce the best 'results' for student learning (Stinson & Bullock, 2012). This documentation of 'reality' led to a focus on finding the 'truth' through quantitative, post-positive, scientific studies. However, mathematics education 'achievement' continued to fall prey to racial, gendered, and socioeconomic stratification, prompting a shift to a more interpretivist-constructivist framework in the 1980s. Initially framed as cognitive psychological research, researchers within this tradition looked to problem-solving, metacognition, and conceptual versus procedural understanding to explain and formulate responses to stratified outcomes. The constructivist framework investigated how students constructed their own understanding of mathematics as opposed to how education transmitted a set of knowledge(s) to the student (Woodward, 2004). Evidence of this shift can be clearly seen in the 1984 Journal of Research in Mathematics Education special 'equity issue' that focused on minorities in mathematics education. Bradley (1984), Cuevas (1984), Johnson (1984) and Tsang (1984) allude to students' construction of mathematical knowledge but, even in light of continued 'gaps' in 'achievement,' the authors still locate the problem of mathematics achievement in the minds and motivations

of the students. After this development, mathematics education research began to shift its attention to broader sociocultural forces in mathematics education.

**The Sociocultural Shift**

Mathematics education research continued to expand its understanding of learning and teaching in terms of a cognitive, psychological, constructivist framework (using Piaget's theories as a foundation), which located the construction of knowledge within the student. However, in the late 1980's, there was a turn in mathematics education research to recognize the social construction of knowledge in mathematics, drawing from other theoretical perspectives in sociology, anthropology, and philosophy. Boaler (2000) notes, "in theoretical terms, constructivism posits a view of learning as the individual mind being influenced by the social world, whereas situated theories propose that learning is a social phenomenon constituted in the world" (p. 5). For Lerman (2000) the sociocultural turn in mathematics education research is "intended to signal something different, namely, the emergence into the mathematics education research community of theories that see meaning, thinking, and reasoning as products of social activity" (p. 23). In other words, research in mathematics education began to recognize that mathematics cannot be separated from students' social, historical, and cultural backgrounds and pushed against the notion that mathematics itself is 'acultural;' mathematics has its own explicit and implicit socio–historical and socio–cultural uploads that students must negotiate within the classroom. As such, the sociocultural research in mathematics education began to focus on how teachers, schools, and policy should change in order to provide more access and opportunities for students to engage with, and participate in, mathematics education.

It is important to note that the shift to include a more sociocultural perspective was not only felt within mathematics education research. Lisa Delpit (1988), bell hooks (1993), Paolo Freire (1996), Gloria Ladson-Billings (1994), and Michael Apple (1982) are a few notable researchers outside of mathematics education who heavily influenced a broader educational research turn towards a sociocultural (also framed as multicultural or intercultural) understanding of learning, teaching, and knowledge. These authors drew heavily from critical, multicultural, critical-race, and feminist theories in order to address the continued marginalization of students in education. By the late 1990's, the mathematics education research community was focused on providing better and more inclusive instruction, curriculum, and policies for students that did not fit the 'norm,' that had been propagated for over a century. Jo Boaler (2002), Judit Moschkovich (1999), David Cohen and Deborah Loewenberg Ball (2001), Alan Shoenfeld (2002), and Gloria Ladson-Billings (1997) are a few researchers who looked at how mathematics education was constructed and deployed within the classroom and how students negotiated this construction. Gutstein, Lipman, Hernandez, and de los Reyes, (1997) sum up the ideas of sociocultural research in mathematics education as focusing on

> conceptions of self and others that reflect belief in, and commitment to, students and their communities; classroom social relations that are equitable, reciprocal, and that foster community; and knowledge as shared and collectively constructed, viewed critically, multifaceted, and built on children's culture and experience. (p. 713)

Sociocultural research in mathematics education continues to this day and has contributed to expanding opportunities and access to mathematics for underrepresented and marginalized students.

**Ethnomathematics and Acknowledging the Political**

The ethnomathematics movement began around the same time as the sociocultural turn began to take root in mathematics education research. In the mid 1980's, researchers such as Ubiratàn D'Ambrosio, Arthur Powell, Marilyn Frankenstein, Marcia Ascher, and Robert Ascher drew heavily from cultural anthropology to propose that mathematics should not merely be understood as a Western, Eurocentric concept. Ethnomathematics instead looked to other cultural productions of mathematics in order to proliferate different epistemological conceptions of how to use mathematics both within and outside of the classroom. As D'Ambrosio (1997) states, ethnomathematics "look[s] at the history of mathematics in a broader context so as to incorporate in it other possible forms of mathematics" (p. 14). The purpose, then, was to investigate how mathematics in its traditional Western framework was used – both historically and presently – by other cultures to promote a more diverse curriculum for students to learn mathematics. As D'Ambrosia (2001) summarizes, "ethnomathematics encourages us to witness and struggle to understand how mathematics continues to be culturally adapted and used by people around the planet and throughout time" (p. 309). Evidence of this 'understanding' can be seen in studies ranging from "nonliterate" Demara sheepherders' understanding of mathematics (Ascher, M. & Ascher, R., 1997) to the use of Mayan ethnomathematics in an autonomous school in Mexico (Hirsch-Dubin, F., 2006). According to early ethnomathematics researchers, by understanding other ways of 'doing' mathematics we could deploy mathematics curricula and pedagogy that related more to students' lives, facilitated understanding and inclusion of difference, and diversified the epistemological understandings of mathematics education.

Unlike the sociocultural framework of mathematics education research, which continues to speak from a position of 'access,' ethnomathematics has evolved over the last twenty years from an 'ethnic' mathematics – which has been widely critiqued as a colonial, imperial enterprise – to a more politicized critical research agenda looking to flatten the ontological field of mathematics[2]. Pais (2011) summarizes the problem with traditional conceptions of ethnomathematics; "the system satisfies the societal demand of a meaningful education for all, by importing local cultures into the curriculum, while assuring that such 'insertion' will not actually change any of the core features of the school system" (p. 225). It seems then that ethnomathematics, framed as a part of Western mathematics education, only reifies the sociocultural perspective of expanding the boundaries of Western mathematics without critiquing or transforming a system that demands students perceive reality through a singular mathematical lens. As Pais (2011) notes, "the Other is accepted, even celebrated, as long as it is the Other of our gaze" (p. 211).

Still, more recent researchers have looked to proliferate and politicize ethnomathematical framework. Drawing from antifoundational theories (Queer, poststructural, critical-race, pragmatism) ethnomathematics research has now flipped the conception of mathematics education. Instead of ethnomathematics being a part of the Western mathematics framework, Pinxton and Francois (2011) see ethnomathematics as an umbrella term and Western mathematics as one epistemological and ontological framework within a multitude of different mathematics realities. Knijnik (2012) asserts that "it is possible to admit that modern rationality—and the mathematics that gives

[2] See Arturo Escobar's (2008) *Territory of Difference* for a full account and description of 'flat ontology.'

support to it—may not be the only rationality of our epoch: other ways of reasoning can coexist in a same form of life" (p. 91). As such, ethnomathematics appears to be emerging from its assimilationist, colonial roots to a more critical and antifoundational stance, urging scholars and practitioners to examine both their epistemological and ontological assumptions. This move, however, can be directly linked to another shift in mathematics education research that has materialized over the last ten years: the sociopolitical turn, which has troubled the foundational assumptions long held by mathematics education researchers and teachers.

**The Politics of Mathematics Education**

The 'sociopolitical turn' in mathematics education research surfaced in the early 2000's. Scholars such as Walshaw (2001, 2004), Valero (2004), Skovsmose and Borba (2004), Gutierrez (2010), Popkewitz (2004), Stinson (2012), and Martin, Gholson, and Leonard (2010) have noted the turn and contributed heavily to its theoretical development. Citing the limitations of a sociocultural framework, these authors have sought a more critical lens that would produce different questions and subjectivities around the purpose and intentions of math education. According to Pais and Valero (2011), a sociopolitical framework centers mathematics education as a broad construct of "social, economic, political, and historical practices and discourses," whereas mathematics education research is a set of practices that contribute to the (re)inscription of naturalized discourses around mathematical rationality and epistemology (p. 35). For Gutierrez (2010), the "sociopolitical turn" is a theoretical perspective that acknowledges identity, knowledge, and power are directly interrelated to social discourses and researchers must disrupt normalized assumptions which privilege certain populations

while marginalizing others. For both Gutierrez (2010) and Pais and Valero (2011), the politicization of mathematics education research is necessary in order to transform mathematics education towards a more equitable practice.

By foregrounding the 'political' in sociopolitical research, mathematics education researchers are looking to problematize traditional conceptions of power and destabilize inequitable structures that continue to exclude. Upon first glance, power often implies the traditional and explicit unequal distribution of force. This particular framing of power looks to overt examples of stratification among race, gender, class, ableness, and sexuality. Using this definition of power, the sociocultural research agenda looks to critique the explicit forces of exclusion (i.e., Why are there not more students of color in upper level math classes?) and respond by providing more 'access' to this power (i.e., How can we provide more support or learning opportunities for students of color in order to increase their numbers in upper level math classes?). However, by looking at power in this perspective, researchers fail to critique what it means to have 'access' to this power, who defines and continues to reify this normalized power structure, and the inherent binary of power/powerless when looking to 'assimilate' or 'access' power. Sociopolitical research seeks a more nuanced and complex notion of power. Popkewitz (2004) acknowledges the explicit form of power mentioned above (negative power), but sees a sociopolitical agenda analyzing what he calls "productive power" (p. 254). Power in this nature is not one that imposes explicit rules that exclude or marginalize, but is derived from Foucault's conception of "governmentality," which sees power as an inscribed notion of governance based on reasonable, rational, normalized actions. Power, thus, does not create explicit boundaries of what is deemed acceptable, but instead inscribes a

set of historically constructed social practices and values that determine what is and should be considered normal, reasonable, and rational (Popkewitz, 2004). As such, power is derived from, defined by, and enacted through sociocultural, political, and historical discourses.

This nuanced, critical, and complex understanding of discursive power is evidenced by the growing body of studies that have looked to destabilize taken-for-granted assumptions concerning the epistemological and ontological understandings of mathematics in the classroom. Gutierrez (2008) troubles mathematics researchers' 'gap-gazing' obsession (always referring to 'closing the achievement gap') while failing to problematize what oppressive and marginalizing discourses are produced within/around this narrative. Danny Martin (2011) uses a race-critical discourse analysis framework to critique and problematize institutional racism in mathematics education and its connection with discourses around nationalism and militarism. Chronaki (2011) deploys a poststructural feminist and postcolonial framework to trouble the embedded notion of 'development' within mathematics education and its connection to producing an oppressed subjectivity of women as they participate in mathematics. Pais and Valero (2011) look to a deeply critical theoretical perspective to reveal and disrupt the capitalist agenda within mathematics education discourse. Stated succinctly, the sociopolitical framework in mathematics education seeks to destabilize the sociocultural and early ethnomathematical conception of mathematics education as a Western, white, male, middle-class standard. Instead of (re)producing violent and marginalizing narratives that encourage assimilation, the sociopolitical framework looks to proliferate divergent realities of engaging with mathematics, deconstruct the status-quo of who produces

knowledge and what knowledge counts, and critically analyze and question from a point of difference in order to problematize and transform mathematics education.

**Pragmatism's Possibility**

As communities wrestle with the dynamic, complex, and intersectional constructions of modernity, there is a desire for ways to facilitate socio-cultural and -political transformation and amelioration. In light of the poststructural turn in mathematics education research – which disrupts transcendental signifiers[3], highlights the historicized social construction of reality, and denies the rational, logocentric quest for truth - the absence of a philosophical grounding to facilitate positive, normative claims has become more pronounced (Latour, 2004; West, 1989). For this reason - among many others – I propose a renewed focus on philosophical pragmatism as an intellectual guide for research in mathematics education, especially for the sociopolitical move, which has productively disrupted oppressive discourses but lacks a theoretical framework for action.

The pragmatic philosophical literature has expanded over the last century from an almost exclusive focus on the classical pragmatists such as William James, Charles Sanders Peirce, John Dewey, and Jane Addams who wrestled with overarching ideas around inquiry, experience, truth, fallibilism, rationality, consequences, and action to include the neo-pragmatists such as Richard Rorty, Cornel West, and Hillary Putnam who have tackled the role of language, politics, and hope in a 'post-modern' environment in addition to the more traditional pragmatic ideas. It is difficult to define 'Pragmatism,' since it has been interpreted and (re)interpreted in multiple ways, but within this study I will first paint a broad picture of pragmatism drawing from the classical literature, look to

[3] Jacque Derrida coined the term "transcendental signified" in *On Gramatology* (1976) in an effort to show how there cannot be universal truths in philosophy.

a theoretical transition from the poststructuralism to pragmatism and, finally, include more recent neo-pragmatist ideas to outline the potentials of a pragmatic turn in mathematics education research.

### *Pragmatism: A Definition*

In order to situate philosophical pragmatism it is important to explore its formulation and main principles. Pragmatism had its beginnings in the 1870s, primarily as a result of conversations between Charles Peirce and William James. Peirce was credited with coining the term and through a series of lectures, papers, and discussions the two philosophers established the basic tenets of pragmatism. Later, John Dewey and George Herbert Mead contributed to developing, framing, and publishing the foundations established by James and Peirce. Out of this collaborative enterprise, pragmatism became a philosophical tradition that proposed unique and powerful tools for academics and practitioners alike. Particularly, the ways pragmatists hold *truth* as flexible, contextual, and polymorphic; center *experience* as the basis for action, reflection, and growth; and use *inquiry* as a process of critically examining the past to best determine contextualized action for the future.

*Truth* is a term that pragmatism holds lightly. For James (1905) "ideas (which themselves are but parts of our experience) become true just in so far as they help us to get into satisfactory relation with other parts of our experience" (p. 34). *Truth* from this perspective is something that works best for a particular situation at a particular moment and only after the fact can we determine whether it was a 'true.' James goes on to propose, "we say this theory solves it on the whole more satisfactorily than that theory; but that means more satisfactorily to ourselves, and individuals will emphasize their

points of satisfaction differently. To a certain degree, therefore, everything here is plastic" (p. 35). Here James acknowledges the flexibility of truth depending on the problem. By proliferating what 'truth' means, one recognizes that there can never be a single best or perfect way, but instead several possibilities which could lead to different understandings and ways of doing or being. In other words, "new truth is always a go-between, a smoother-over of transitions. It marries old opinion to new fact so as ever to show a minimum of jolt, a maximum of continuity" (James, p. 35).

Dewey (1998) defines *inquiry* as "the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole" (p. 320). In other words, inquiry involves critically examining a problem - through a historical and contextual lens - determining the best possible action for this problem, and reflecting on the consequences of this action. For Dewey, this inquiry or experimentalism was inextricably tied to experience. In its most basic and, I'd argue, revealing form, Dewey (2004) ties experimentalism to an infants exploration of the world; as the infant interacts with the world it begins to grow from these experiences, adapting future actions based on the consequences of past experiences. William James, in an effort to expand the definition of experimentalism, proposes radical empiricism as a normative mode of inquiry towards (re)construction.

For John Dewey *experience* is a continuous dialectic with the world around us. As we interact with the world it changes our perceptions as well as changes the things we interact with. As he notes "the basic characteristic of habit is that every experience enacted and undergone modifies the one who acts and undergoes, while this modification

affects, whether we wish it or not, the quality of subsequent experience" (Dewey, 1998, p. 35). For Dewey experience was a continuous transaction of more and more connections with the world, helping inform our future actions. Dewey used the term 'growth' to describe these connections and their educative force on future decisions. For Jane Addams this growth from experience is lateral. The more you experience - socially, culturally, politically, physically - the more meaningful and informative connections you have with the world around you.

Philosophical pragmatism holds *truth* as tentative, *inquiry* as a necessary process for solving problems, and centers *experience* as a means to inform decision-making. What philosophical pragmatism adds to the sociopolitical conversation is a means to both critique problems *and* propose tentative, intelligent ways to deal with these problems. What follows is a theoretical connection between the problematization found in a poststructural sociopolitical stance and the purposive action stressed by philosophical pragmatists.

### *From Poststructuralism to Pragmatism*

Drawing from Colin Koopman's (2011) work there is an explicit connection between poststructural theory and pragmatism that might benefit mathematics education research. Koopman's scholarship outlines a way in which the problematization of Foucauldian poststructural work is unsuccessful in proposing viable potentialities, where as a Deweyan pragmatic reconstruction is in need of a more robust set of methods for the problematization of existing structures. The sociopolitical landscape of mathematics education research drinks deeply from Foucault's ideas of problematization –

destabilizing the normalized, historicized discourses around mathematics and education – but could seek methodological satiation from Dewey's normative reconstruction.

According to Koopman (2011), Foucault uses history (genealogy) to uncover structures that have created problems found in the present. Foucault's historicized method is used to disrupt our taken-for-granted conceptions and stimulate questions around current problems that need to be answered. This problematization is not necessarily an aggressive critique of current systems but rather a general "skepticism" around contemporary, unquestioned, structural assumptions. In other words, the process opens up previously closed "transformative potentialities." Additionally, genealogy, according to Koopman (2011) is "*a history of the present* (first feature) *that is also a preparation of the present for the future* (second feature)" (pg. 539). But this preparation is merely a preparation. Genealogical work can disrupt norms and transform discourses through critique and analysis but it is not a method of normative transformation.

Dewey proposes that reconstruction is actively transforming conditions for the better. Although, philosophically Dewey has been critiqued for his inadequate metaphysics, Koopman (2011) proposes it is more productive to look at reconstruction as a useful methodology. As such, reconstruction can be thought of as a process of inquiry that is historically dependent. Much like Foucault, Dewey feels that our present conditions are constructed from the past and by way of a thorough analysis of the past (for Dewey this is a logical inquiry) we may propose future-oriented action. Dewey sees analysis of the past as a narration of the present; or the present frames our analysis of the past in order to elicit problems to be answered in the present to affect the future. Additionally, Dewey's reconstruction is an educative process, which involves

learning from the past in order to make more informed decisions in the present. However, Dewey fails to thoroughly develop a method for problematizing the present and, according to Koopman (2011), "Dewey [just] accepts that the problems we face are already given to us such that our task is to get out there and to fix things up" (pg. 553). For this reason Dewey's proposals are insufficient in determining the problems needed to be reconstructed.

Power, knowledge, identity, language, curriculum, pedagogy, and many other themes have been destabilized, deconstructed, and de-centered as a result of Foucault's scholarship. This work has contributed enormously to the field of mathematics education and has begun to hopefully open new doors in policy and practice. However, mathematics education research could benefit greatly by looking to Dewey's ideas of reconstruction as a complement to genealogical problematization and vice versa. Remaining entirely within discourse - as the sociopolitical research often does - does not provide a framework for deliberative action, nor does depending entirely on reconstruction provide an adequate framework for genealogical problematization. Now we will venture deeper into the tenets of philosophical pragmatism outlined above, focusing on more contemporary philosophers and how they might contribute to mathematics education research.

### *Looking Closer: A Contemporary Definition*

#### Truth, Reality, Fallibility

Pragmatism's antifoundationalism draws attention to a deep skepticism regarding universal claims of truth. These claims, often indicated as 'Truth' rather than 'truth,' are central maxims of scientific rationality and enlightenment reasoning. However, in

concordance with antifoundational traditions, truth, to many pragmatists, is a part of the process rather than the product. Hence, truth is connected to experience, inquiry, and fallibility. For the purposes of this dissertation it is important both theoretically and methodologically to critically examine big T-truth claims, especially as they apply to mathematics education, where standardization and traditional schooling continue to advance a particular reality that viscously marginalizes many students.

For Richard Rorty, the idea of truth is not productive for the aims of pragmatism, especially when one considers truth in connection with reality. Rorty (1999) notes "for the pragmatist, true sentences are not true because they correspond to reality, and so there is no need to worry what sort of reality, if any, a given sentence corresponds to – no need to worry about what 'makes' it true" (p. 4). Here, Rorty seems to adhere to the classical pragmatist line of thought in saying that pragmatism should not worry about describing reality or finding an overarching 'Truth.' Rorty claims that there is no need to look to 'Truth' or 'truth' simply because it does not provide a satisfactory reason for taking a particular action. According to his perspective, truth is just a word deployed to describe general properties shared by statements and, as such, does not serve a purpose for determining whether something is useful or not. Rorty (1989), grounded in language, asserts that "truth cannot be out there—cannot exist independently of the human mind—because sentences cannot so exist, or be out there. The world is out there, but descriptions of the world are not. Only descriptions of the world can be true or false" (p. 5). In other words, it does not help a situation to ask whether something is a linguistic construction or a reality in the physical world because only what is constructed through language is real. Truth, then serves as a descriptive function within language and has no productive

purpose for pragmatism. The cat is a cat because humans say it is a cat and the word cat serves its function for that particular description. For Rorty, pragmatists should only be concerned if there is a better way to approach a particular situation, not whether something is 'truthful' or not.

While Cornel West would agree with Rorty about the fallibility of truth and the inability to find the 'Truth,' he seems hesitant to deny the importance and need for 'truth.' This reluctance to deny truth any credence in pragmatism could be tied to the influence of Marxism on West's philosophical grounding. Much like William James, West (2008) sees "truth being tied to the way to truth" (Mann, Basmajian, & Taylor). Stated in another way, West understands truth as a way of life rather than truth as a set of descriptions that correspond to 'things' in the world. Here is where West begins to connect truth with ethics instead of claiming, like Rorty, that 'truth' serves little purpose for taking action. West (1989) remarks that "truth is a species of the good" (p. 40) and as such "the conception of the good is defined in relation to temporal consequences" (p. 40). For West, then, it seems that truth and 'goodness' are tied to consequences and, as such, serve a purpose for guiding our actions. Whereas Rorty looks to utility for guidance – deemphasizing terms such as 'ethics,' 'good,' or 'morals' – West acknowledges a connection between ethics, truth, and action. As the latter (1989) summarizes, "the first notion of the truth as a species of the good means that our beliefs about the way the world is has ethical significance" (p. 40). West goes further to posit that our experience with the world guides our actions, and those experiences have an element of truth. This connection between ethics and truth supports Cornel West's political and historical conception of pragmatism.

As we look to mathematics education research it is imperative that we hold ourselves accountable to examining and remaining suspect of overarching claims of how things should be. Instead, like Cornel West, truth is interconnected with ethics and, as such, the "quest for truth" and truth itself are indistinguishable, while still serving as an impetus for action. In other words we cannot ignore the historical, cultural, political, and personal identities of our students, teachers, and community, but these experiences should guide our "quest" and inform our action.

Interaction, Experimentalism, and Inquiry

Part of this antifoundationalist tenet and what Cornel West would deem the quest for truth is an emphasis on the 'acquisition' of knowledge as a continual process rather than a final product. This experimental process of thinking deeply about context, implementing a pedagogical or curricular decision, and critically reflecting on the outcomes of this action is uncommon in mathematics education. Although the sociopolitical framework provides a robust method of problematization, we must look to philosophical pragmatism for a method of action. The idea of inquiry or experimentalism provides an antifoundational, historicized, and contextualized process for collectively working through problems and centering experience as a source of insight.

Richard Rorty (re)affirms this point as he skirts the edge of relativism and supports an "antirepresentational" stance on knowledge, acknowledging that knowledge production should not be a universalized (re)description of how things are (which he believes is impossible), but instead a process of inquiry that leads to utility. Cornel West, in a similar vein stresses that experience is directly tied to the idea of 'experimentation' and that everyday, localized experiences should be the guide for inquiry. Medina (2012)

expands on West's political interpretation of pragmatic inquiry, looking to a critical historicized examination of experience as well as a projected proposition of what could be:

> this inquiry is both backward- and forward- looking: it involves the critical examination of the conditions of experience, which includes an inspection of its history, of what led up to it; but it also involves an exploration of the potentialities of experience, that is, a critical investigation of the future, of the different possibilities that are open (or can be opened) in one's experience (Medina, p. 200)

Scott Pratt (2002) uses the term interaction – a more inclusive term related to inquiry – as a reference to the epistemological and ontological process of interacting with something and reflecting on this interaction. Epistemologically we learn from this interaction (i.e., knowledge about said 'thing') and ontologically we have a deeper understanding of what constitutes said 'thing.' It is in this vane that we can proceed experimentally by reflecting on our interactions.

Additionally, both Cornel West and Richard Rorty connect inquiry with collective decision-making, once again stressing the importance of the process rather than product. For Rorty, "the purpose of inquiry is to achieve agreement among human beings about what to do, to bring about consensus on the ends to be achieved and the means to be used to achieve those ends," (p. xxv) while West (1993) notes "that consensus forged is a dynamic consensus because nothing blocks the road to inquiry" (p. 50). Scott Pratt (2002) affirms this attention to connectedness and connects the inquiry process to a sense of responsibility; highlighting the importance of a "reciprocal relationship to the world" (p. 24) during the inquiry process.

Experience

By way of pluralistic, continuous experiences, shaped through interaction and relations, we develop community and benefit from lateral growth. Philosophical pragmatism sees experience as the substrate from which the commitments outlined above emerge. Mathematics education and research continues to sideline the experiences of students and teachers in the classroom as legitimate sources of knowledge. Whether this is a product of the 'acultural' or 'apolitical' misconception of mathematics or the result of increasing commodification, standardization, and deligitimazation of teaching and learning, (re)centering both teacher and student experience is imperative for a transformation of mathematics education. For the purposes of this dissertation, teacher experience will serve as the impetus for problematization, action, and reflection.

Jose Medina (2012) describes experience as "making and seeing connections in one's actions and in one's life. It is a kind of knowledge that cannot be assimilated to the conception of knowledge as a mirror that merely reflects what is already there" (Medina, p. 203). Richard Rorty (1999) connects experience directly with our use of language. For Rorty language and experience are inseparable. He uses the term "ironist" or someone who is continuously aware of their fallibility and frailty in contrast to someone who is rooted in common sense or carelessly describes the world according to a final vocabulary. Following the same path as an ironist, Rorty insists that in order to change our experiences, and the world itself, we must first change our vocabulary.

Cornel West, on the other hand, is distinctly aware of the physical reality of experience, which translates to a more politically charged framing of pragmatism. While West would agree that experience is mediated by language to a certain point, he argues

that there is something beyond language, something deeply aesthetic that cannot be described by language. As he (2000) asserts, "scars and bruises are felt with human bodies, some of which end up in coffins. Death is not a construct. And so, when we're talking about constructs having concrete consequences that produce scars and bruises these consequences are not constructed, they're felt. They're very real" (p. 504). West compares his philosophical perceptions to Russian novelists and blues singers, emphasizing the "tragedy" and "despair" in everyday lived experience. West situates his notion of experience much along the same lines as Dewey, declaring that pragmatism is a form of "cultural criticism" that forefronts the political implications of people's "everyday experiences" (p. 205, 1989). Everyday experience for West (1989) is political because it acknowledges that experience is shot through with systems of power and "human struggle sits at the center of prophetic pragmatism, a struggle guided by a democratic and libertarian vision, sustained by moral courage and existential integrity, and tempered by the recognition of human finitude and frailty" (p. 229). West, much like Dewey and Emerson, positions human struggle—the relations, sufferings, and actions of past, present and future life—at the center of the epistemological framework for pragmatism. Human struggle, and the "brutalities and atrocities in human history" (West, 1989, p. 218) then guide political action and amelioration. For West, a deep sense of the tragedy found readily in human experience is necessary for pragmatic intellectual and political pursuits.

Theoretically, philosophical pragmatism provides a means to amend the sociopolitical conversation. Instead of remaining in a poststructural cycle of critique without room to offer contingent proposals, philosophical pragmatism is a space where

researchers can both critique and propose contextual, tentative solutions. Grounded in experience and relying on inquiry as a method of engaging with the problems of our world, philosophical pragmatism is a source for critical examination and active steps towards amelioration.

Where, then, does this leave us for mathematics education research? Throughout this sociopolitical turn there has been a noticeable absence of active mathematics teachers contributing to the conversation. The academe has provided a robust critique of what is wrong with mathematics education but the majority of this problematization has been dictated from above rather than cultivated from the ground up. As a result, little has changed at the local level. This dissertation looks to philosophical pragmatism as a means to transcend this top-bottom divide and center teacher's experience as a source for transforming mathematics education. What follows is a closer look at teacher knowledge as a way to contribute to this community of education research.

**Teacher Knowledge**

> Missing ... are the voices of the teachers themselves, the questions that teachers ask, and the interpretive frames that teachers use to understand and improve their own classroom practices. (Cochran-Smth & Lytle, 1990)

Over the last thirty years there has been a conscious effort to deprofessionalize teacher knowledge through standardization, institutional ideological control, and technical rationality (Baines & Stanley, 2006; Giroux, 1985). These efforts have stifled teachers' abilities to employ a more creative, politicized, and contextual experience for students in the classroom. Currently, teachers maintain some control of their curriculum and practice, but increasingly the intellectual, creative, and relational aspect of teaching have been narrowed or eliminated completely. In mathematics education, this

deprofessionalization is even more apparent as politicians and institutional leaders refer more and more to the 'failure' of the United States mathematics educational system on local, regional, national, and international exams. The reaction to this 'failure' is increased standardization and control over the craft of teaching. From this perspective, in order to improve students' scores on standardized examinations, teachers must do the exact same thing at the exact same time, which will, in theory, lead to the exact same results. The problem is it's not working. Something must change and part of this effort lies in reestablishing the trust, sovereignty, and responsibility of teachers as legitimate professionals. As such, it is imperative that academic efforts strive to (re)legitimize and (re)professionalize the craft of teaching, which for this dissertation begins with centering teachers as producers of knowledge.

However, because there are many forms and perspectives on what knowledge is required for teaching it is important to specify where this dissertation falls on the continuum. Thinking about what it takes for a teacher to envision, design, plan, conduct, observe, question, reflect, and adjust a single lesson plan is evidence of the broad and complex knowledge(s) required to teach. And, this is one aspect of a very dynamic and intellectually demanding craft. As a result, what follows is a brief introduction of what is teacher knowledge and how it has been framed, followed by what aspects of teacher knowledge this dissertation hopes to address.

### *Teacher Knowledge as Content and Pedagogy*

The idea of teachers possessing knowledge(s) that are needed to facilitate student learning is an enormous research agenda within education. Much like social science research and what we consider 'knowledge,' teacher knowledge has blossomed into a

complex, multifaceted, interconnected concept that continues to be a lively debate in academic circles. In fact, up until the 1980's teacher knowledge was almost entirely framed as a teacher possessing 'content knowledge' (Shulman, 1986). So, during the last thirty years – again mimicking the crisis in social science research – there have been dramatic shifts in identifying and exploring what knowledge is important for teachers. During the early 1980's education research moved away from content and began to focus on pedagogical knowledge as the answer to education's problems. This is not to purport that content isn't important, but during this era researchers focused on instructional practice – scaffolding, assessment, questioning techniques, etc. – which perhaps gave less credence to content knowledge. However, there was a quick backlash in education research to this shift towards pedagogy without also attending to the content knowledge of teachers (Ball & McDairmond, 1989; Hill, Rowan, & Ball, 2005; Shulman, 1986). Shulman (1986) claims that we need to attend to both the content knowledge as well as the pedagogical knowledge of teachers. As a result, he breaks down knowledge in teaching into three parts: content knowledge, pedagogical content knowledge, and curricular knowledge. Content knowledge represents the knowledge a teacher possesses as it relates to the subject they are teaching, so a mathematics teacher who teaches algebra should have a significant and comprehensive understanding of academic algebra in order to teach students algebra. That being said, someone who poses a comprehensive understanding of algebra doesn't necessarily poses the ability to *teach* algebra. So Shulman (1986) provides a secondary tier to this conception of knowledge of teaching. He proposes pedagogical content knowledge as way to describe how an algebra teacher takes the content and is able to effectively disseminate this knowledge to their students.

This is a complex understanding of what the content is, how it's transferred, what questions or challenges will the students face, what examples or exercises best suit learning, as well as other aspects of teaching a particular subject. Finally, Shulman (1986) proposes curricular knowledge as a way to describe a teacher's ability to put all the pieces together when teaching a particular course. This involves materials, assessments, classroom structure, and other essential pieces that facilitate the larger profession of teaching. If we were to imagine teacher knowledge at this point it might look something like Figure 1:


***Figure 1. Visualization of Teacher Knowledge According to Shulman (1986)***

Shulman's (1986) attempts to broaden our understanding of teacher knowledge proved to be highly influential and spawned a rush of research on pedagogical content knowledge (Ball, 2000; Grossman, 1990; Ball & McDairmid, 1989; Shulman & Grossman 1987). What is not discussed in these articles is the assumed divide between professional and practical knowledge. Most of what is discussed within this research on teacher knowledge is framed as 'this is what knowledge is needed for teachers' instead of looking at teachers as producers of this knowledge.

### *Teacher Knowledge as Practical*

On a parallel research plane there was another group of scholars attempting to wrestle with the professional and practical division of teacher knowledge. Shulman (1986) alludes to a 'wisdom' of practice as he explores subdivisions within each category

of teacher knowledge but he never expands on what this wisdom entails. Instead he inserts wisdom into one of his categories, further reifying the divide between professional and practical knowledge. Donald Schon (1983, 1995) who is not couched entirely in education research but his theories are directly transferable collapses the dualism of professional and practical. Schon (1995) sums up his argument by stating, "It seems right to say that our knowledge is in our action" (p. 29). Schon (1995) argues against the "technical rationality" of academia that assumes a role above practitioners, deeming what problems are important and how we might solve these problems. For Schon (1995) and others (Clandinin, 1986; Clandinin & Connelly, 1987; Elbaz, 1983, 1991) there is no distinction between practical and formal knowledge and as a result practical knowledge is not framed as 'less than.' Instead practical is formal and that within practice teachers create new and unique ways of knowing/doing.

Much like Dewey (1998), Schon (1983, 1995) proposes that knowing and doing are inextricably linked and that through a cycle of inquiry and reflection practitioners produce knowledge. Others have coined terms such as "craft knowledge" (Grimmett & Mackinnon, 1992) or "personal practical knowledge," (Clandinin, Connelly, & Craig, 1995), which try to capture knowledge(s) of teaching that transcends the top down model of previous iterations of teacher knowledge. These attempts look to an inherent artistry, context, or performance of teaching that can only be explained and known by practitioners. As a result of these efforts we can now reframe our image of knowledge more like Figure 2. In this respect pedagogical content, content, and curricular knowledge(s) are inextricably tied to personal practical or craft knowledge. However, what is missing from this context is an attention to the political and communal aspects of

teacher knowledge. Namely, how do we reframe teacher knowledge as a more sociopolitical endeavor?

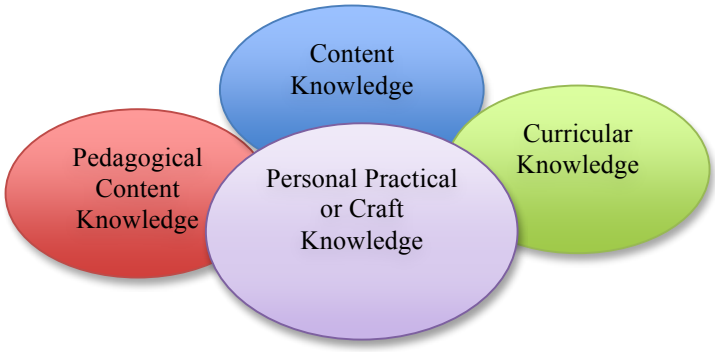


***Figure 2. Visualization of Personal Practical Knowledge According to Clandinin, Connelly, & Craig, 1995***

***Teacher Knowledge as Political, Relational, and Fallible***

At this point, research on teacher knowledge has focused on practice, content, and the formal/practitioner dualism but has been largely devoid of any reference to politics, community, and fallibility. These terms are highlighted because over the last ten to fifteen years there has been a significant push in education research to incorporate a more politicized understanding of teaching, to focus on communities as important partners in education, and to realize the fallibility and finitude of our knowledge on teaching and learning.

Although there will be reference to other authors, this section draws heavily from two prominent scholars in teacher knowledge who clearly articulate and connect these ideas to teacher knowledge. For Cochran-Smith and Lytle (1999), it is important to carefully consider and critically examine conceptions of knowledge because both have lasting implications for teacher preparation, professional development, and teachers' continued learning outside of formal structures. The authors suggest that it is important to recognize the politicized and agential nature of knowledge (whose knowledge counts,

how is knowledge constructed, and what is the role of knowledge in 'quality' teaching); teachers (what or who determines the practice of teaching, how is 'novice' versus 'expert' constructed, and what are teachers' roles in school change); and teacher education (who determines what makes a 'good' teacher, how is knowledge conveyed or constructed in formal and informal ways, and what is the role of the institution in school change). For Gutierrez (2012, 2013) teachers must have both a deep political knowledge and a strong knowledge "with" students and their communities. She draws from Anzaldua's (2013) *conocimiento* and *Napantla* to theoretically develop both teacher knowledge and teacher's relationship with knowledge. *Conocimiento* identifies knowledge as a collective experience, centered on action and *Napantla* complements this action with uncertainty and multiplicity. Teacher knowledge in this light is a process of tentative, collaborative, action.

With this in mind, Cochran-Smith and Lytle (1999) propose three different understandings of teacher knowledge: *knowledge-for-practice, knowledge-in-practice,* and *knowledge-of-practice. Knowledge-for-practice* can be summed up into two words: "formal knowledge" (p. 250). The authors explain that knowledge for practice is predicated on the idea that teacher understanding of curriculum, content, pedagogy "leads more or less directly to more effective practice" (p. 254). *Knowledge-for-practice* emphasizes *what* teachers should learn, looks to 'rational' practices rather than normative proposals, stresses teacher assessments, and does not perceive teachers as knowledge creators. *Knowledge-in-practice* focuses instead on the "practical knowledge" of teaching. Cochran-Smith and Lytle (1999) describe this understanding of knowledge as, "what very competent teachers know as it is expressed or embedded in the artistry of

practice, in teachers reflections on practice, in teachers' practical inquiries, and/or in teachers' narrative accounts of practice" (p. 262). This construction of knowledge, then, sees very little difference between what teachers 'do' and what teachers 'know.' It represents an epistemological break from 'formalized' conceptions of knowledge in that teachers are co-constructing the necessary knowledge for practice, making learning dependent on collaboration, reflective supervision, coaching, apprenticeships, and action.

Shifting to incorporate a more critical, political, and fallible understanding of teacher knowledge the authors identify *knowledge-of-practice,* which posits that teachers "generate local knowledge of practice by working within the contexts of inquiry communities to theorize and construct their work and to connect it to larger social, cultural, and political issues" (p. 250). In this conception of knowledge, 'knowing' is always held suspect, tentative, and finite, which leads to teaching from a critical, politicized stance. As the authors indicate, *knowledge-of-practice* dissolves the inherent dualisms that are found in the previous two conceptions of teacher knowledge: no longer is there a divide between formal/informal, knowledge/learning, or novice/expert teachers/teaching. Instead the *knowledge of practice* is constructed collectively (through teacher networks, inquiry communities, school-based collectives) within local and larger communities.

In order to better describe how someone might approach this conception of knowledge Cochran-Smith and Lytle (1999) reframe *teacher knowledge* as a more proactive stance. Instead of a body of knowledge that someone can tap into in order to learn how to teach, the authors develop the term *inquiry as stance* to better articulate how a teacher might approach political, social, local, and tentative forms of knowledge.

Knowledge is developed, refined, and critiqued in local communities involving multiple partnerships. Knowledge no longer is a static body but a dynamic, contextual, act of inquiry. *Inquiry of stance* represents a way of problematizing, reframing, acting, and reflecting on teaching. There has been other work that reflects parts of Cochran-Smith and Lytle's *inquiry of stance* involving critical or democratic forms of action research (Esposito & Evans-Winters, 2007; Hyland & Noffke, 2005; Noffke, 1997), "funds of knowledge" (Civil, 2007; Gonzalez, 1995; Gonzalez, Andrade, Civil, & Moll, 2001; Moll, Amanti, Neff, & Gonzalez, 1992) and critical or emancipatory forms of knowledge (Friere, 1970; Giroux, 1988; Apple, 2014). However, *inquiry as stance* seems to eloquently and concisely describe a conception of knowledge teachers need in order to address and overcome ongoing challenges in education. From their framework, teachers – preservice, novice, expert, teacher educators – become agents of change, researchers, activists, theorists, and school leaders.

Similar to Cochran-Smith and Lytle's (1999) conception of teacher knowledge but focused on mathematics education, Rochelle Guiterrez (2012) asks "how might we conceive of a 'knowledge for teaching' to honor a broader conception of both a) mathematics and b) student diversity in society" (p. 32). It is from this question that Gutierrez draws from Anzaldua's (2013) concepts of *conocimiento* and *Nepantla* to frame teacher knowledge. Although *conocimiento* literally translates as 'knowing someone' in English, for Anzaldua it conveys a deeper meaning of connecting with others, solidarity, and action on gained knowledge. Gutierrez (2013) describes *conocimiento* as it applies to mathematics education:

> For me, political conocimiento assumes clarity and a stance on teaching that maintains solidarity *with* and commitment to one's students. Among other things,

> political conocimiento involves: understanding how oppression in schooling operates not only at the individual level but also the systemic level; deconstructing the deficit discourses about historically underserved and/or marginalized students; negotiating the world of high-stakes testing and standardization; connecting with and explaining one's discipline to community members and district officials and buffering oneself, reinventing, or subverting the system in order to be an advocate for one's students. (p. 11)

In other words, *conocimiento* extends beyond the knowledge of one's students and involves a deeper understanding of how students are framed by dominant narratives in education. In order to have knowledge *with* students, teachers must understand larger discourses that affect students' identity and how this relationship might play out in a mathematics classroom. *Nepantla* is the state of being in an uncomfortable space that has no solid ground, multiple realities, and the tension of uncertainty where new knowledge is produced. *Nepantla* is directly connected to *conocimiento*. As we know more – about our students, communities, schools, teaching, etc. – we are more troubled by our assumed knowledge. So a teacher in this space is constantly reflecting on what they know and what they don't know; who they are teaching; what they are teaching and why it is important; larger discourses influencing education; and their own position in the classroom. A teacher who is truly doing good work is constantly creating time/space to better know their students and is comfortable with discomfort. So, in this respect a teacher must attend to *conocimiento* but through this attention a teacher experiences the uncertainty and possibility of *Nepantla*.

If we were to take what these authors have to offer us we might see two different images for teacher knowledge. For Cochran-Smith and Lytle (1999) the image might be similar to Figure 3. Cochran-Smith and Lytle (1999) are not denying that there is a place for both professional (formal) and practical (informal) teacher knowledge. And, this

knowledge can be created or situated within the academy. However, they stress that in order to (re)center teachers as legitimate creators of knowledge – much like this dissertation – we must collapse this dualism into *knowledge-of-practice* which subsumes both the other categories.

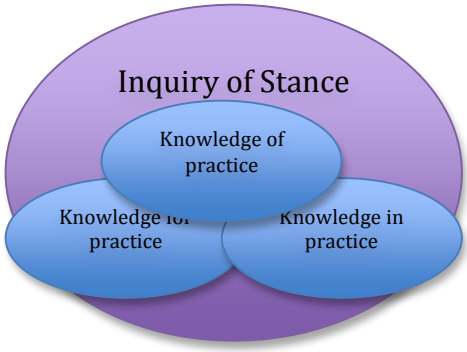


***Figure 3. Visualization of Inquiry as Stance according to Cochran-Smith and Lytle (1999)***

Gutierrez (2013) offers her own image of what knowledge is important to teach in Figure 4. Within this image a teacher still needs content and pedagogical knowledge but intertwined are both political knowledge and knowledge with students/communities. Each is influenced by the other, so there is no escaping an attention to both who your students are as well as the political elements of teaching.

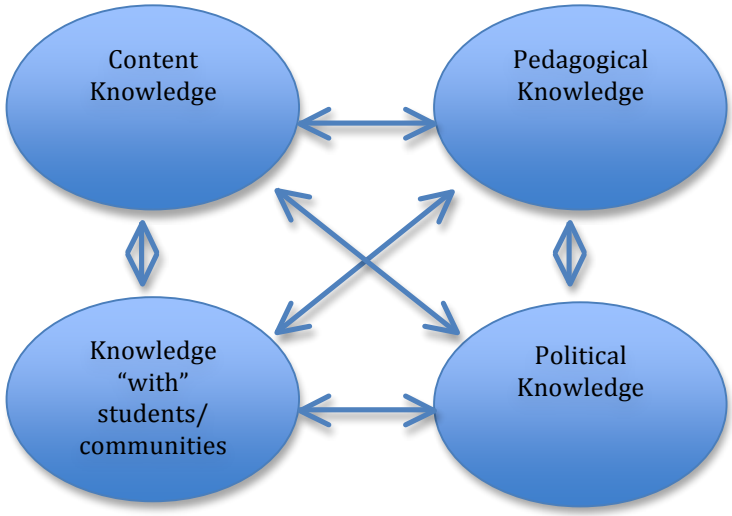


***Figure 4. Visualization of Teacher Knowledge according to Gutierrez (2013)***

So, how might we collapse these images into one and also include former conceptions of teacher knowledge? Perhaps Figure 5 articulates what knowledge(s) are important for teachers. *Inquiry of stance* is positioned at the center of the circle because it is a broad, inclusive term to describe both an approach to knowledge and what knowledge(s) are important for equitable teaching. The outer ring infuses terms from Gutierrez' proposal to describe teacher knowledge with more specificity. Circles are used in an effort to counter a hierarchical framing of knowledge and instead look at all of the knowledge(s) as important and interdependent pieces. Cochran-Smith and Lytle (1999) and Gutierrez (2012, 2013), offer a critical and inclusive grounding to understand and frame teacher knowledge. This dissertation will draw from both *knowledge-of-practice* as well as *Nepantla* and *conocimiento* as models of how to (re)claim teacher knowledge as legitimate and powerful sources for transformation in mathematics education.

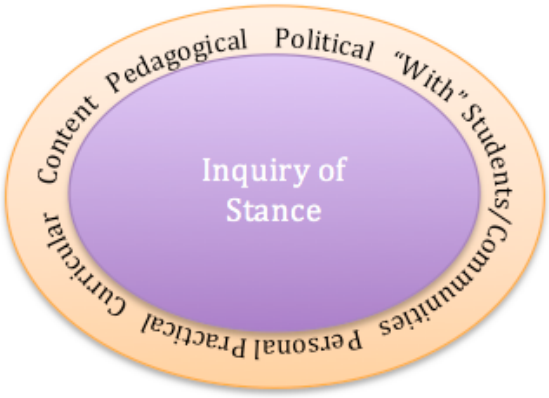


***Figure 5. Combined Visualization of Teacher Knowledge***

***Teacher Knowledge as Narrative***

In addition to a political, relational, tentative framing of knowledge, this dissertation will look to teacher knowledge as narrative. Clandinin and Connelly (2000) believe that teacher knowledge is not concrete and subsumed by other knowledges "but

as something lifelike, something storied, something that flows forward in ever changing shapes" (p. 318). As the lives of teachers and students unfold in the classroom, past experiences and present interactions play out in dynamic, complex, and narrative ways, leading to shifting and tentative ways of knowing. This perception of teacher knowledge, much like the idea of *Napantla*, translocates knowledge from a fixed position to something that is constantly moving as teachers experience difference.

In order to best account for this type of knowledge Clandinin and Connelly (1998) center experience as directly connected to the practice of teaching. The authors have coined the term "personal practical knowledge" to expand our current notions of teacher knowledge as only being affected by things that happen within the school. Instead, the authors offer "personal practical knowledge" is,

> a term designed to capture the idea of experience in a way that allows us to talk about teachers as knowledgeable and knowing persons. Personal practical knowledge is in the teacher's past experience, in the teacher's present mind and body, and in the future plans and actions. Personal practical knowledge is found in the teacher's practice. It is, for any one teacher, a particular way of reconstructing the past and the intentions of the future to deal with the exigencies of a present situation. (Connelly & Clandinin, 1988, p. 25)

Clandinin and Connelly posit that we cannot separate the personal from professional knowledge as both are inextricably linked. As much as teachers try to separate the personal from the professional, the practice of teaching is heavily affected by both personal and professional experiences. Olson and Craig (2001) refer back to Dewey (2004) to reiterate that personal practical knowledge is constantly transformed by ongoing social transactions. As teachers engage with the world their perceptions, beliefs, dispositions, and understandings are constantly being shifted, transformed, and

reinforced. Olson and Craig (2001) posit "we learn, that is, construct and reconstruct knowledge, through our experiences." As a result our experiences are directly connected to our personal practical knowledge and this knowledge directly affects our future experiences.

As I document, analyze, and represent the stories of mathematics teachers it is important to not only hold teacher knowledge as political, relational, and tentative, but also narrative. From this perspective a teacher's knowledge is not isolated to their experiences in the classroom but a collection of all of their experiences at that moment of reflection. As a result, it also begs the question of whether other methods of capturing or disseminating teacher knowledge are appropriate, especially concerning the more political, cultural, or emotional aspects of teaching. Now, in order to further address how teaching mathematics might meaningfully shift to problematize current traditional modes of practice and better meet the needs of our students, we need to take a closer look at how teachers acquire knowledge of practice, what current empirical research suggests for inservice learning, and what is missing from the teacher learning conversation.

**The Reexamined Question**

Based on the literature review it is important to (re)examine the research questions posited above.

- How can philosophical pragmatism add a purposive, action focused piece to the sociopolitical theoretical framework?
- What sociopolitical microstances – focused on the practice of teaching – can we identify from the narratives of mathematics teachers?

- What inhibitions can we identify that are preventing teachers from further transformation in their classroom?

As for the first question, which was addressed in the literature section, philosophical pragmatism contributes a robust critical and purposive theoretical grounding for mathematics education research. In order to continue making significant changes in mathematics education we need to look at theoretical frameworks that instill a sense of action on top of critique because without this added piece we will spin in a continuous cycle of critique. What is needed at this point is both problematization and practical steps towards amelioration.

As for my second question I hope the literature has painted a broad picture of what is needed to teach mathematics for equity. What is missing from this picture, however, is a better understanding of what these knowledge(s) look like. What does teaching mathematics for equity look like? How can we broaden the idea of sociopolitical mathematics education to look at specific practices that create a more inclusive and equitable classroom? How can a teacher's story help us understand what *stance(s)* are needed in order to teach mathematics towards a more sociopolitical and equitable end? Through narrative inquiry I hope to further develop this image – providing stories to elucidate what sociopolitical microstances looks like.

Lastly, my final question will also be addressed through the narratives and explored in the conclusion. From the literature we understand that there are a lot of institutional structures – identified primarily through the sociopolitical turn – that could prevent teachers from actually transforming their mathematics classroom. But, again, I am left with theoretical descriptors and no image of what this looks like in a classroom.

What inhibitions – personal, social, institutional – are preventing teachers from taking larger strides to transform their mathematics teaching? In what way do the narratives of mathematics educators help us better understand what these barriers are? And, from this understanding, what are some ways to alleviate these inhibitions?

What follows is a look at the methodological approach to this research as well as the specific methods that were employed to document and compose teacher narratives.

# CHAPTER III

# RESEARCH METHODOLOGY

> The main claim for the use of narrative in educational research is that humans are storytelling organisms who, individually and socially, lead storied lives. The study of narrative, therefore, is the study of the ways humans experience the world. This general notion translates into the view that education is the construction and reconstruction of personal and social stories; teachers and learners are storytellers and characters in their own and other's stories. (Clandinin & Connelly, 1990, p. 1)

A teacher introduces a lesson and a story begins to unfold. The details of this complex story are interwoven with and influenced by student identity, personal history, institutional structures, community values, and sociopolitical understandings. If we are to better understand how mathematics teaching should change, the complexity and messiness of this story cannot be reduced; and I believe what we find in these stories - their nuances, intersections, and frustrations - will help us better understand current efforts to teach more equitably and how we might facilitate further change. In order to capture these stories I used narrative inquiry. Clandinin and Connelly (2006), define narrative inquiry as follows:

> People shape their daily lives by stories of who they and others are and as they interpret their past in terms of these stories. Story, in the current idiom, is a portal through which a person enters the world and by which their experience of the world is interpreted and made personally meaningful. Narrative inquiry, the study of experience as story, then, is first and foremost a way of thinking about experience. Narrative inquiry as a methodology entails a view of the phenomenon. To use narrative inquiry methodology is to adopt a particular view of experience as phenomenon under study. (p. 375)

My study focused on the everyday experiences of teachers, the challenges they face, their emotional toil with doing this difficult work, and what decisions they make in the face of political, social, and institutional challenges.

Because this dissertation focused on human experience and is framed by pragmatist philosophy, narrative inquiry is a natural fit. Clandinin and Rosiek (2007) note that there is a strong relationship between pragmatic philosophy and narrative inquiry; namely that narrative inquiry's focus on experience unfolding through time complements the basic premise of philosophical pragmatism. Because of this theoretical framework, the narratives in this research look to this 'unfolding' as a way to present a more dynamic and complex understanding of teaching mathematics. As teachers reflect on their experiences teaching mathematics in an urban, diverse high school, their knowledge of teaching and learning is constantly transforming as they interact with the tensions of teaching mathematics within a racially, culturally, and linguistically diverse community.

In reference to these experiences of dissonance and new understandings Clandinin and Rosiek (2007) state,

> The regulative ideal for inquiry is to generate a new relation between a human being and her environment—her life, community, world—one that 'makes possible a new way of dealing with them, and thus eventually creates a new kind of experienced objects, not more real than those which preceded but more significant, and less overwhelming and oppressive' (Dewey, 1981b, p. 175). (p. 39)

In this sense, Clandinin and Rosiek (2007) claim that narrative inquiry is transactional or that knowledge is generated and not separable from experience. What seems like a good idea in the classroom one day may drastically shift the next day after a thoughtful

discussion, politicized reading, enlightening student interaction, or disastrous lesson. Our knowledge about teaching is transformed from a discordant experience, but this transformed knowledge cannot be separated from previous experiences. Instead, it is directly connected to past, present and future experiences.

Inherent in all of these examples is an experience or series of experiences that shift perspective, producing more insights and questions. It is in this manner that narrative inquiry "is an act within a stream of experience that generates new relations that then become a part of future experience" (Clandinin & Rosiek, 2007, p. 41). By looking to teachers' experiences we can better understand what practices they are employing to create a more inclusive, equitable space and what further conditions, tools, structures, and support are necessary to substantively radically change mathematics teaching.

According to Clandinin, Pushor, and Orr (2007) "A central element in narrative inquiry, as in other forms of inquiry, is the justification, the reasons why the study is important. Narrative inquirers need to attend to three kinds of justification: the personal, the practical, and the social" (p. 24). What follows is a brief account of each justification:

**The Personal.** This study is important personally for several reasons, namely a frustration born from years of teaching mathematics with little academic recognition of teachers working tirelessly to make a difference; reading educational scholarship that continues to overshadow teacher's personal practical knowledge; and local, state, and national structures that prevent teachers from envisioning and enacting a more transformative mathematics classroom. It is my belief that teachers want to transform their curricula and practice, but I continue to hear the pain, tension, and frustration of teachers running into barriers that hinder this significant change. I am interested in what

teachers are doing to subvert traditional, disconnected, and individualistic framings of mathematics education through everyday instructional practices and, also, what prevents teachers from taking the necessary risks to transform their curricula and practice. In other words, what institutional, personal, cultural, or political experiences support or prevent a transformative stance of teaching mathematics?

Additionally, our experiences, and the knowledge that emerges from these experiences, are storied. And these experiences, which elucidate the complexity, intersections, and discourses of teaching, can be recounted through narrative constructions that honor "lived experience as a source of important knowledge and understanding…" (Clandinin & Rosiek, 2007, p. 42). Teachers are an important source of knowledge in mathematics education research and are often unheard. This dissertation will attempt to document teacher's experiences – to (re)center teachers as producers of knowledge – as they engage with students, instruction, and larger structures of mathematics education, specifically looking to their growth, struggle, and decisions around teaching.

**The Practical.** This dissertation acknowledges and upholds the "personal practical knowledge" of teachers, with a sociopolitical understanding that the personal is also deeply political. Knowledge in this capacity is also considered uncertain, dynamic, and tied to the community – much like the experiences we live – shifting and transforming as we develop new relationships and experiences with the world around us.

Narrative inquiry is particularly situated for capturing this knowledge. Rosiek and Atkinson (2005) note that "respect for teachers' practical experience as a source of

unique knowledge means committing to the idea that there is some part of the reality of teaching that teachers have access to in their daily practice that is not available through other means of inquiry" (p. 437). Much of the scholarship in mathematics education, especially the sociopolitical turn in mathematics education research, has not focused on the practice of teaching. One reason for this conspicuous silence could be due to an absence of arts-based research - including narrative inquiry - in sociopolitical mathematics education research. However, the reason for using narrative research extends beyond 'filling a methodological hole' in mathematics education research. Narrative inquiry will provide a unique, first-person documentation of teachers as they navigate the structural barriers of teaching and take a stance to create more inclusive, equitable classrooms. These stories will reveal a more complex and multifaceted understanding of what sociopolitical is within mathematics education as well as insights into what characteristics or activities might hinder educator's commitment towards transforming practices and curricula. As such, this study looks to 'access' teachers' experience as it relates to troubling traditional notions of teaching mathematics education.

**The Social.** The social, in this case, refers to how the narratives of these mathematics teachers might also expand who has access to educational research. The intention of this dissertation is to expand our conception of sociopolitical mathematics teaching but it is also an effort to expand the audience in mathematics education research. It has taken me years to identify, read, and reflect on a small portion of the mathematics scholarship available and I have the unique and privileged experience of being a graduate student while I'm teaching. So, how can we expand research on teaching beyond the

walls of academia? As Barone (2007) asks: "Should parents, other lay people, the intelligentsia, and educational policymakers at all levels, be afforded direct access to the stories of those whom the imaginary has stereotyped and mischaracterized?" (p. 461). If education is to truly transform in light of the sociopolitical turn, mathematics education research needs to ask whether or not it's reaching enough people to engender this change.

What follows is a focus on the specific methods used to collect and compose the narratives of mathematics teachers. Specifically I will give a brief overview of where the research was conducted and my role in this space, what data sources were used and how data was collected, and finally I will outline how the data was analyzed and presented.

**My Role and the Site of Research**

Three years ago I had the fortune and complication of moving to a new school to serve as a mathematics instructional coach and teacher. The move was fortunate because I transitioned into a strong, thoughtful department; diverse, urban school; and I have had the opportunity to work directly with teachers to improve practice. It was complicated because the move coincided with my transition into the dissertation process. Because there was a drastic change in my situation my intended research shifted with my new context. However, even though the original intent of my research changed I was presented with new opportunities to work with effective and politically conscious mathematics educators in a racially, linguistically, culturally, and economically diverse school.

At this point I think it's important that I clearly articulate who I am and what my role is within the school before I briefly describe the site. I do this to provide a more nuanced understanding in regards to the data collection, analysis, and representation. As

far as the district and school are concerned I am a high school mathematics teacher and instructional coach at a diverse and economically marginalized school. I have taught an Algebra 1 and Algebra/Physics blend class at this school for the last three years. In addition to this teaching load I run the mathematics department, provide continued instructional support for teachers, and meet regularly with administration to make school wide decisions. My departmental and coaching role includes structuring department meetings, developing and designing professional development, guiding inquiry cycles, conducting observations and providing feedback, interacting with and interviewing students for improved instruction, and pushing teachers to think hard about sociopolitical issues in mathematics education. Because of my job I have had the privilege of working alongside and developing strong relationships with the participants in this study. I also have the unique perspective of seeing school and district policies intersect with the daily experiences of the teachers in this study. As a result of my position – both professionally and personally – I hope the narratives offer a unique picture of what teachers are doing and what is preventing them from doing more.

The site of the study is at a comprehensive, urban high school in a large northwest city. The actual physical structure was originally built in 1910, rebuilt in 1926, patched and amended over the next century, and as of 2014 is being scraped clean and 'modernized.' The 1926 facade will remain the same but everything else will be completely new. The original 1926 building is still the centerpiece of the school, boasting large fading columns, a beautiful red brick, and a cathedral-like clock tower. Huge, inefficient windows line the walls of every classroom providing ample reasons for distracted students to dream of being outside. The 'guts' of the school still remain largely

unchanged. There is a grand staircase that leads to the second floor, loud and uncontrollable heaters that line the walls and are fed by an ancient boiler, and anachronistically tall ceilings. Over the last century there has been a patchwork of additions to the original building; a sixties era library and humanities hall, a poorly designed cafeteria, and several other additions intended to better serve the community but seemingly ill conceived. This physical patchwork has led to a disjointed and confusing layout that often ruptures student and teacher community.

Demographically the school is considered – by far – one of the most diverse in the region. The school has a total population of over 900 students (this figure changes daily so no specific figure will be cited). According to district and local news media websites 21.6% of the students identify as Black, 36.4% identify as Latin@, 6.9% Asian, 1.3% American Indian, 6.5% Unknown, and 27.5% White. Within these racial or ethnic 'subdivisions' there are 29 languages spoken and 9% of the student population is learning English as a second, third, or even fourth language. Over 50% of the student population receives federal support for food – some estimates put this closer to 75% but numbers vary depending on the source and are typically guarded for anonymity purposes – and 18% receive special education services. Graduation rates at this high school have been faltering but typically range from 50-60%.

These numbers paint a particular picture, one framed entirely by numbers, devoid of context or narrative, and one that might promote a deficit perception. If we were to flip the script and speak anecdotally, the students at this high school are strong, resilient, creative, brilliant, hilarious, and compassionate. They engage politically and intellectually. They challenge teachers to defend what they are teaching and explain why

the subject is important enough to pay attention. They are angry, frustrated, but hopeful at the continued injustice against their black and brown bodies. They work together to solve complex problems and demand a better, more challenging educational experience. They dance in the halls, play outside, and laugh with abandon. They share language, food, culture, and difference. They are kids, adults, and cultural and political warriors. They love sports, music, art, film, reading, and writing. Each and every student brings a unique story, perspective, and position to the table. And this is what makes teaching at this high school an intellectually complex and professionally rewarding experience.

The teachers at this school also bring different perspectives and approaches to education. Some are still reflective of the process-product ideology from the 1980's while others are pushing the boundaries of progressive and critical pedagogies. From large-scale social justice projects to innovative engineering and technology courses, it is evident that many teachers are working hard to include pedagogies of access and dissent (Gutstein, 2007). At the same time there are unique social and psychological demands at this high school so attrition is high. Over the last three years average tenure at this high school has dropped from almost 12 years to 7 years. From another perspective, over fifty percent of the teaching staff has turned over during this same time period. Within the mathematics department there were five new members this past year and, although we were fortunate to hire three with experience, each has had less than five years in the classroom.

Zooming in a bit more, the mathematics department at this school is composed of ten full time mathematics teachers and myself – a half time teacher and half time instructional coach. There are five women and six men. Four of the teachers identify as

teachers of color. The department is a mixed bag of teacher-directed and student-led instruction with the impetus of instruction focused on preparing students for the two dual-credit college mathematics classes offered for juniors and seniors. As a result of this department focus, students are prepared based on the skills they will need to succeed in these two classes. These skills are typically framed as 'college readiness' skills (Conley, 2007) and much of the focus is on *precision and accuracy, problem solving,* and *interpretation*. Fortunately, the push for 'college readiness' has not devolved into rote test-taking, skill development. Instead, much of the department's work has focused on collaboration and critical reflection using race, gender, class, language, and 'ableness' data as foundational markers for future planning. Although many teachers want to include social justice curricula into their mathematics classroom there has been little movement because of external and internal barriers. That being said, almost every teacher I have talked with stresses the importance of strong relationships, a supportive community, and collective high expectations in their mathematics classroom.

**Data Sources and Data Collection**

I began the process of looking for participants in August of 2013 and finished data collection in the spring of 2015. The data was collected in one strand – focused entirely on the teachers – but this data was a combination of interviews, classroom observations, casual conversations, and collaborative work. Because of the demands of teaching and a desire to accurately represent the stories of the teachers data was collected over two years. During the research process I was a full participant (Connelly & Clandinin, 1988; Marshall & Rossman, 1995) in the teachers classrooms – I helped plan lessons, worked with groups of students, and provided feedback on teaching. This participation was

varied, though, so my involvement was sporadic and dependent on the demands of the school.

**Participant selection:** As noted, because of context the scope of my research changed drastically after the move. However, I quickly realized how my framework could adapt and produce different, equally powerful narratives within this new context. After observing different teachers for several months, talking with teachers about the practice and philosophy of mathematics education, and considering what stories I wanted to tell, I approached **three** veteran mathematics teachers. Beyond these grand descriptors, there are other more specific reasons I decided to ask these three educators. These teachers had spent their entire career at this school and two of the three also did their student teaching at the school. Each had taught all levels of mathematics and all were academically, socially, and culturally 'successful' with students. 'Successful' is a broad term, so more specifically each demonstrated an unparalleled ability to help students realize they could do high level mathematics while also attending to the social and cultural identity of each student. They were able to structure lessons where students could learn, discuss, argue, and still be themselves. Students took pride in their work and there is a well-established culture of persistence and excellence in their classrooms.

**Pre-interviews and pre-observations:** Because my intention was to also include stories of struggle, tension, and conflict I did not want to sugar coat the challenges of teaching mathematics in this context, so I made sure that each participant had examples of these stories prior to our interviews. It would be hard to find a teacher who did not have personal and professional experiences that forced them to critically reflect on and change their teaching practice, but I made sure this was the case before we started. I also

spent time in each participant's classroom reflecting on their practice, interactions with students, and approach to teaching before asking them to participate. After making a decision I asked each participant in person, describing the purpose and final product of this research.

**Teacher interviews:** Interviews were the main source of data for this research. Because of the demands of personal and professional responsibilities, interviews were conducted individually and as time allowed. As mentioned, interviews were sporadic in nature but each interview lasted from 20-40 minutes and I met with each teacher for a minimum of five times. Interviews were most often conducted during school but occasionally the teachers would meet me before or after school and on the weekends to answer questions. At first, interviews were framed ethnographically but I quickly realized that the questions I was using (see the Appendix for my initial set of questions) were not eliciting the stories I was hoping for. Many of the responses to the first set of questions were philosophically enlightening but did little to paint a picture of the teacher's experience. As a result I switched to "interviews as narrative occasions" (Reissman, 2008). According to Reissman (2008) this form of interviewing looks and feels more like a conversation. There is entrance and exit talk, turn-taking, shifts in topic, and stories that lead to other stories. By changing my approach to interviewing I relinquished some of the control usually attributed to social science interviewing. I had an agenda and vision of what I wanted to ask, but in the end I needed to follow the teachers story not my own agenda. As a result, I changed my questioning technique to a more open-ended format that focused less on "the specific wording of a question" and

more on the "emotional attentiveness and engagement and the degree of reciprocity in the conversation" (Reissman, 2008, p. 24).

**Observations**: Over the two years of this research I was in the teacher's classrooms on a monthly, if not weekly, basis. These observations were both to help the teachers professionally and to contribute to my research. Because my focus was on the teachers stories – their voice – I did not take field notes during these observations. Instead, observations were used as a reference to help compose a more accurate image of the teacher's disposition, approach to instruction, and interaction with students. I would often observe a classroom and then directly add details to the stories I was composing.

**Other sources of data:** There were other interactions that helped shape the stories of the teachers in this research. On top of the observations and interviews there were countless 'hallway' conversations, collaborative planning experiences, departmental discussions, and extracurricular interactions that contributed to the data. I helped plan a project-based mathematics unit with one of the teachers and co-planned a social justice lesson with another. I spent many hours discussing the purpose of mathematics education, philosophy of education, and tensions between access and dissent in mathematics education. We discussed race, gender, economics, and ableness as it applied to mathematics education. We problematized standards, high stakes testing, and traditional practices. I helped one of the teachers with a graduate class she was teaching and ended up presenting for several of these classes. I talked with the participants about our respective families, likes and dislikes, and other interests beyond school. We commiserated, congratulated, and collaborated. All of these interactions and experiences

influenced the teacher's stories and I believe this provided a depth of context that I could not have expected if I did not work with these teachers.

**Data Analysis and Representation**

I began writing the stories almost immediately after I started interviewing the teachers. I transcribed each interview and then extracted quotes from each interview that would fit within the arc of a story. And, as quotes became layers within a larger story I was able to easily return to the participants to clarify lingering questions and ask for more detail. However, because I expanded and elaborated on what the teachers provided the narratives are partially fictional. The quotes served as the backbone for the narratives and I added details to guide the stories towards a theoretical point (Sconiers & Rosiek, 2000). During this process of elaboration, teachers had full access to both their interview transcripts and their developing stories as a means of eliciting feedback and each teacher read a final draft of their narrative in order to check the story for accuracy and voice.

Part of this feedback was an attempt to 'restory' the experience. In this respect as the narrative research evolved, the participants had access to their narratives and could "restory" their experiences through commentary, questions, additions, and subtractions (Clandinin & Connely, 1990). Admittedly, the process of restorying was complicated by the constraints of coproducing with teachers who have little time outside their workday to collaborate. However, teachers commented on the power of rereading what they said during their interviews and the narratives that were produced from these efforts. At least two of the teachers relayed how the narratives prompted critical reflection on their current teaching practices. As to how 'restorying' affected the narratives, after reading their accounts, teachers would often return to a later interview with more insight on a

previous story, a different perspective on what happened, or more thoughtful commentary on why something occurred. Because interviews were conversational stories that were told and retold in different ways as new ideas were explored and different possibilities were considered. As Clandinin and Connelly (1990) describe restorying, "You tell me what you heard and what it meant to you. I hadn't thought of it this way, am transformed in some important way, and tell the story differently the next time I encounter an interested listener or talk again with my participant" (p. 9). Through these transactions, the narratives became an intimate exploration of not only how teaching mathematics is a complex sociopolitical act but also a profession that is deeply connected to the historical, social, and political experiences of each teacher. What follows is a brief outline of the phases of data analysis followed by how the data was represented.

**Phase one:** From August of 2013 until December of 2013 I conducted pre-observations and pre-interviews. During this time there was little data collection but it provided me the opportunity to get a feel of my context and decide on who would best fit the research. I asked two of the teachers to participate during this time. I also finalized my intent to create semi-fictionalized, sonata-case narratives and I created a set of questions I hoped would elicit these stories.

**Phase two:** During the winter and spring term – January 2014 until June 2014 – I conducted the bulk of my interviews for Bianca and Rebecca. I spent over five hours interviewing each teacher in addition to the almost daily interactions, continued observations, and informal conversations. I began my analysis drawing from Ollerenshaw and Cresswell (2002) by way of Clandinin and Connelly (2000) who outline a three-dimensional approach to analyzing data in the process of writing narratives:

1. Interaction involves both the personal and social. The researcher analyzes a transcript or text for the personal experiences of the storyteller as well as for the interaction of the individual with other people. These other people may have different intentions, purposes, and points of view on the topic of the story.
2. Continuity or temporality is central to narrative research. The researcher analyzes the transcript or text for information about past experiences of the storyteller. In addition, it is analyzed for present experiences illustrated in actions of an event or actions to occur in the future. In this way, the analyst considers the past, present, and future.
3. Situation or place needs also to be analyzed in a transcript or text. Narrative researchers look for specific situations in the storyteller's landscape. This involves the physical places or the sequence of the storyteller's places. (p. 339)

Shortly after each interview I would either transcribe or have a transcription company produce a written document of the interview. I then reread each interview, extracted quotes, made notations, and added further questions. Because the focus of my research was guided by pragmatist philosophy, sociopolitical teacher knowledge,[4] and narrative inquiry, I looked for quotes that detailed both an ideological stance but also a purposive action that supported this stance. So, when a teacher discussed race in the context of mathematics education I noted this area of our discussion and often used it as supportive commentary but I extracted quotes that detailed what a teacher did in the context of race. Specifically, I looked for moments in the participants' teaching where there was conflict, tension, or uncertainty as it related to equity in mathematics education and used this as the base for both the story and further questions. These moments provided a picture of

[4] See the literature section for further detail on what aspects of teacher knowledge were the focus of this research but in summary *inquiry of stance, Napantla,* and *conocimiento* (Cochran-Smith & Lytle, 1999; Gutierrez, 2013) were the main concepts that channeled my focus. Additionally, the sociopolitical turn in mathematics education guided my attention to moments that involved student identity (race, class, gender, etc.) and power (either direct as in teacher/student or more subtle forms of 'governmentality') as the teacher interacted with students.

philosophical pragmatism's cycle of inquiry[5] and, within the sociopolitical context, revealed knowledge(s) are needed to be a more equitable mathematics teacher. After quotes were identified using the aforementioned theoretical lens, they were then laid out to fit the sonata-case form (see following section on representation).

Once this was completed and a more comprehensive picture began to emerge of each narrative, I identified spots where more detail or further explanation was needed. Sometimes this was a quick clarification of minor details such as names, numbers, or setting, which usually happened in our 'hallway' conversations, but other times more extensive details were needed. Once these gaps were identified, I wrote questions to address these needs, which typically framed my next interview. I also began the process of adding details to the stories provided by the teachers. Although I had previously identified that I would be writing partially fictionalized narratives, this phase began the actual elaboration and expansion of stories. As detailed by Chang and Rosiek (2003) the aim of this fictionalization was to produce narratives that were cohesive, accessible, and painted a picture of *what could be* in pursuit of an equitable mathematics classroom. As quoted in Chang and Rosiek (2003), Nel Noddings (1995) helps frame the purpose of these fictionalized accounts:

> Every researcher should be honest about the status of his or her work as report, philosophical fiction, or speculation. But if the confessed purpose of a narrative is to encourage readers to "try looking at it in this way," the truth of the account may not be of primary importance (p. 130).

Each narrative was framed by interviews and personal interactions but the narratives were composed to offer new and different ways of looking at equity in mathematics education.

[5] The cycle of inquiry involves problematization, action, reflection, and further action. Problematization emerged naturally in the face of uncertainty and the resultant action within the context of a story provided evidence as to whether the action 'worked' or not.

**Phase three:** From July 2014 until August 2014 I continued to work with the interviews and produce the narratives. Much of this time was spent going back and forth between interviews and the first two narratives, formatting and adjusting to best fit the teachers' experiences and voice.

**Phase four:** From September 2014 until January 2015 I interviewed Adam, finished Bianca and Rebecca's story, and began to compose Adam's story. During this time I also worked with both Bianca and Rebecca to ensure that their stories accurately reflected their experiences. Each teacher was given access to their interview transcripts as well as their stories. Both Bianca and Rebecca read pieces of their narratives to begin with and then during the latter part of this phase they each read the entire story. Each provided both written and oral commentary on the narratives.

**Phase five:** From February 2015 until July of 2015 I finished editing Rebecca and Bianca's narrative, composed Adam's narrative, and began the cross-case analysis. The cross-case analysis involved reading the narratives several times to identify similar themes framed by sociopolitical understandings of teacher knowledge and practice. Immediately, 'race' was a common thread found among all of the narratives as teachers tried to navigate the racialization of students in their classrooms, but more subtle knowledge(s) such as 'community' and *Napantla* were eventually determined after comparing the narratives with current sociopolitical literature. Evidence of these themes was extracted from the narratives and used to support the identification of sociopolitical microstances. Towards the end of this phase I also gave Adam his final narrative to review.

**Phase six:** From August 2015 until November of 2015 I continued to work with Adam on adjusting his narrative and finished my cross-case analysis as well as identified inhibitions to broader classroom transformations.

**Representation**

How then is narrative inquiry – and more specifically partially fictional, sonata-form narratives – uniquely positioned to answer my question and contribute to the field of mathematics education research? To address the first part of the question I believe my dissertation - both theoretically and methodologically - positions teachers and their experiences as the foundation for what is and what could be happening in mathematics classrooms. Individual experiences are drowned out by the sociopolitical movement's reliance on macrosocial theories and the teacher learning literature fails to address how the political connects with practice. Narrative inquiry provides a space for the macrosocial to meet the individual, for the sociopolitical scholarship to meet teacher knowledge scholarship, and for the theoretical to meet the daily practices of teaching mathematics. We cannot posit what is or is not needed in the classroom without considering the experiences of teachers, nor can we help teachers learn how to teach without integrating a larger social, cultural, and political context. By documenting a mathematics teacher's story, allowing them to directly contribute to this story, and connecting this story to larger theoretical propositions of knowledge, learning, and the politics of education, narrative inquiry provides a means to create a dynamic, complex, and accessible picture of what is happening in a mathematics classroom; detail what stances teachers are taking to make mathematics more equitable; and how we might

better facilitate a transformation in mathematics education practice to consider the political implications of teaching and meet the needs of our communities and students.

To address the lack of narrative representation in mathematics education research, there are a few studies using narrative inquiry as it applies to preservice and experienced mathematics teachers (Chapman, 2008; Kaasila, 2007), but few have focused on the experiences of veteran teachers in light of the sociopolitical turn in mathematics education research. As mentioned in the literature review, much of this research has focused on the theoretical constructions of 'sociopolitical' but not how this might look within the classroom. I hope to contribute to the sociopolitical literature by looking at the stories of mathematics teachers in order to better understand what it takes (knowledge) to teach a more equitable mathematics and what might hinder larger transformations.

Additionally, there is a significant absence of "story" in mathematics education research. As previously noted, there is some literature focused on narrative inquiry in mathematics education research, but much of the research in prominent journals remains either quantitative, focused on theoretical development, or more traditional, 'legitimized' forms of qualitative research (ethnography, case studies, etc.). There, of course, is no 'right' or 'wrong' methodology as it applies to mathematics education research and each framework has its use in describing particular characteristics or phenomena as it relates to instruction, curricula, or teacher knowledge. However, in lieu of the sociopolitical turn in mathematics education research, which looks to destabilize the traditional discourses of mathematics, mathematics education, and philosophical conceptions of mathematics education research, it seems there must also be a push to broaden the methodological borders of mathematics education research. According to Chapman (2008) narrative

inquiry is uniquely positioned to capture some of the messiness, uncertainty, and ambiguity of teaching mathematics whereas other methodologies might simplify or ignore the complexities of teaching. A study using narrative inquiry might not only challenge the status quo in mathematics education research - subsequently opening the doors for more arts-based methodologies - but could also reveal a more nuanced understanding of the challenges, tensions, and possibilities of teaching mathematics differently.

### *Sonata-Form Case Study*

Furthermore, and as mentioned in the literature review, the experience of teachers in mathematics education has been systematically ignored and delegitimized as a result of standardized assessment scores and scripted curriculum. As a theoretical and methodological framework, pragmatism in concordance with narrative inquiry (re)centers teacher's experience as both legitimate and essential at a pedagogical and epistemological level. By (re)presenting these experiences as narratives I hope to trouble current conceptions of mathematics teaching (traditional, scripted, teacher-centered) and open up new ways of thinking about teaching and learning in a sociopolitical context (e.g., considering the students lived experiences, localized curricula, project-based, inter-subject problems). For these reasons I will be using the "sonata-form case study" representation for this dissertation. This particular representation uses teacher interviews, reflections, observations and input from others to compose a partially fictionalized account of a teachers' experience. As Chang and Rosiek (2003) affirm, "we believe this shift from describing actual meanings to describing possible meanings is justified. Its aim is to produce a kind of scholarly speculation that remains accessible and germane to

teachers' personal practical experience" (p. 254). As a practicing teacher, it is important to me that my scholarly work is both meaningful and accessible to scholars and teachers. I believe that the sonata-form case study provides a rich textual experience, facilitates multiple access points, and still provokes questions, divergent interpretations, and troubles our normalized assumptions.

Sconiers and Rosiek (2000) conceptualized the sonata-case study as a way to "document the teacher's unique understandings of how subject-matter content and sociocultural influences intersect in the classroom and the manner in which teachers responded to this interaction" (p. 398). This dissertation will follow the sonata-form case study format, which has been outlined by Chang and Rosiek (2003):

1. It opens with a classroom episode that sets a tone for the rest of the story.
2. A description follows of a classroom activity that illustrates the teacher's instructional philosophy and intentions.
3. A situation is reported upon in which those instructional intentions come into conflict with a student's life experiences.
4. The teacher's intellectual and emotional response to this tension is described.
5. A step back is made from the immediate situation to reflect on the teacher's understanding of the tension encountered. This often involves extensive biographical reflection on the sources of the teacher's insight (or lack of insight) about students' lives.
6. The narrative returns to the episode of teaching in which the original conflict was introduced. Its meaning is now changed by the exploration of student experiences, teacher biographies, and socio- cultural context in which the moment is nested.
7. The story ends, not with a resolution, but with an open-ended commentary on this new understanding of the relation between science teaching and students' cultural, linguistic, and/or class experience. (p. 256)

The representation within this study deviates slightly from the aforementioned prescription as it does not initially focus on a content driven classroom activity but instead looks more broadly at a dynamic moment involving students. These moments could involve an entire class or a single student and occur in or out of school, but this

shift in representation was precipitated entirely by the teachers who presented these stories as sources of transformation in their approach to teaching. The intent, then, is to broaden what it is meant by 'instruction' and add to conception of sonata-form case study. Sconiers and Rosiek (2000) outline three reasons for using this particular form of narrative representation:

1. It attends to teachers' practical knowledge and provides a platform for cross-case analysis
2. It provides an emotive focus to the narrative, connecting reflection directly on practice
3. It builds meaning and connections among seemingly different aspects of teaching and problematizes the simplification of teaching as separate from broader cultural, historical and political considerations

The sonata-case form provides a powerful representation to answer my research questions, specifically what additional knowledge(s) might be included in the sociopolitical literature and how stories might contribute to these efforts.

### *Fictional Narratives*

In addition to the sonata-form case study – and as mentioned in phase two of the research process – the narratives will be partially fictionalized. There has been, and continues to be, debate in broader social science circles and more specifically within the narrative inquiry community in regards to 'fact versus fiction' (Clandinin & Connely, 2000; Barone, 2007). The topic is especially controversial because educational research continues to be framed by a "single drop of blood" framework that dismisses any inclusion of fictional "literary devices" (Barone, 2007). However, in light of the proliferation of methodologies mentioned in the introduction (Lather, 2006) there have been philosophical and theoretical reasons to explore more fictionalized accounts of teaching. What is important to consider though is how fictionalized stories might

contribute to the field of mathematics education research, how being released from the "methodological straightjacket" (Barone, 2007) might help us both trouble narrow conceptions of teacher knowledge and provide insights of teaching mathematics towards equitable ends.

The main elements of the narratives – the stories, characters, the emotion behind the interactions, the critical reflection on what was happening and why – were taken directly from the participants, and at times directly quoted the teacher. However, the narratives were not intended to document a phenomenological account of what happened in the classroom but instead to problematize and broaden our current understandings of what it takes to teach mathematics with equity in mind. This representation falls more in line with postmodernist claims of troubling "one true account" and arts-based representations that look to unearth *what could be* (Sconiers & Rosiek, 2000; Kinchloe 1997; Hall, 1996; Noddings, 1995). This ties directly with the pragmatist theoretical framework that looks to both problematize past and present understandings and offer new and different possibilities of mathematics education (Koopman, 2011; Medina, 2012). As a result, the narratives are complex '(re)presentations' of mathematics teachers' experiences as they navigate the uncertain and complex moments of teaching mathematics while attending to their students' sociopolitical needs. From these uncertain moments we see new possibilities and further insights that help engender a more intricate and political understanding of mathematics teacher knowledge.

The major tensions, dynamics, and reflections within these case studies were not fictionalized, but because the participants could not always recall specific dialogue between students or what the setting was like at a particular location, I often composed

these elements. For example, the moment in the coffee shop with Bianca and Amber actually happened but the teacher could not recall the exact details of that entire experience. So, the setting and some of the dialogue was co-constructed with the teachers. The same applies to the other participants. As they recounted their stories, thoughts, and critical reflections on these stories, details were missing and even after time and further probing questions could not be entirely recalled. These brief moments or minute details were fictionalized to offer a more complete, albeit complex picture of the teachers' experiences.

# CHAPTER IV

# BIANCA'S STORY

The narrative that follows is a glimpse into the teaching experiences and life history of a veteran mathematics teacher at Regence High School. Bianca has been teaching mathematics at Regence for twelve years at the point of this narrative and her dedication to the students and community of Regence is unparalleled. The narrative first explores a moment in Bianca's career that demonstrates this dedication and introduces several themes that will emerge throughout the narrative. These initial themes focus on the importance of student relationships in teaching, how high expectations counter deficit narratives, and the debilitating structures within remedial and college-level mathematics. The narrative then turns to a historical account of Bianca's experience with education. This turn helps us contextualize Bianca's diverse but privileged experience, especially in mathematics education, but also reveals someone who – from an early age – engaged in critical self-reflection on racism and tracking within schools.

The narrative then returns to Bianca's teaching career, starting with an interaction she has as an inexperienced teacher with a student. Her assumptions around this student – framed by economics, race, and ability – end up defining this student as a 'problem' and a 'deficit' without much consideration. This story reveals the importance of building strong connections with students and their families as well as countering deficit narratives in mathematics education. Bianca's critical reflection then transitions to more of a

microstance when she develops a strong, demanding, and supportive relationship with another black male student at Regence. This story demonstrates the power of high expectations, having a deep connection 'with' students and their families, and understanding the racialized experience of students in mathematics education. Finally, the narrative returns to the first story – not to answer questions, but instead to engender more questions about what it means to be a mathematics teacher and what is the purpose of mathematics education.

**Extracurricular Conversations**

The rain dribbles down the fogged window in a faint nod to fall's incoming saturation. The air inside the coffee shop is a humid cloud of whirring espresso machines, conventional jazz, and overstimulated conversations. I sit by the window as college students hurry past – faces bowed down and grimaced as they charge through the rain. A constellation of colors refract through the droplets, dulled rainbows shifting as people walk by. Through the condensation, I make out diversity, difference, black and brown – a unique concentration in an otherwise white town. This scene is also a reflection of my students at Regence High School – the "diverse school" – and thinking of them, a sense of pride warms my soul and I find myself smiling: their awkward, beautiful, brilliant faces testing my twelve years of experience everyday. I love every one of them.

The reason that I am at the coffee shop near the community college is to meet one of my former students. I originally taught Amber when she was a freshman and continued to maintain a strong relationship with her as she progressed throughout high

school. It's been several years since Amber graduated and moved on to college, but when she reached out to me for help, I offered to meet without hesitation.

Where do I begin with Amber? First off it's hard to say no to Amber; she exudes energy. As a student she was gregarious and thrived on being the center of attention. We have all had *that* student: the one who can easily direct the energy of the entire class, for good or bad. When they 'buy in,' the class follows. Well, Amber was that kid. So, when I had her in class, I knew that I had to be strategic: first, I concentrated on developing a strong student-teacher relationship; and then I provided a space and structure for her to channel this energy. And she thrived. Amber taught the class how to use algebra tiles. Amber helped with tasks around the classroom. Amber always presented for her group. A trait that might be construed as a deficit by many teachers was an asset in my class. I won't romanticize the situation and say that Amber was the perfect student in mathematics and struggled in every other class - we had many frank conversations about acceptable behavior and the importance of giving her best effort - but by recognizing her personality and providing room for her to be who she was, everyone benefited. Her asset became our asset, and she emerged as a leader. If we want to put that in terms of school lingo, Amber 'exceeded expectations' in Algebra.

Three years after my initial class with Amber, I was asked to help determine whether to transfer her out of an AP science class. The principal, a special education teacher, a psychologist, a counselor, and a handful of other educators sat across from Amber as she advocated dropping the class, claiming that she couldn't handle the work. I sat quietly, leaning forward and listening as several of the 'experts' at the table agreed with her that the class was too much. As the special education teacher summarized, "we

all know that Amber is a smart girl but she has a lot going on in her life right now. Maybe it's best if we found a different science class." I couldn't help but cringe. Granted, there was some level of truth in that statement: Amber was a foster child. The statistics are overwhelmingly pessimistic for foster children: only about fifteen percent take college preparatory classes, roughly 10 to 20 percent will attend college, and about two percent who enter will actually graduate. The numbers are equally disturbing for employment; with studies estimating that up to 50% of former foster kids are unemployed. Still, as I sat there at the table, all I could think about was how we were lowering our expectations for Amber. The conversation kept orbiting around a deficit perspective. The principal and I were the lone voices of dissent at the table. "I disagree, I think you can do this Amber" I encouraged. "I've seen the work you are able to do and I think that by dropping this class you aren't allowing yourself to not rise to the challenge," the other of us said. Don't get me wrong, I empathize with Amber's situation, but shouldn't the conversation have started with "what do we need to do in order to help you succeed in this class" rather than 'well, if it's hard then maybe you shouldn't continue?"

As I sit across from Amber, I can't help but think that interaction, in particular, is part of the reason that I'm sitting here in the coffee shop. Amber called me because she is struggling with a community college mathematics class. Despite taking three years of mathematics in high school, she tested into Mathematics 20 at the local community college, an introductory course covering basic content that she has already mastered. Here is a girl who was teaching other students how to factor quadratics five years ago and now she is relegated to a class that is focused on Elementary and Middle

school topics such as fractions, percents, and ratios. Not only is she in Mathematics 20, but this is her third time taking the course. I am frustrated and angry at the situation, but mostly I'm sad. I know the Amber who took a leadership position in my mathematics course, collaborated on difficult problems, and was able to communicate complex mathematical ideas to others. What could have happened? Was she not prepared enough in high school? I'm worried that Amber doesn't fit the standard mold carved out by many community college mathematics departments. Is she struggling with 'watch as I complete this problem, memorize the process, do fifty practice problems, and take this paper-based summative test to assess your understanding' type mathematics class? Do her teachers know how she learns? Do they care? Who, in this equation, is responsible for her struggles? I am excited to see Amber, but I wish it were under different circumstances.

Like a whirlwind, Amber blows into the coffee shop - slightly disheveled but otherwise sporting her signature smile. "Hi Ms. Brohm!!" she says a little too loudly and we share a big hug. Without asking, I notice the exhaustion and frustration in her eyes. She seems tired. "Hey Amber!" I say. "Look at you! How are you doing? I'm so happy we could meet." We sit and talk for several minutes catching up on life. She gives me the highlights of her experiences after Regence and her transition to college life. We touch base about her current friends, family, aspirations, and struggles. We reminisce about high school and she asks how other teachers are doing. "How's Mr. Tsab? Ms. Robin?" The conversation drifts from one memory to the next: a random sampling of positive memories from high school. Every so often Amber jumps up unexpectedly and runs to the door, swinging it open with a bit too much force and yelling out at someone she knows. At first this behavior is shocking. People in the coffee shop are glancing up

with judging eyes and I find myself looking down at my hands. But, then I realize that this is the same kid I taught in Algebra. A kid who is full of energy and zeal. A person who wants to connect with others and expresses her emotions acoustically. She is over the top and, after my initial discomfort, I relish every second we spend together.

Amber's story is a single narrative highlighting a much larger arc of mathematics education: from beauty and applicability in elementary school, to the increasing rigor and segregation of middle school, to the roadblocks and repression of high school, and, finally, the blatant omission in higher education. Amber is fighting a system that continues to push out, prevent, and discourage students from realizing their academic goals. Nearly two-thirds of high school student's enrolled community college needs to complete a "remedial mathematics course."[6] Part of this very troubling statistic is a blatant disregard and distrust of what is taught in high school on the part of higher education institutions. A student can go through four years of high school mathematics and then - without deference to their transcripts or teacher input - take one 'placement' test that will determine their proficiency. As a teacher and professional I feel insulted, but more importantly it is unfair to the students. Amber did extremely well in high school mathematics and "owned" the content. Now she was being asked to repeat grade six. How many of the thousands of kids have similar stories to Amber - strong high school mathematics students who struggle through 'remedial' college level courses? And, out of those thousands how many truly need college level mathematics to be successful in their respective career path?

[6] This is based on a report produced by the Institute of Educational Sciences in conjunction with Education Northwest by Michelle Hodara (2015)

"I want an associates degree in early childhood education so I can work at Headstart, and I don't know how this math applies to my goal." Amber relays to me during our conversation. And, with as much conviction as I can muster under the current circumstances, I respond "I'm not sure if it does, but you have to pass this class to move forward so let's work through some problems and figure out where you are confused." Amber is working extremely hard to accomplish her career goals, but greater forces are restraining this seemingly possible vision from materializing. Ironically, in addition to suffering the social stigma of being in a 'remedial course' and the meaningless process of solving simple mathematics, Amber was denied financial aid for Math 20 because it does not count as a college-level course. Not only does the class seem unnecessary both pedagogically and occupationally, but it creates an undue financial hardship. Amber is caught in a frustrating cycle of try, fail, repeat. But how long can someone sustain this? I have heard numerous stories reflecting a similar cycle, and for many students the endless loop leads to frustration, anxiety, and, eventually, a concession of defeat.

As a mathematics teacher, I find myself at a crossroads during my all-too-brief meeting with Amber. I want to prepare my students for 'what comes next' but what should I do if 'what comes next' seems, in many respects, unfair? Do we train students to function in this narrow system of 'success'? Or do we teach in ways that engage students, build strong relationships, focus on collaboration and communication, and look for ways we can individualize learning so every student is an asset rather than a problem? Amber represents a much larger and more complex conversation in mathematics education that needs to involve students, the community, administrators, teachers, and college professors. More importantly, however, it is a conversation that

needs to move forward and not stagnate in endless debate. Students are suffering at the hands of idleness and, as evidenced by Amber, lives are being drastically affected by unquestioned practices. I'm tired of watching students get pushed out because they don't represent a particular type of learner, and, let's be honest, in mathematics this ideal learner is white and has money. How do I rectify my practice as a teacher - student-centered, collaborative, in depth, nurturing, compassionate - and the subsequent frustration my students encounter beyond high school?

**My Experiences as a Student**

I guess maybe I am primed to acknowledge oppressive structures. From the beginning, I have always engaged in conversations about race and poverty. I'm not saying that my parents negotiated the complexities of white privilege or systems of oppression, but as a family we never shied away from difficult conversations about difference. "You are responsible for helping those who have less than you," was the repeated moral to every conversation. Maybe this outlook was a result of the racial tensions and protests during the late sixties in our town. More likely, it was because the disparity between white and black, poor and rich was always blindingly apparent. The Midwest town I am from is not a big place, as of 2012 there was 68,000 people in the city, but it reflects larger metropolitan cities - segregated by race and class. The majority of the black community lives north of the railroad tracks, with a smattering of black and Latino communities crossing the conspicuous border to access 'better schools' or 'nicer neighborhoods.' This shameless segregation extended into the schools and also our dinner conversations.

Fear is the word I feel best describes most conversations I overheard about the communities of color. In hushed "did you hear" or offhand comments about "those people," I can distinctly remember the underlying unease and suspicion in white people's descriptions and accounts of northeast neighborhoods. Unlike the blatant discriminatory comments of my neighbors and friends, my parents tried hard to counter this racist narrative with words of equality. I will not proclaim that our conversations were critical of unjust systems or reflective on white privilege, but they never shied away from conversations about race. Instead of whispers or hushed tones they were willing to engage in candid dialogue about what was going on in our town and how some people were still treated less than others. To add to these conversations, my brother and sister's father lived in a big, beautiful house north of the tracks. But, as many people made sure to point out, he lived 'in the bad side of town.'

My elementary school could probably be considered diverse, but it was by no means the 'diverse school' in our town. My best friend at the time was a fundamental example of how the racial and socioeconomic borders played out in our schools. Jasmine's mom was a nurse and worked particularly hard so they could live in a wealthier neighborhood, even though it was evident they struggled financially to sustain this lifestyle. Jasmine's mom was white but Jasmine looked African American. Jasmine did well in school, was identified TAG, and seemed to have found an inclusive group in the elevated math and reading track. But, this 'inclusion' was complex and to a certain extent racially disparaging. I distinctly recall a friend of ours talking to Jasmine about how her family does not like black people, then realized who she was talking to and tried to recover with "except for you!" I wonder how Jasmine felt at that moment. As far as

my peers were concerned I can only surmise that because Jasmine was TAG, was in a good neighborhood, and had a white mother she was not considered black. I can only surmise that this interaction might have been much more blatantly racist if one of the above characteristics were different.

My decision to leave public school for a private school was entirely my choice. I was doing exceptionally well at my elementary school, along with Jasmine I was in the top track for mathematics and reading. I also learned how to play the compliant student well; emulating the traditional values of a 'successful' student - perseverance, problem solving, strong work ethic, staunch individualism, etc. As an example, I recall getting so upset at not understanding how to graph in the second grade that I cried in front of the class. I was so fixated on being *that* student that I couldn't handle the eventuality of not getting a concept faster than everyone else. However, my elementary school experience was shadowed by chronic bullying. I don't know exactly why I was bullied; perhaps I represented a larger system that these two students felt compelled to resist or perhaps I was just the small white girl who was not going to fight back, either way I decided it was too overwhelming and told my parents "I'd like to go to Saint Mary's School."

Looking back, I have mixed emotions about my transition to a private school. I wholeheartedly believe in public schools and have dedicated much of my life to improving mathematics in public education, but at the same time, that particular move drastically improved my experience at school. This is a tension that to this day I wrestle with. I often find myself - with my partner or other teachers - comparing other schools, especially private schools, when discussing our kids or students who have transferred. How do you rectify something that benefited you but you know perpetuates

a system of inequity? Admittedly, it was a privileged decision. Even during the third grade I recognized that I was experiencing unearned privilege. I had the support and resources to make a decision many others did not have the opportunity to make.

In fourth grade, I was again tracked into the advanced mathematics classes. It was a hard working, competitive group where challenging problems catalyzed a drive to do more challenging problems, a cyclical, self-sustaining passion for figuring out the problem and moving on to the next challenge. For me, mathematics was framed through this experience; it was fun, exciting, and rewarding. I connected with the consistent, systematic processes; found solace in the continual often-unnecessary practice; and experienced repeated success in the regurgitation of knowledge on traditional assessments. I fell in love with what we now call 'traditional mathematics' instruction and was rewarded in kind. But, I also realized that within this so-called 'elite' private school there was pervasive, systematic tracking. Many of my friends were placed into 'regular' mathematics classes and as a result were rarely pushed or expected to go beyond the minimum.

Middle school reified my 'giftedness' in mathematics and further separated me from 'regular' students. I was one of three students promoted to take algebra at the high school. Without any words I was told that I was good. It wasn't someone sitting me down and explicitly saying I was good at mathematics, it was unspoken assumptions, unsaid preconceptions, and unexamined mindsets that directed what teachers would say, what classes I should take, and how I was expected to perform. I fit a very narrow profile and I was rewarded. Let's be completely honest, I also loved every minute of the attention and success. There was a tension - more pronounced as I reflected on these

experiences as an adult - but at the moment I was happy having teachers set high expectations and knowing, without a doubt, that I could meet these expectations. The problem, I would later understand, is they didn't hold these same expectations for every student. I saw these inequities when I was in school, but as a teacher I now know how dangerous these presuppositions can be to a student.

Even though adults were unwilling to talk about the inequitable systems in place, my peers were more than willing to call it like it was. The 'popular boy' at the school decided to catch phrase my experience in school by coining the term "Brohm'd it!" So whenever he did well on a test he would proclaim to any and all who were in earshot "I Brohm'd that test!" The phrase caught on and my name became synonymous with doing well in school. I, again, enjoyed the attention and at the time was unfazed by it's broader imagery. Now, however, I recognize that the phrase represented larger conditions of who was included and excluded. Much like the conversations I overhear today about 'smart' and 'dumb' mathematics classes, "Brohming" was a representation of success versus failure in a context that does not support every student. It represents who was in the advanced class and who was in 'regular mathematics.' Who found a connection with traditional mathematics education and who was pushed out because they didn't fit the one-size-fits-all approach. In essence "Brohming it" signifies a complex and oppressive story of mathematics education in the United States, an unquestioned binary separating those who get it with those who don't: 'this is what I am, so this is what I do; you on the other hand are not *advanced*, *gifted*, *tag*, *honors*, *IB*, or *AP* so that is not what you do.

Once I entered the tracking system of middle and high school my story was already written. I was more or less destined to be a 'math person.' As I transitioned to

high school I was on a catered path of advanced courses. Instead of taking Geometry, I took Advanced Geometry where anyone outside of our restrictive sphere was largely excluded; this included 'regular' sophomores who were also taking Geometry. I even had friends my senior year who wanted to take PreCalculus but were denied because they were not on the same track. As a result, they were relegated into a class called Modern Analysis and who knows what that curriculum looked like. I graduated high school having experienced nothing but success in mathematics (except for the incident in second grade). Ironically, I became a mathematics major and experienced the complete opposite at the University level: resistance at every turn, constant microaggressions because of gender, and overt exclusion because of rampant patriarchy.

All of these experiences are part of my motivation to do what I do. Students shouldn't have to fit a particular mold in order to have the same opportunities and encouragement as other students. Yes, there are some limitations to the structures of a comprehensive high school that may exclude certain students but, in my mathematics classroom I critically reflect and shift my practice to meet the needs of as many students as I can. Ultimately, I think an equitable classroom is one in which all students receive the same opportunities, encouragement, and guidance.

**Transition to Teaching**

I arrived at Regence High School without doing a lot of research. I worked at a school in the suburbs for a year and wanted to transition to the city, so I applied for the position, interviewed, and was offered two teaching jobs in the district. I wish I could say I had some internal drive to work at the 'poor' 'diverse' school but I was 23 and looking forward to living in the city, so I choose Regence because it was closer to where I

wanted to live. I'm not sure if I was actually shocked by my transition to Regence but I immediately realized that teaching at Regence High School was not going to be easy. Because our students continually face overwhelming inequities - well beyond what one might find in an economically advantaged and predominantly white school - I had to quickly learn how to be a mother, counselor, activist, social worker, friend, and mathematics teacher. I couldn't drive up to Regence High School and expect to just teach mathematics and call it a day; in order to be effective I had to become something beyond a teacher.

From the very beginning I would often put in twelve-hour days at Regence in addition to working Saturday morning and most of Sunday. I don't say this to elicit sympathy or to assert a *better-than-thou* attitude, but merely to describe the time needed to do a good job teaching mathematics. I think this is especially true for mathematics education at a school that is often described - in the same breath - as 'diverse,' 'poor,' 'black,' 'immigrant,' etc. - as being an underperforming or failing school. So my job is not only to teach mathematics (in addition to all the other duties I describe above), but also to fight a system that continues to tell our students they can't do mathematics. This is, obviously, bullshit. If anything, based on the stories of resilience I have personally witnessed and heard, our students are *more capable* than students from other schools. But it's not easy to convince my students that they can do the mathematics, that the mathematics they are doing is useful beyond passing tests to graduate, or that they must pass the test in order to have the same opportunities as any other student in our district.

Over my twelve years at Regence, I have learned that being direct is often the best way to convince students that they are capable of doing what has long been propagated that they can't do. Life doesn't sugar coat what happens to my students outside of school so why should I change the tone to make their actions seem less important? Ironically, my directness often inspires uncomfortable laughter. You know, the hesitant laughter that follows an awkward comment – was that sarcasm or an uncomfortable truth that needed to be aired? But I'm not being sarcastic; I am brutally honest with students when they do not meet my expectations. I feel like I should clarify that these expectations are primarily framed by what I think students will need to know in order to be successful after high school, but I also think about the content students are supposed to learn in my class (standards, learning targets, etc.), their collaboration and support of their peers, and a more individualized understanding of what each student can do at that particular moment. If a student has had an especially difficult week at home I am willing to negotiate the expectations of that particular student for a set period of time, but over the long run I will not compromise high standards for any student.

You might wonder why I'm willing to have those unnerving, difficult conversations with students in regards to mathematics and why I feel it's important that students work extremely hard in school. It's because I know that my students - because of existing structures of oppression - will have to work harder than most in order to have similar opportunities as those with unearned privileges. I understand that the black males in my classroom will have a 30% higher chance of being suspended and an almost 40% greater chance of being arrested in comparison to my white students. I acknowledge that many of my Latin@ students have two or three languages mastered but are still

considered deficient because their test scores aren't as high as the white students. I recognize that many of my first and second generation students are struggling to find their place and identity as they are caught between the traditional values of home and the hegemonic white discourses that pervade public education. I know from returning stories, both successful and horrific, that my students of color will have to fight everyday, to the point of exhaustion, in order to attend and persist at a college or university. And, these Universities will not attend to different learning styles or listen with compassion if a student has a bad day; without hesitation they will be isolated, forgotten, dropped. I know because of my privilege that I can't experience what my students face everyday but I am empathetic towards the economic, social, political, and cultural pressures that they must navigate in order to just get through the day. And, with all of this in mind, I make my students work hard and let them know when they are not working hard enough. In fact, I make them work harder than other students in our district because I know the proverbial deck is stacked. For me, the way to change the system is for my students to have access to the system.

That being said, I am also unabashedly honest that I love my students and believe each one of them can be successful in my mathematics class. I dedicate my lunches to help students; I stay after school to, again, help students but also plan thoughtful lessons and contact my student's families (my goal is three students per day); and, most importantly, provide space and time to listen when students need to talk. I am uncompromising when it comes to mediocrity but I'm also willing to put in the work to support my students' success. I believe that this approach, in combination with building strong relationships and equitable support, makes a difference for students' present and

future experience in education. Sure I have students who, no matter what I do, remain unconvinced and choose to disconnect from the classroom but for the majority, if I hold them accountable, provide the support they need, and consistently reinforce that I believe - with every fiber of my being - that they can do the mathematics, I have very few students who are unable to put in the work and, eventually, do well in my mathematics classroom.

Part of the philosophy of directness is targeted directly at black and brown boys in my classroom. Let me clarify this statement. Ever since I started teaching at Regence, but more pronounced recently, there has been a stark and troubling disconnect between males of color and school, and this has been especially felt in the mathematics department. I'm not entirely sure why; perhaps it's a blatant discordance between an oppressive white institutional space and being black or brown. Or perhaps it's more subtle for the boys at Regence: constantly seeing teachers who don't look like you; not interacting with or hearing stories of educationally successful males of color; witnessing people work really hard without any economic or political pay off; not seeing education as social, economic, and political resource; and experiencing classes in which a teachers' 'differentiation' is holding them to lower expectations. I know schooling was designed for, and has perpetuated, a certain type of learner, namely white and middle/upper class males. As a result, my African American, African, Latino, Pacific Islander, and Native boys seem to struggle filling the role as the prototypical 'good' white student. Or, more appropriately, systems of schooling struggle to understand and connect with different ways of engaging in learning. Whatever the reasons - and I believe it's a combination of all - my approach to this problem is to show unwavering love and support but maintain a

direct stance with my boys of color. I'm not afraid to target them with phone calls home and a leveling directive that *you will be staying after school to work with me on this concept.* I know I'm walking a dangerous line of essentializing; not all of my males of color need extra support and, yes, I generally act like this with all of my students. But, the numbers at our school don't lie and I will do anything in my power to prevent another one of my boys from becoming a negative statistic.

My focus and urgency around male students of color started with Deshawn. Deshawn entered my class with a swagger. It was a swagger that spoke of confidence, resistance, and an intelligence of how the world works for poor students of color. It was a swagger that swirled the dust of my unchecked assumptions. His entrance into my classroom could also be the start of a conventional Hollywood script: I was a young, ambitious, white teacher from the quiet streets of a small Midwest town; he was a tough, imposing, thoughtful black student from the unpredictable and often chaotic streets of a medium-sized city. Deshawn wore baggy clothing and cursive tattoos. He also bore deep, invisible scars of formal education's erasure of his identity and as a result, postured indifference from day one. If the situation had played out like your average movie plot, he would have resisted my good intentions as an educated and liberated mentor until there was a crisis (state testing? college entrance? gang related shooting?) where I convinced him that he needed my help; we would have worked tirelessly on mathematics and mastered the different levels in a matter of weeks; he would have graduated with fanfare; and I would have felt vindicated because I 'saved' another one from the 'streets.'

Perhaps this is what I wanted at the time; I'll be honest that there is a certain uncritical, superficial draw to the savior storyline. I know there is a system that silences my students - sometimes violently - and I want to protect everyone of them from these awful experiences, but I am very aware that it's not a matter of saving them; it's a matter of providing a safe space for making mistakes and taking risks, for honoring difference and listening to each others' stories, and for expecting nothing but excellence and providing the support to meet these expectations. But those thoughts are well vetted from years of experience. At that time I was young and uncritical of my biased assumptions, so I had already written Deshawn's story before he sat down: he was a disengaged black male student who would rather listen to music than do well in my class. It was his decision, his problem, his deficit. As much as Deshawn disconnected from my class I disconnected from him. I know now that my reaction was a defense mechanism; it made me feel better at night to know that it was all his fault. I am not entirely sure why I chose to see the situation that way. Maybe, the English teacher who, out of anger with the Special Education department, told me "you should pass every special education student because they aren't receiving the appropriate accommodations" influenced my approach to Deshawn.[7] Or maybe it was an assumptive fear borne from society's portrayal of black males as disengaged, unsuccessful, and resistant to acting white. Whatever the cause, I decided to let him be. I allowed myself the comfort of letting one student slide. So, Deshawn entered my class every day and was, largely, ignored.

On a wet March afternoon, Deshawn was doing his thing, which was mostly a whole lot of nothing. It was going on six months in my mathematics class and, other than

[7] Deshawn was on an individual education plan – he was identified as "mentally retarded" – so my deficit could have been influenced by a deficit on 'ableness.'

the continuous in class prodding, I didn't confront the elephant in the room. Deshawn got away with not doing work. He was never a bad kid, and actually I found him quite genuine, but the fact remained that Deshawn had eased into a comfortable situation of showing up to class and not having any expectations from me except to sit and wait for the bell. He was essentially coasting through mathematics. However, on this spring afternoon he was talking with his table partner and I overheard him say "I do my work for Ms. Thompson because Ms. Thompson calls my house." Time stood still for me. Again, to reference Hollywood, I felt like it was a scene from a movie where everything freezes and the camera pans around my shocked face. I lowered my gaze and kept the class going without pause but my heart clenched in anger, frustration, and sadness. For six months I had lowered my expectations of Deshawn because I made dangerous assumptions of who he was as a student based on a cursory and misguided understanding. Instead of seeing the opportunity to engage a brilliant, complex human being, I saw the path of least resistance. I was not seeing Deshawn.

The most horrific part of this whole story is the reason that I didn't contact Deshawn's home. Because, let's face it, in addition to the 'what can I do to help Deshawn be successful in my class' conversation I should have called to just introduce myself. But, without any context whatsoever, I chose not to call his house because I thought his mother either would not care or would not support him. Why on earth would I think this? Who was I to decide? I did not even give his family the opportunity to have a voice in the conversation. I was the first and final discussant, the arbiter of how Deshawn did in my class. Teachers tend to pick up tidbits of information about students and their families: whether their family helps or hinders, who to call and who to not call, how best

to get students to work, etc. It's possible that I heard too much dismissiveness from other educators and support staff, "Don't call his mom she won't help," "Oh, Deshawn's family, yeah good luck with that!" or "It's a waste of time." Over the years, I have learned to ignore such deficit conversations about students and their families, but in that moment, I probably allowed them to guide my actions.

My experience with Deshawn was a transformational point in my teaching practice, forcing me to examine what happened, why it happened, and what I needed to do next time. From that point on, I have made it a point to call the homes of every student as frequently as time allows, and I spend more time getting to know the families, especially those of my black and brown boys. If I don't show them that I truly care for them by including everyone in the conversation then why should they care about my math class? I am the warm demander: I will love them, support them, and demand of them more because this is what they need to survive and flourish in this world.

**Time Moves On**

I have settled into an invigorating discomfort at Regence High School. The discomfort stems from my drive to constantly improve my practice as a mathematics teacher under the guise that I'm never doing quite enough for my students. It also manifests from the incessant reminder that our school and district aren't doing enough. During the twelve years that I've taught, I've seen more than fifteen administrators come and go at the school. Regence has transitioned from a comprehensive high school, to three small learning communities, and back to a comprehensive high school in a span of six years – an experiment that yielded many positive experiences but glaringly reified racial segregation. I've seen the slow evolution and, in many cases, recirculation of

mathematics curricula. Advocates and highly paid consultants connected with direct instruction, collaboration, student-centered, project-based, problem-based, culturally relevant, discovery-based, and growth mindset have advised, coached, suggested, demonstrated, and lectured about how each one is the best option. Some are blatant about their proclamations, others more subtle. I have thousands of pages of 'best practices' in binders that sit dormant, collecting dust never to be looked at again apart from a quick flip through before recycling.

Not all of the experiences have been worthless and my pedagogy has shifted when 'experts' take the time to work one on one with me designing specific actions. For example, Sue Ruth from the Teachers Development Group helped me design mathematics lessons that facilitated and supported group work. But this is one experience out of dozens of interactions. As teachers, then, how are we supposed to navigate these often overwhelming and unending shifts in practice and institutional structures? And, more importantly, how do our students survive this unpredictable storm, which for most, is an additional burden to their already unpredictable lives?

In contrast to the onslaught of constantly-changing best practice advice, one thing that remains constant in my classroom is a focus on developing strong relationships with students as a foundation of my teaching practice. As I mentioned, part of cultivating relationships is my role as the warm-demander: listening to, understanding, and loving my students while holding them accountable. And, to be more specific, I'm not talking about just knowing my students names; I know their families, important memories, their dreams and aspirations, their hopes and fears, and what makes them tick in my classroom. I know when a student feels uncomfortable reading in front of the class and

which students are energized by presenting to their peers. I know when to push a student hard and when to back off because they are at the tipping point, that delicate moment when a student retreats instead of perseveres. To me, knowing a student goes beyond the words *to kno*w; for me it is a deeper, more complex, and more intimate understanding of a student and their context. Why are relationships so important? Because, when a student walks into my class there is an unspoken assumption that we have zero connection. And, I completely understand why they would think this. I look very different from them and, as a result, they assume my life is very different from theirs. For most of my students this probably is the case so, why would a student trust me? Why would a student listen to me when things get tough? To do this work - especially in a subject which many have experienced educational trauma - there needs to be trust, so I work hard to develop strong relationships.

When I reflect on building strong relationships I can't help but think of Deonte. I taught several of his family members over the course of my tenure at Regence and have worked extensively with Deonte on self-confidence and his identity as a student in mathematics. He would often talk to me about family and friends, of which I would gladly engage in and offer my opinions. These personal conversations were a springboard for my attempts to coach him on the importance of and his place within academics. One particular moment strikes me as evidence of our dynamic relationship. The assembly for spring sports has just finished when I glanced over to see Deonte with a group of his friends. The gym is awash in echoes as students run around the gym floor, expending energy after an exhausting hour of listening to talking heads, an assembly that, unfortunately, reflects what many experience in their classrooms. The teachers all

reminisce how our assemblies were so much better, but I'm not sure if that's really true or a product of age distorting reality. Deonte sees me sitting with some other teachers and bounds over in a couple of jumps; his feet clanging loudly against the old bleachers. "Hey Ms. Brohm!" he says with carefully subdued enthusiasm. I can tell he wants to talk to me about something but is trying not to seem too desperate in front of his friends. He eases into a seat next to me, leaning back into the dip where feet usually go and spreading out as only a lanky, awkward, high school boy can. "Hiya Deonte!" I smile back. "It's so good to see you! How are you doing today? I over exaggerate my excitement and Midwest drawl to elicit some humor. Deonte smiles and quickly glances at his feet. "How is your family?" I ask. He looks up at me and says, "It's alright. I'm struggling with my mom right now. She got really mad at me the other day and I just can't stand how much control they have over me. I really want to get out of my house."

Deonte and I talk for several minutes about home and the complexities of being a teenager and living with parents, the former wanting more freedom and the latter seeking to maintain boundaries. Deonte tells me that he was out late and failed to check in with his parents, so his mom, obviously, was very mad and revoked some of his privileges. I put on my counselor, teacher, and parent hat, listening to his story and offering advice when needed. Our conversation never devolves into school or academics but unfolds as another moment that signifies how relationships can make the difference in teaching. It was only a month ago that our relationship was tested in my classroom. I was having a candid conversation with Deonte in the hall about controlling his distractions and refocusing on learning the material. Deonte was living through a moment that most of us have experienced where we see or interpret that someone else is better than we are at

something and we become frustrated and, often, angry trying to reason out why. "You need to take yourself seriously and practice these concepts more Deonte*"* I say directly, having the hard conversation that many avoid. "You mean I need to practice because I'm stupid" Deonte responds quickly, not looking at me during this conversation. "No, Deonte," I replied. "You are not stupid. You need to practice because we all need to practice to get better at things. What can we do to make sure you feel supported and can work in class?" I offer. Deonte stops for a moment, looks down the hallway and says "What about Josh? He doesn't need to practice as much." "Well," I said, "some people are able to practice less and do well. Just like you might not need to practice as much on something else and do better than Josh. In this case mathematics comes easier to Josh and you might need to practice more. It has nothing to do with intelligence." Deonte nodded and went back into the class but I'm not sure if he believed me.

Deonte is someone who needs this type of relationship in order to do well in mathematics. He struggles with confidence in school, especially in mathematics, which I am guessing has to do with a long history of low expectations, disconnected content, and minimal support. Deonte and I haven't discussed his mathematics history - yet - but I've heard enough stories from other students to paint a picture of what many Regence students experience as they move through the mathematics education system in our school cluster. I don't mean to imply that any specific class or teacher is to blame - many teachers are doing amazing work – but, as a whole, our approach to mathematics continues to shake students' confidence and limit their conception of what they can achieve, be it in school or beyond. And these thoughts weigh heavily on me every time I interact with Deonte. I first have to dispel the myth that he is not stupid or not good at

mathematics, but before I can even do that I must connect with Deonte on a deeper level. He needs to trust me as a person so that we can move onto the mathematics.

Admittedly, Deonte is not easy to teach. That is, he doesn't represent society's conception of a compliant, diligent, hard-working student. Although redirection works well in Deonte's case, he is the type of student who will show up to a class on time, sit quietly, and become irritable if you try to get him to work. For many teachers this behavior serves as an easy excuse to blame the student and move on, much like I did with Deshawn. But, when you've built a strong relationship, this counterproductive behavior shifts. Deonte is a really nice kid who wants to do well in school but if there is no connection he won't give you the time of day. I've worked hard to get to know Deonte and his family so, in my class, it's not a matter of getting him involved, now it's trying to redirect his effusiveness with other students towards more productive mathematical pursuits. I know we have a strong relationship because he is comfortable chatting, whining, and trying to wiggle out of hard work. But I don't relent and eventually he practices and learns.

I also wonder if my instructional practice may not fit his optimal learning context. On a regular day, my lessons may seem like a common 'textbook' lesson: introduction, instruction, practice, repeat. So students enter the classroom, usually after an overwhelming greeting from me and start on their warm-up. I survey the room checking attendance, gauging student disposition, and ramping up for the lesson. I check in with each student, observing their progress, asking questions, probing knowledge, and finding ways to connect with them. As they finish the warm-up I have the students discuss their process and solutions in their smaller groups and as a whole class. I have

various tools to facilitate these conversations but my focus is always on student thinking: their ability to make connections, understand the process, and apply this process to novel situations. As I listen, I make calculated adjustments to my next move: do I move the students on or do I review past material? Is the larger class misunderstanding a crucial step or is it one group that is struggling? Based on this formative understanding, I take a few minutes to present or review content. The lesson then transitions to students learning new material and communicating this learning through collaboration, discussion, practice, and presentations.

Contained in that format, students typically work on curricula that would be considered more 'traditional' in nature. I wonder if Deonte needs something different than traditional content to connect with mathematics and find it meaningful, but I feel enormous pressure to prepare students for a system that continues to hold 'traditional' as the only way. At least, this is the discourse that our district and local universities continue to push. Sure, I've done social justice mathematics projects that were interesting, meaningful, and provided a different way of seeing the power of mathematics. However, did the students learn enough mathematics to help them where society feels it counts most? Did I do my students justice by ignoring some standard content in place of a more interesting context? How should I deal with the fact that some students still didn't feel connected to the project? All of these questions underpin a larger concern: I am deeply troubled how often social justice teaching seems to be the only way to help students, especially students of color and from poverty, learn mathematics. Can social justice teaching be reduced to projects and context or is it a larger issue of expectations, teaching practice, and equitable structures? Everyday I try to reconcile

these ideas with my teaching and have learned - often the hard way - that it is an uncomfortable, difficult, and liberating state of being. Likely, there is no easy answer.

**With Open Arms**

I'm admittedly tired after twelve years of complete dedication to Regence High School. That being said, I take a certain pride in the conversation I have when I'm supervising a student teacher and they think they can sit up front while students work. "You probably should be circulating the room right now, helping students, asking questions, and being seen," I say. "Oh, yeah...sorry," many reply. To me, though, it's ludicrous that anyone would think of sitting idly while students are working; if they are doing then you are right there with them, also doing.

I have entertained the idea of moving on, looking for schools that are closer to my house and whose students are perhaps 'easier' to teach. There is a perilous dream that teachers will find a school where they can 'just' teach, whatever that means. I often find myself stuck in this dream but then I think, is it really teaching if all you are doing is teaching? Meaning, isn't teaching also listening, caring, loving, demanding, working, crying, laughing, and celebrating? I keep feeling like this is where I am supposed to be and I can't justify leaving until I become less effective as a teacher or my life outside of school demands more than I am able to give; a precious balance of emotional and physical dedication to personal, family, and work life.

I'm considering what it means to be 'just a teacher' during my prep time as I watch Lorena diligently work on a pre-calculus assignment. Ahmad, one of my Muslim students, focuses on *Salat* off to the side of the room. I stroll over to Lorena to check on her progress and offer a few cheeky comments to lighten her serious disposition. "Who's

your favorite teacher Lorena? No, it's okay, you don't have to tell me, I know that you love me!" Lorena smiles - a genuine smile - and shakes her head at my childish behavior. Ahmad finishes his prayers on a cardboard mat and walks towards the door with his head down. I turn from Lorena and ask to speak with Ahmad out in the hall. The reserved student seems scared by the prospect, but I am already walking out of the room. I turn to Ahmad and without hesitation, offer my renewed support for him to use my class for daily prayers and reiterate that if there is anything I can do to make the space more conducive to his needs, he need only ask. I've heard from an adult that students are supposed to be alone during prayers, so I want him to know I can arrange for this if needed. It's more of a one-sided conversation than I hoped, but Ahmad nods with a mixture of fear and appreciation, and when I finish he smiles tentatively and turns to head back to class. I walk back, lost in thought. I suddenly feel unsure. Did my directness scare him away? Am I creating an inclusive space for students to worship and learn? Why had Ahmad chosen my classroom to pray in? I still don't have definitive answers to those questions but Ahmad showed up the next day during my prep time to pray.

I've worked really hard over my career to establish a classroom culture that values difference, encourages taking risks when things get hard, asks questions when only one method is being considered, prioritizes helping each other (but not too much), and understands that mathematics cannot explain everything. No matter the storms brewing in life, inside my classroom there is a sense of routine, purpose, and community. Students know what to expect and can count on that tomorrow. A few years back, I somehow managed to cultivate an Algebra I class that was a hive of productive,

collaborative, and compassionate activity. While students were presenting their ideas others listened intently and asked poignant questions. Students were willing to take risks, trying different methods to solve problems, and students were willing to help each other out no matter how much someone struggled. It was busy, it was loud, it was fun, and it was beautiful. When we got a new student half way through the year a group of students - self selected - immediately took him in, showing him the school and helping him catch up in mathematics. I had no direct involvement in this act of kindness, but our classroom environment opened up the space, support, and expectation for such an action to be normal.

After a fantastic year of Algebra I, the class moved into a Geometry class where the teacher did not think classroom culture was important, and instead focused entirely on the mathematics. One might say that he was 'old school.' Students sat in rows, worked individually, and didn't talk while they worked. The lecture took up significant part of class, and then students were expected to practice the rest of the time. The teacher also seemed to enjoy challenging students with insanely hard mathematics problems. I'm not sure if the intent was to teach kids humility or if he got pleasure out of making students fail, but the class devolved into a space of negativity, fear, and defeat. Because we were in small schools at that time, I continued to have contact with many of the students and they recounted some of the horrific experiences to me. Many did not like, nor did they look forward to future mathematics classes. And, I didn't blame them. I, of course, tried to convince them that future math classes would be different but what more could I do at this point? I was a young mathematics teacher and here was another teacher who had been doing this for more than twenty years? I had conversations with administration and

tried to suggest a different approach to this teacher but, ultimately, he just wasn't willing to approach teaching differently.

I want to be clear that I do not have all of the answers. I have presented many lessons that mimic what I just described as an 'old school' and, potentially, damaging experience for some students. But, I am constantly working to improve my practice and to develop a classroom culture that not only honors the individual, but holds the community as essential.

In a classroom where only the individual reigns and mathematics is the center no one leaves feeling successful. The students who enjoy individual work leave feeling like they get the content but fail to realize that communicating this knowledge, asking tough questions, and making mistakes is part of the process. The students who don't enjoy this classroom culture leave hating the subject, teacher, and, to a certain extent, education. So what is more? Obviously mathematics content is important, but beyond a doubt creating a classroom in which students honor each other, challenge each other to do better, help each other when things get tough, see themselves as a reflection of what is happening in the class, and see me as a collaborator rather than an arbiter of all knowledge is what I aspire to help create. I look at what was happening during my prep - the juxtaposition of a largely Western mathematics with an Eastern faith - and feel that is a powerful image of what a mathematics classroom could be in this picture: students learning, exploring, and making connections while also feeling completely comfortable to be who they are.

**A Blast from the Past**

I saw Amber years later at a Regence basketball game. I'd love to tell you how she got past her Mathematics 20 class after my help, received her degree, and now owns

several childcare facilities. I am not ashamed to say I want this level of success for every one of my students. But, it was not the way things played out for Amber. It was Friday night and I could hear the rumble of the stands, screech of whistles, and caustic buzz signaling the end of a quarter from my classroom. I had just finished planning for the following week so I walked down to watch the varsity boys play. It's always a bit of a shock to walk into the gym; the blaring fluorescent lights, the raucous, echoing noise of a few hundred fans, the powerful smell of teenage sweat, and the constant drone of dribbling basketballs with the intermittent clang of a missed shot. I spotted Amber in the stands as I stood in the corner contemplating where I should sit. She was in her element, talking with several friends and saying hi to people she knew who passed her. I couldn't help but smile at her energy.

"Hi Ms. Brohm!" she shouted during a lag in the thunderous reverberation. "Hiya Amber! How are you doing?" I responded. I sat close to her and leaned my head in so I could hear what she was saying. I was reminded that I didn't need to lean too close. We sat for a while catching up on the news. She updated me about her life and asked about Regence. I filled her in on some of our news and recounted some of my recent life changes. Not willing to avoid the topic I asked, "So how is school going?" Uncharacteristically, Amber looked down at her feet and then up at the game. She seemed frustrated, angry, and more alarming, defeated. "Well, it's not great. I'm turning twenty-one soon so all my financial aid will be ending. I still have a few semesters to go but I don't know how I'm going to pay for school. My foster father has been helping a lot with what he can but he can't give me any money. He's been helping with stuff around the house, which helps a lot but right now I need to figure out how to pay for

school. I'm seriously thinking about having a kid. I learned that if you have a kid you can still take out loans past twenty one." She again, looked away, the emotions of her situation bubbling up. I wasn't quite sure what to do at this moment. I was desperately searching for the correct piece of advice or the appropriate question to ask but couldn't conjure anything worthwhile. My roles were shifting - mom, friend, teacher, counselor, activist - but I couldn't find what role fit and how this might help Amber. We sat for a while in silence, both contemplating the significance of this moment.

For me, it was a striking reminder that our education system is inherently unfair to those who don't fit a particular mold. It was also a depressing realization that despite all of the extra work and energy I put into fighting the injustices in education, the system often wins. Still, despite the overwhelming adversities I still have hope for the system. Many students have benefitted, it's now up to us to create something that benefits all students. My practice is far from perfect, but I'm working hard everyday to both repair what students have experienced in past mathematics classes and prepare students for what they might face in the future. I think of Amber often when students complain that things are too hard or need a different context for learning. How can I compromise my expectations when so many are not prepared for what is to come? How can I shift my practice to better meet the needs of all students? What is the purpose of teaching mathematics? In what ways am I reifying oppressive structures? How am I ensuring that students leave my class with the skills and confidence to be successful at whatever they decide to do next? I am relentless in my pursuit to trouble the way things are, but also to help create a mathematics learning experience that is better and more just for all of our students.

**Stance(s) in Mathematics Education**

Both Cochran-Smith and Lytle (1999) and Gutierrez (2013) help us frame Bianca's experiences and eventual stance(s) within her teaching. It is apparent from the beginning of her narrative that Bianca is someone who forefronts a deep and meaningful connection *with* students. The term 'with' is pulled from the idea of *conocimiento* detailed by Anzaldua ( ), and applied to mathematics education by Gutierrez (2013). Anzaldua uses the term 'nos/otras' to describe *conocimiento*, intentionally using the feminized version of 'nosotros' and adding the slash to acknowledge the unique voices of difference. So instead of an all encompassing 'we' or 'us' (nosotros), 'nos/otras' recognizes that there are multiple perspectives present when we use the term 'we.' Bianca is aware of *conocimiento* and acts on the intricacies that Anzaldua and Gutierrez describe. Whether this is an academic issue outside of school (Amber), a personal matter within school (Deonte), or the complexities of culture/religion at school (Ahmad) Bianca recognizes that her stance is both *with* students and also to acknowledge that each has a unique narrative. She knows the value of 'nos' but recognizes how vital the 'otras' is in a mathematics classroom. Bianca creates the space, support, and compassion that is needed to embody *conocimiento.*

Connected to *conocimiento* but extending into Bianca's expectations of her students, Stinson (2008) found that trusted, demanding, and committed educators positively impacted the experiences of black males in high school mathematics. Interviewing 'successful' black males, Stinson (2008) relays that teachers who held both high academic expectations and established strong, meaningful relationships – extending beyond academics - heavily influenced the students' expectations of success. So not only

did Bianca find a way to connect at a deeper level with students but she also used this connection to hold students to high expectations. The interdependence of relationship and expectations led Bianca to describe herself as a 'warm demander.' She always held academic expectations high but her most important charge was to attend to the whole student – to ensure students' felt included, validated, and empowered as a result of her teaching.

Bianca also looks to uncertainty as inspiration for trying new things. In casual conversations it was obvious she quickly became frustrated with teachers who got stuck in their own world and refused to acknowledge the living experimentation that is teaching. Like Cochran-Smith and Lytle's (1999) *inquiry of stance*, Bianca looks to inquiry as an essential and continuous part of teaching. And for Bianca, as it is from Cochran-Smith and Lytle, inquiry is both a "social and political" act because it problematizes current conceptions of schooling, assumed knowledges, and her role as an agent of change. Bianca is constantly reflecting on her practice and her role perpetuating or fighting systems of marginalization. Often these systems are out of her control, but this does not stop her from deeply reflecting on her actions and their consequences within a broader sociopolitical picture. Specifically, we see this manifest for Bianca as a struggle to prepare students for the rigorous demands and limited instructional differentiation of college mathematics and the tension she faces as she considers the access versus dissent dynamic.

We also begin to see the true demands of teaching. At a social and psychological level, teaching requires us to be more than the stereotypical 8:00 to 3:30 worker. Teachers must have a deep personal and professional commitment to working with

students in whatever capacity is required: social worker, parental figure, counselor, or coach. Bianca embodies all of these roles as she attempts to connect with and support her students. She understands that Amber needs a mother, social worker, teacher, college counselor, and friend all at the same time as she navigates the challenges of college. For Amber and any other student, Bianca never hesitates to shift, adapt, and broaden her approach to being a teacher in order to provide a more equitable experience.

# CHAPTER V

# REBECCA'S STORY

Much like Bianca, Rebecca is a twelve-year veteran of Regence High School. However, unlike Bianca, Rebecca has only taught at Regence – she did her student teaching and has continued to work at Regence ever since. Rebecca can be generalized as a calm and quite person who deftly navigates conflict in an effort to find compromise and resolution. In the classroom she is organized and routinized in her approach, but often willing to experiment and play in order to engage students. Rebecca's narrative opens with her efforts to engage two disconnected students. Both are senior students of color who have responsibilities outside of school that make attending and engaging in school difficult. As the story unfolds we begin to see Rebecca's efforts extend well beyond the classroom and she becomes frustrated with the disconnected content required by the state and national standards. She also interrogates her own deficit framework as she tries to find a way to connect with her students.

The narrative then looks back at Rebecca's life history. In a primarily white, socioeconomically privileged experience with education we see how there were few moments that Rebecca encountered difference but those moments were punctuations in her experience with school. Even though she was privileged she still felt disconnected from the academics and struggled to make sense of the content without intense support from her father (who has a Ph.D. in mathematics). The narrative then examines

Rebecca's first year teaching, which included two sheltered mathematics classes. During this year Rebecca critically reflects on her misaligned assumptions and begins to question the purpose of mathematics education, but she also sees the power of inquiry and the importance of building a strong community of learners. The story then examines a recent Algebra I class that, again, tested Rebecca's resolve as an educator. This classroom was particularly challenging because of its context and, as a result, it forced Rebecca to constantly reflect on her instruction and shift accordingly to meet the students' needs. But, at what point is the situation too overwhelming to overcome? Finally, the narrative returns to Rebecca's original story. As the year ends we find the two students fully engaged in a lesson, motivated most likely by graduation, but assuming leadership roles and taking ownership of their learning. What emerges from this story is further questions about how we might engage and support marginalized students more effectively in mathematics.

**Inverse Relations**

Emblazoned in front of me is the question: "Why should we care about logarithms if we are never going to use them in our life?" I have reread this question several times in hopes it might tell me something different over time; in hopes I might slowly distill some constructive essence from it. Or, perhaps, through repetition I might figure out a way to abstain from considering the larger message, but I know avoidance is not nor will it ever be sufficient. Frustrating, but as a teacher I've never been able to abstract myself from these important philosophical considerations. Though it could be read as petulant, the students question is actually a profound one. It sends me down a rabbit hole of educational dichotomies. Progressive versus traditional. Standardized versus

contextualized. Projects versus lecture. Meaningful versus abstracted. Endless dichotomies of what happens versus what should happen. But who gets to decide what should happen? Who am I to tell a student what is and what isn't important? How does the state or national government know what my students need to be successful? Who defines success anyways? And how does 'advanced' mathematics represent success? The questions cascade one off of another; a source of increasingly complex and interrelated questions that force me to think hard about my practice and position as a teacher. It is definitely a profound question.

The question that is causing intense self-reflection was a product of two students who, more generally, made me think hard about the goals of mathematics education and my place within these goals. Francisco and Tyrone were students who had circumstances outside of school that demanded much of their energy, so getting them to see a reason for mathematics education was a challenge. I can see them now as they slowly walk into class with shoulders hunched, empty backpacks slung over one shoulder, and hoods masking distant stares. Each efficiently scans the room, looking for an exit or corner to hide in. Both have done this before; taking stock, weighing their options, and making a strategic decision of where to sit based on where others are sitting, the position of the teacher, and gut intuition. Where can I be left alone? Anticipating this I always assign seats. Francisco and Tyrone reluctantly find their seats; for better or worse their first problem solving experience in the class has already ended in frustration. Generally, students try to move to the back, knowing that with enough skill they can increase their probability of being ignored by the teacher. However, my classroom is compact so hiding is a challenge. Students enter at the front corner of the classroom, in line with the

projector screen and what is considered the 'front' section. Extending opposite the doorway is a wall of windows, which give us a clear perspective of the evolving seasons. Turning left along the entrance wall a whiteboard with today's agenda takes up most of the space. The 'back' wall extends twenty-five feet towards the windows, with my desk in the opposite corner of the doorway. Mismatched, grafitied desks fill the rest of the room; grouped in fours, they are anachronistic symbols of a time when we 'learned' and taught in rows. The room is small but comfortable, with enough space for students to work and move around but not enough to hide.

I try not to immediately judge students but I got the sense that Francisco and Tyrone were going to be difficult the moment they walked in. I want to be clear that 'difficult' for me is not a statement about behavior. I do not mean to conjure images of rowdy boys throwing papers and disrupting the class. There are the occasional moments of controlled chaos, but I've learned how to deftly guide and support 'school sponsored' behaviors. I'm not saying these behavior expectations are what our students need but that's a different story. For Francisco and Tyrone it was a different challenge; they were passive resistors. They entered my Algebra 3-4 class with a wall of indifference built brick by brick, year by year, from the crushed stones of repressive experiences in mathematics. When I spoke they didn't listen, when we worked in groups they didn't participate, when we practiced individually they didn't try on their own, and when I tried to connect mathematics with the world around them they didn't care.

But I get it; how could they not enter my class with this disposition when the typical mathematics story of male students of color is largely a story of disconnection, lack of success, and teachers who struggle to focus on their connection or success.

Admittedly and ignorantly, my thoughts slipped into a deficit characterization of Francisco and Tyrone. I put the responsibility on them to be engaged, studious, participatory, collaborative, and independent without thinking about the larger system – of which I am a part of – that regulates what behaviors and characteristics fit the systems limited definition of success. Here they were, two seniors in a class largely populated by sophomores and juniors. Their story, like many of my other students, is a year of attrition between who they are and what they are required to learn. Did they have any say in what they got to learn? None whatsoever. They were required to attend my class because they needed the credit to graduate, so from the very beginning their only motivation was some distant, abstract requirements, ironically, similar to the standards of Algebra 3-4. I've heard that mathematics education needs to be like a mirror and a window, so students can not only see themselves but see the world around them from a different perspective. Although I tried, this is not what happened.

At first, the class was too large. Before Ms. Olin - a new mathematics teacher at Regence - was hired the class had roughly 45 students in a room that reaches its comfort level at 30. I mentioned my classroom was cozy but there are limits to this interpretation. Students were sitting on the floor, standing in the corner, and trying desperately not to be in the way. Referring back to first impressions, I'm sure the class size did not help to convince students that Algebra 3-4 was a worthy academic pursuit. If the school was not taking it seriously enough to reduce the size of our classes, then why should they care about paying attention? And, how hard is it to concentrate on abstract and difficult content with 45 other bodies in the room? I, of course, am projecting my own feelings onto my students - perhaps I was the only one feeling this way - but I saw it

in their eyes that if this was more important we would not be in a class of 45 students. Fortunately, after a painful month the administrators hired Ms. Olin so my class dropped to twenty students, and often - because of attendance - the class was in the teens.

However, even with a small class size we still struggled to build relationships. The class met every other day for ninety minutes and often one of the two boys was absent. So, on a good week I might only see them twice. How could I ever build a strong relationship with students when I only get to work with them for 8.5% of their total school hours? This was in addition to their apparent apprehension of being in the class. I feel this is especially poignant when one considers how mathematics education is traditionally framed as an individual pursuit, not to be tainted with relationships or community. I was taught in a way - and have subsequently witnessed many teachers continue a tradition - that values internalization and regurgitation of a particular type of knowledge; one that does not include relationships or collaboration as a means to master this knowledge. However, despite this individualistic narrative, over the last twelve years I have realized that in my classroom relationships are the most important part of teaching. If I cannot connect with the students and students cannot connect with each other then the mathematics doesn't work. I believe that because there is risk involved with learning and practicing abstracted content – content that generally lacks a clear connection with physical reality - if there is no relationship to support these risks then many students will not even take that first step. For Francisco and Tyrone their only steps were reluctantly trudging in and out of my door, once in a while.

I start the day like any other day, a warm up was up on the screen and I greet students with a big smile, positive eyes, and *hello* or *good morning*. Most of the students

vibrate into class well before the bell. There is the usual drone of teenage chatter, sporadic wandering to catch up on gossip, and the occasional device that needs checking, but students are used to our routine and almost all are sitting and focused on the warm up within a minute. We are beginning the section on logarithms so my warm up is a review of inverse functions. Much like their first day in class, Francisco and Tyrone saunter in a few minutes late and although they acknowledge my presence there is still a solid wall of separation between us. I, in association with this class, represent another hurdle in what is already a very difficult life. Tyrone walks in front of the projector and sits down with his group, not greeting the other students and making no move to get out his notebook. Francisco on the other hand seems a bit more open to collaboration and he takes out his materials, copies down the question, and begins to chat with his team about the warm up.

'Whatdya guys get for the warm up?'

It was not exactly what I want to hear from one of my students. I would prefer to hear: *Can you explain how you got that answer? Are there other ways to do this problem? Does this process work for every inverse problem?* But, I'm relieved that Francisco opens up to his group members and actually made it to class, so I give him a break. I'm troubled by this break, though. Out of the two students, Francisco seems more engaged in the process of taking risks, practicing, collaborating with other students, and taking assessments seriously. But, like many stories at Regence High School, his life beyond school is stressful. It is less about learning for Francisco and more about survival. As the counselor said before Francisco was placed into my class, 'He's a mess. He's got a lot going on right now and I thought he would be better in your

class.' I'm not entirely sure what she meant by that, perhaps it was intended as a compliment, but I interpreted this as meaning Francisco would be a lot of work. What I did find out was that Francisco was also attending night school four nights a week and, as a result, missed my class frequently. I would then email his counselor who would chase him down and he would be in class the next day. This pattern repeated itself for the entire second semester. So, do I give him this break? How do I balance the desire to hold Francisco to high expectations - maintaining the integrity of the class - while showing compassion for his situation?

Tyrone on the other hand is completely disconnected during formal class time. He generously donates his time after school, coming in frequently to get help from me, practice skills, and retake exams. In fact he shows impressive persistence after school, retaking exams as many times as needed in order to pass the requisite standards. Tyrone is also a father. He is taking care of his son while the mother was attending a university a few hours away. Because of his circumstance he had an insatiable desire to always provide for his family, and, his understanding of 'provide' is to work. Consequently, Tyrone is trying to hold down a job at the same time he is attending school and taking care of his child. He works nights for UPS and then tries to function at school the following day. There is no way this is sustainable. It sounds terrible, but I am hopeful that this job doesn't work out. It's obvious that he can't manage all of his responsibilities and I feel that finishing high school is essential for his future ability to provide. I know the harrowing statistics for those who don't finish high school, but try explaining this to a high school student.

We finish the warm up and I have students share their work on the document camera. I ask probing questions and hope that other students will chime in with comments or questions but it's a hope dashed by reality. As we move into the structure of the lesson I am nervous about this next section. As I've mentioned, we are starting to explore logarithms and my brief experience teaching logs in addition to other teachers' stories has me worried. In my opinion it's an extremely difficult and abstract concept to understand and master. Logarithms are the inverse of an exponential function. Anything exponential is difficult enough to explain, but now we are asking students to reverse the process with something titled 'log.' The word log brings up all sorts of images but nothing intuitively says *reverse an exponential equation*. In algebraic terms a logarithm is defined as follows $y = b^x$ so $x = \log_b(y)$. Because of the way mathematics is taught in the United States many students are still struggling with the basic concepts of solving equations, variables, exponents, etc. so asking them to now reverse a process and understand a deeper, more theoretical concept is terrifying. How do I connect this to their lives?

In an effort to make some connection I found an article by Steven Strogatz titled "Power Tools" in his opinionator blog on the New York Times. His articles try to depict mathematics as useful, meaningful, and powerful. I say try because some are more convincing than others and, although I feel mathematics can be useful, meaningful, and powerful, I also understand that people can be successful without a deep understanding of mathematics. A belief not widely recognized or supported in this country. However, in a desperate attempt to connect the abstract with something tangible, we read his article. He admits at the beginning of the article that most people don't understand nor will they ever

use logarithms: “Most folks never use them again after high school, at least not consciously, and are oblivious to the logarithms hiding behind the scenes of their daily lives” (Strogatz, 2010). At this point, our glorious mathematician will show us how logarithms are powerful but elusive. He starts with the usefulness of functions, how they are the ‘tools’ for mathematicians, much like ‘steel’ or ‘wool,’ again, trying to convince us that the abstract relates to the everyday! He then connects functions with their ability to describe parabolas and how we see these arching lines are everywhere, including Detroit’s airport. From this point Steven writes about inverse functions and how engineers and scientists use these functions to describe growth and decay; basically these are the ‘tools’ we use to ‘unpack’ exponential growth. He elucidates this point with an account of a high school girl who derived the exponential function of how many times one can fold a piece of paper in half based on the thickness and length of said paper. He then rounds out the article by stating that logarithms are humanity’s way of dealing with really big and complicated numbers in a more concise function.

This is my hook; an attempt to connect the abstract to its obscure uses in the real world. Steven will help us bridge that gap between the abstract and the tangible, the meaningless and the utilitarian, the confusing and the revelatory. Looking back, perhaps I should have paired this article with a hands on experience but I was pressed for time and stressed with the requirements. I offer a scaffolded reading protocol; students read at their table groups, each student takes a turn reading while the others are highlighting and writing in text notation. After we read the students get a moment to review their notations, chat with each other in small groups, and we discuss the article as a whole class.

'It's a good thing we read this article. Logarithms are behind the scenes in so many things we see in our life.' Says an enthusiastic sophomore. I pause to enjoy this comment; it is exactly what I want to hear. Many of the other sophomores and a few juniors join the commentary, adding more details to the above theme. Many are impressed by the high school girl's derivation, several are surprised at how useful and important exponential and logarithmic functions are to explaining natural phenomena. As the discussion unfolds, however, I notice that Tyrone and Francisco are silent. Tyrone sits back in his chair, uninterested in the commentary but listening to what others have to say. Francisco is tracking the discussion but unwilling to participate. Both look unconvinced by Strogatz. But, as the discussion finishes and we transition to doing the mathematics, I see both Tyrone and Francisco begin to shift.

**High Expectations**

I come from a math family. My father has a Ph.D. in mathematics and my brother teaches mathematics at the local community college. So, I really had no choice but to be good at mathematics. This doesn't mean I liked mathematics or was inherently good at math; in fact I'd say that throughout my K-12 education there were very few times I really connected with a mathematics class or felt comfortable with the content. Granted, I had nice teachers and enjoyed my classes but I can't recall one specifically that inspired me to love mathematics or helped me immeasurably more than any other. I had a pretty typical daily experience with mathematics, we started class reviewing the homework, the teacher lectured and I took notes, we practiced in class - usually twenty to forty problems that didn't have the answers in the back of the book – and what we didn't finish was homework. I then went home and actually learned the mathematics from my father. I

can't express how fortunate I still feel to have a dad who was capable of helping me through the traditional system of education. I know now that it wasn't my fault I struggled to get concepts or ever feel comfortable in class; I simply didn't learn the way that they were teaching me. I need to talk about things. I need to move around. I need to connect ideas to other ideas and see how concepts evolve over time. More importantly, I need to have a community of other learners who are willing to take risks, make mistakes, and try different ways of doing mathematics.

My dad taught at the Naval nuclear power school but he eventually left the Navy and we moved to South Carolina so he could teach at a small private college. However, when South Carolina offered bleak financial prospects my mother made an executive decision that the family needed to find something better. Both of my parents came from poor families so with three kids my mom wasn't excited about repeating this experience with her own kids. In order to ensure a more stable situation, my father got a stable position at a power plant in the Northwest. Using his mathematics and education background his job involved managing computer based training for a power company. We moved into a middle-class neighborhood, finding an excellent house located a stone's throw from the second best elementary school in the area. Looking back I'm highly critical of any ranking system, but at the time it was important to my parents that we lived near a *good school*.

It was a young neighborhood with many new families moving into the area who were finding similar employment opportunities. It was an economic westward expansion, another wave of white, middle class families looking for opportunities. As a result, my elementary school was almost entirely white and predominantly middle-

class. There was one student of color, Robert, who became a good friend of mine. Robert always seemed to be either getting in trouble or making everyone laugh; usually both at the same time. Looking back, I'm sure some of this was a defense mechanism against overwhelming white supremacy and more likely he wasn't really in *getting in* trouble but was simply experiencing unfair scrutiny. Needless to say, we stayed friends through elementary school but the transition to middle school did not play out well for Robert. He was progressively finding himself the target of authorities and our friendship faded as we transitioned into high school.

My academic experience in elementary school was typical of an economically privileged student with highly educated parents in a supportive context. I tested into the advanced reading and mathematics group, and other than one moment where I couldn't wrap my head around remainders, I did well. That being said, I feel this particular moment of confusion is reflective of my experiences in mathematics education. We were practicing long division and the teacher had just introduced the concept of remainders. I raised my hand in confusion and asked for help. I watched as the teacher looked up in surprise - perhaps even shock - by my confusion. I was a compliant, quiet student, I had highly educated parents, I was white, I came from a middle class family, and I was a student at the 'good' school. It may be a stretch, but is it too much to say that I fit a certain archetype that inspired shock when I was confused. Did Robert experience the same shock if he didn't understand? Or was that just expected? What about the girl who was noticeably struggling financially, was she also worthy enough for low expectations?

Reflecting on this experience as a teacher I'm sad that this point of confusion wasn't used as a moment to have students help each other, honor the value of confusion

and mistakes, and promote a more distributed sense of learning. Instead, I was met with a stammering teacher awkwardly attempting to re-explain the concept, in a louder and slower tone. I realize that I'm being overly critical on a specific moment, but this was a pattern exhibited throughout the year. Admittedly, I've made similar, inattentive moves in my own classroom. But this moment points to the gravity of carefully examining every aspect of our practice, even our reactions to students, because we never know what pattern we might establish just by reacting different to certain students. I was fortunate that I had someone at home to help me so I didn't always have to ask questions in class; I could, instead, wait and work with someone who loved me beyond what I produced in class. But what happens to the student who doesn't have this type of support? How are they supposed to navigate this critical moment without leaning on a support network beyond school? Students who don't have this support are one of the reasons I try to teach differently.

In high school I remember sitting in our auditorium when I was confronted directly with race – or the lack of race – as something that was worth discussing. 'This is the whitest school I've ever seen,' said an African American speaker to our high school student body. A handful of students - the small contingent of students of color - audibly laughed after he made this comment. Much like my elementary and middle school I was at a high school that didn't have much racial difference, but it was the first place where I started to hear and engage in conversations about race and see these dynamics play out in schools. These racialized conversations were part of a larger dialogue that our town was having as local demographics shifted. I lived in a town that bordered two other medium-sized towns and the populations began to shift significantly during my K-12

experience. Not only did the racial and cultural landscape shift but communities, much like the rest of the country began to segregate. Although this is a simplification of what is really going on, one town became the wealthy white town, another the middle class mostly white town, and the last became the poor, diverse town. It was never said outright but in hushed tones people cautioned each other about going to the poor, diverse town. I'm not sure if the town was any more dangerous than any other town - statistically it probably was not - but the conversation of fear was wrapped up into larger narratives of racism and classism. This is my present consciousness reflecting back on a situation that has become glaringly obvious, but at the time I was oblivious and complicit in perpetuating these conversations.

We sat down in our freshman social studies class one day to hear our teacher present on Islam. I was not a fan of history and I remember thinking this lesson was going to be no different from any other, but what made this situation different was that my friend from India – who happened to be Muslim – was in the class and I thought she might connect with this lesson. However, as I would learn, I was oblivious to the whitewashed, patriarchal perspective that was being offered. My friend, on the other hand was not amused by or sympathetic to this perspective and she confronted the teacher. In a thoughtful and purposive pedagogical move, the teacher encouraged her to present to the class the next day. She was passionate about clarifying the history and practice of Islam, refuting many of the points the teacher had presented and providing a unique insight into a religion and culture that most of us had no experience with. I don't remember the teacher's reaction and I remember feeling that the class was somewhat interested in what she was saying but we didn't know how to respond after she

finished. There were no questions or commentary that facilitated the unique and deeply personal cultural experience. At the time I didn't think much of this experience but looking back I think this was a significant illustration of our lack of understanding and exposure to cultural and racial difference.

Perhaps, difference is not important to those who don't hear the stories or experience much difference, but our lack of support or understanding was not surprising. Here was a freshman student courageous enough to stand in front of a class, tell her story for all to hear and critique, and we didn't know how to react. It makes me think that the stifled, uncomfortable laughter coming from the students of color during the presentation was less of a humorous response and more akin to 'you have no idea' laughter. Later that year I found myself engaged in a conversation about race with this same friend. I'm not sure how the conversation started but I remember the friend from India vehemently stating, 'yes, skin color does matter in this country.' And, I responded ignorantly, *No it doesn't. Everyone is treated equally no matter their race.* Because I had little interaction with difference and conversations about race my ignorance was not surprising but it was troubling. However, it's a lesson I take with me everyday I teach: listen to people with compassion and empathy; fight ignorance and create space for difference to be heard; and be critical of practices that might perpetuate silence.

I remember stories from the rest of my high school experience but can't seem to remember much about my mathematical experience, other than it was very traditional, I always felt uncomfortable with how we learned, and I got a lot of help from my father. I followed the elevated but highly institutionalized structure of Honors Algebra, Honors Geometry, Honors Trigonometry/Advanced Algebra, and Calculus. My classes were

mostly white and economically privileged. As mentioned, the style of teaching was almost unanimously traditional with little innovative, creative, or progressive teaching practices considered. We listened, we worked, and we tested. There was little movement, collaboration, or discussion. Our problem solving was limited to trying a problem and looking in the back of the book for the answer. I'm not sure if I would have continued in mathematics had my dad not been directly involved with the subject. I wasn't particularly drawn to any other subject but I know my discomfort might have eventually swayed me in a different direction. However, these experiences did shape how I approach teaching. I want students to move, talk, and actively do mathematics rather than passively absorb and repeat. I want to provide support for my students so that the discomfort of learning is balanced with a safe environment to problem solve, take risks, and openly discuss possibilities. And, I want to engage in conversations about different ways to teach mathematics and how these shifts in pedagogy might open up more opportunities for my students.

**A Continued Journey West**

I moved further west without a job. I wanted to be in a larger city, around some of my friends so I took a risk and left the relative comfort of home to figure things out. I'm not sure why but I gravitated towards working with kids. I started off at the Boys and Girls club and something clicked. After two years I realized I wanted to continue this work but at a more committed and meaningful level. I checked out two reputable teacher education programs in the area and decided on the program that was the shortest. I'm not sure whether or not this was the right decision; I feel that the program did not prepare me for teaching where I am today. Much of my mathematics methods

classes were spent talking about our student teaching experience and then, occasionally, reflecting on and discussing good teaching practices when a specific question was brought forth. To be honest, I think my graduate program was largely ineffective, especially for teachers looking to transition to a place like Regence. The focus of the program centered mostly on how to survive in a white, religious, economically privileged school. We barely read or talked about difference - race, class, gender, sexuality - and its intersection with education, especially as it applies to the mathematics classroom. I'm actually a little embarrassed and shocked at how little was included in our program. I recently was back to teach a summer course for the same program and made it a point to include provocative literature that pushed the prospective teachers to think hard about difference and its inseparability from teaching.

What I did learn during my graduate program was almost entirely from my mentor teachers. The irony isn't lost on me that I learned most when I was, again, away from school. Even though I was not prepared I signed up for a student teaching placement at Regence High School under the guidance of Jim. Jim had been a teacher for quite a while and I would categorize him as largely traditional but he was willing to experiment with pedagogy so during my time with him I saw slight shifts in practice views on instruction evolved. Granted, we taught an Algebra 3-4 and PreCalculus class, which are less burdened with the pressures of behavior and motivation then say an Algebra I class, but Jim and I worked together to center the class around group work and introduced more comprehensive, challenging problems. Students responded to this change and we saw levels of engagement increase, especially from students who had previously been disengaged. I won't say it was a sudden transformative moment, some

students were still disengaged, but it revealed how small changes can lead to substantial differences in student's relationship with mathematics. Mathematics was suddenly a social subject. No longer did students face the individualized, disconnected, partitioned subject they had come to loathe but they could now talk to each other about what they were doing. Maybe it was not always about mathematics but 'talk' became a part of our mathematics class, when previously it was an 'unspoken' word. In an ideal world students would know how to help each other on difficult tasks, ask focused, thoughtful questions, and persist when things got too hard, but I get ahead of myself. This experience at Regence supported my experience with mathematics and convinced me that I needed to be in a place where the expectation is that mathematics is taught differently, or at the very least, I had the room to teach it differently.

After student teaching I was fortunate enough to land a position at Regence High School. I interviewed at another school but something opened up at Regence and considering my great experience with Jim I didn't hesitate to accept the opportunity. I won't sugar coat my first year; the euphoria I experienced during my student teaching quickly dissipated as I began teaching on my own. A teacher down the hall from me who was in her second year when I started likes to joke, 'There wasn't a day that someone wasn't yelling in your class.' I was no longer teaching the docile older students in advanced Algebra and Precalculus, I now had to guide freshmen through their first year in high school mathematics. I was overwhelmed and underprepared. I also developed a deeper respect for Jim, because even though the older students were - generally - easier to handle I realized he had had a large influence on how well the classroom worked. I didn't understand how to structure a mathematics lesson in order to engage hesitant

learners and direct the staggering energy of some students. I was trying to navigate the delicate balance of standards and relevance; where could I connect mathematics with student's lives while I appease the state's expectations for what students should learn. Often, I have come to realize, these two are mutually exclusive. I struggled to maintain a routine that felt comfortable, a feedback loop that was informative, and an organizational structure that helped students. Instead of holding fast to my classroom norms at the beginning of the year I quickly gave into student's resistance, which became a slippery slope of rule-resistance-concession. It wasn't all bad. I had classes that were more rewarding and days that were more successful than others, but, I fell into that stereotypical first year teacher experience. It was a difficult, stressful, and intimidating year. However, it was also significantly revelatory.

My mom convinced me to learn Spanish because she always claimed that she would have a long list of jobs to choose from in our town if she knew Spanish. As a result I double majored in Spanish and Mathematics at my university. Her advice was, not surprisingly, prognostic. When I was hired at Regence I was given several Algebra I and two sheltered Algebra I classes. The reason I was given the sheltered Algebra classes is because I was the only mathematics teacher who could converse in Spanish. I, of course, was blissfully excited about the prospect of using my language and mathematics skills to help students learn. What could go wrong? I say blissfully because the skill of language and mathematics itself does not imply that you will be a good teacher. However, I was under this grand delusion as I walked into the sheltered class my first day.

I began the first day like I had my other Algebra I classes; I went over my carefully prepared class syllabus and guide. The guide meticulously laid out classroom rules, procedures, and grade distribution. I'm not sure why but for some reason that multi-paged introduction provides a mistaken sense of confidence to many first year teachers. I, like many others, falsely assumed that my expectations were on the paper so no one would dispute these claims, right? I carefully went over each bullet point, each subtext, and each expectation with the assumption that every student would understand what was being said, review this document again at home, and then follow these expectations down to the last comma. This document was the backbone for a successful class so we should spend forty-five minutes going over said document, right? I finished reviewing the document (or reading and then extrapolating each point), I asked if there were any questions, and was met by a deafening silence. I had experienced a similar silence in my other Algebra classes and, in ignorance, I took it as a sign that the students had listened and understood my expectations. I noticed many of the students in my sheltered classes had confused expressions but I attributed this to the first day at high school and not due to my instruction. I, then, quickly moved into a student-centered logic problem. This quick transition to content and group work I would later realize is not a good move at Regence but at the time, like my syllabus, I felt comfortable with the rigidity of mathematics and not the intricacies and time it takes to develop a positive, collaborative, and safe classroom culture.

I had worked hard to create a mathematics lesson geared towards my non-sheltered Algebra I class assuming that both classes would be similar. The lesson included a warm up, quick review, and elaborate logic problem. We were reviewing

previous concepts; content that is supposed to be covered in middle school but during the summer break becomes a distant memory for our students - an ephemeral recollection of 'I think we did that…' – I reintroduced solving one and two step equations, which involves isolating a variable by canceling and moving numbers. I demonstrated how to do this, while students copied down the example and asked questions. Well, they were supposed to ask questions. In reality I asked the students questions about my process and had them discuss in pairs what was happening. Another rookie mistake is assuming students know how to ask targeted, critical questions; you must nurture this skill with sentence starters, practice, and a safe environment to take risks. We transitioned to the group work (logic problem) and I suggested that students could work through the problem on their own or in small groups. I noticed that most of the students worked in silence and several years later deduced that students had been trained to do mathematics independently; again, productive conversation is something that must be cultivated and not assumed. In my Algebra I classes the lesson went well. I would say it wasn't the most riveting lesson and some students were still confused but I would consider it a successful first day.

However, it was an entirely different story in my sheltered class. The uncomfortable silence that started after my syllabus lecture and explanation of group 'roles' continued with impunity. During the quick review my questions to students were left hanging in the air, echoing throughout the room as I counted the recommended wait time. My internal counts went as follows: *One mississippi, two mississippi, *please someone raise your hand* three mississippi, *this is not working* four mississippi, *just give them the answer!** The students continued to look at me in bewilderment as I guided

them through several more examples. But I trudged on, because I wasn't sure what else to do at this point. This was the lesson plan I had thoughtfully crafted and I was incapable of improvising at this point in my career. I should have done something different – taken a risk on whatever came to mind – because as we moved into the group work I started to really panic. Not only were students looking at me and each other in complete confusion but only a handful of students seemed to actually understand the process. I furiously ran around the classroom helping students; guiding them step by step through what was intended to be an open ended, collaborative problem. For some students I actually took their pencil and wrote down the next steps for them. It was a travesty. I would help (a liberal interpretation of help) one student and the rest of the students in the class would sit and wait for me to come to them. It quickly became apparent that my 'well planned' lesson was grossly miscalculated.

After what seemed like a permanent suspension in time the bell rang to indicate the period was over. Students filed out, smiling in appreciation but unsure what to expect from their other teachers, especially considering the awful lesson they had just experienced. I returned their smiles but couldn't help feeling exhausted and overwhelmed. It was my first day teaching at Regence and my pride and confidence had been whittled down over ninety minutes. Over the last eleven years I have spoken with many teachers who have all recounted their difficult first year but I have only talked with few who have had the first day I experienced. After the day ended I sat down at my desk feeling drained. The excitement, anxiety, and reality of the day came crashing down through my body. My feet were swollen and there was a poignant ache from standing and moving all day, my throat was raw and scratching from talking, and my head was

throbbing from dehydration. I looked over what I had planned and recognized that many of my assumptions about teaching and learning were wrong. I had wrongly assumed that students would be able to communicate effectively in English or Spanish, understand what was expected in a U.S. high school mathematics classroom, know how to talk to each other about mathematics, feel safe in my classroom on the first day, feel confident in their abilities as learners and doers of mathematics, be willing to take risks, be able to collaborate and help each other without just giving the answer, and understand the concepts I was reviewing. This list did not immediately present itself but rather was a slow revelation over my initial years at Regence. In the moment, I felt ashamed that I did not envisage some of the disconnect before the day began but at this point I needed to evaluate what worked and what needed to be changed.

I also recognized while sitting at my desk that I didn't know how to significantly change my teaching. I mean, I made minor adjustments during my student teaching with Jim's help but teaching an ESL mathematics class seemed like a major readjustment. Two other sources I considered were my graduate program, which did not prepare me for this situation and academic literature, which I didn't have the time or ability to sift through. Even if I did I wasn't sure if it would even help me out; my experiences with academia were - and still are - largely frustrating. Granted, I'm not saying academia doesn't have a place in education or that it hasn't helped mathematics teaching, I just haven't found much that has transformed my practice. The reality, however, is that I don't have time to sift through all of the different journal publications and read through the different articles among these journal publications to decide what is actually worth a subscription. And, if I did have the time I surely don't have the money

to pay for a subscription to one of the major publications. Additionally, I can't help but remain skeptical of publications that rely almost entirely on people who are seemingly disconnected from the places they write about. There is a stark difference between being deeply embedded and committed and observing and writing about being deeply embedded and committed. Not all academics are like this but, again, who are they and what journal do they publish in? My main source of academic literature has come from consultants who blow into Regence High School with a trumped up savior complex only to leave a year later disappointed and bitter. Their literature supports whatever method they think will work and, often, is very similar to something I've already tried. Perhaps this is where the bad taste for academia was cultivated but in the end I knew that I needed immediate help and academia was not going to move fast enough.

In desperation I turned to my colleagues. Carol became the most influential mentor I had at Regence. I wish I could say she mentored me over the course of my career at Regence but, as too often the case, she left teaching six years after I started at Regence because of exhaustion. But, while she was at Regence I turned to Carol often for her take on lesson development, classroom culture, innovative curricula, and classroom routines. She was one of the first I knew who piloted standards based grading in her classroom, before it became the 'thing' in our district. Her students knew exactly what they needed to learn and what they needed to do in order to demonstrate their learning. Unlike more traditional forms of assessment, Carol was not impressed by compliance or completion but focused instead on what was learned and how she could become a more effective teacher. If her students did not demonstrate mastery she would shift her practice to better meet their needs. In addition to teaching a sheltered

mathematics course she taught a self-created course called Mathematics 12. In both her sheltered classes and Mathematics 12 she was constantly experimenting with new ways to make mathematics meaningful and challenging. She would create elaborate puzzles where students had to pick up clues (books, notes, classroom) in order to figure out how to answer a problem. This would later be called 'discovery-based' learning but to Carol it was just a better way to teach mathematics.

After that first day I started to talk with Carol regularly about my sheltered mathematics class; often I would take what she was doing and try it in my own class, and not surprisingly it usually worked. That being said, I was not on easy street. One of my sheltered classes had thirty-five students, so it presented an additional challenge of managing the lesson within an overcrowded context. As time passed the class was more collaborative but when a new concept or more difficult problem was introduced we often relapsed to our first day experience: guided practice, confusion, individual help, frustration, and off task behavior. Not to mention that the class size hindered my futile attempts to build strong relationships with students. I desperately wanted to connect with these students and have them connect with each other. If there is one thing I had learned during my experiences in school and again in student teaching was that a supportive, trusting, and interdependent class benefits everyone in the class. Not just those who know how to play school or were fortunate enough to have more opportunities to learn mathematics. Unfortunately, this part of this particular class always remained allusive. Granted, we got along fine and in the end the students seemed to have learned some mathematics, enjoyed the class, and were grateful for my presence but it wasn't quite what I had hoped for.

I was fortunate that my other ESL mathematics class was very small so I could develop strong relationships with students. I fully believe that the distinction between these two classes was almost entirely due to the class size. Without the increased pressures from extra students I was able to deftly shift and accommodate when students needed a different strategy to learn a particular concept. With Carol's support this class became a lab for sheltered instruction. We tried different approaches to see what worked and what didn't and the students - because we had developed a mutual trust and respect - were empathetic when I made mistakes and were patient when a lesson didn't pan out. We could also spend more time getting to know each other. So, not only was there a stronger teacher-student relationship but I also think there was a stronger student-student relationship. Students trusted each other, were able to support each other, and were not afraid to make mistakes in front of their peers. This sense of collectiveness - entirely dependent on the strong relationships we had developed - helped this class emerge as both a place of learning but also a place where identity and mathematics were cooperative. One was not exclusive of the other. Students began to see themselves as doers of mathematics *and* unique representatives of cultural difference.

In the end, my large sheltered class began to feel like my smaller class. Students were talking with each other, asking good questions, finding success, and seeing a collective purpose. However, this evolution came towards the end of the year so the final result felt less fulfilling than my smaller sheltered class. That being said it was a transformative shift in my understanding and approach to mathematics teaching. I was forced into a dissonant situation, not caused by the students but instead by my own dangerous assumptions and after I problematized these misunderstandings my teaching

changed to meet the students' needs. I remember feeling like I could pin this on the students, which I would later recognize is a deficit model, or I could change what I do and see if that helps. I changed and the students responded.

Beyond my practice as a teacher this experience did provoke deeper philosophical reflections on our system of education. The class was not only racially diverse, but there was a huge difference in age (fourteen to nineteen), experience in the U.S. (some had been here five years, others just arrived before school), and bilingualism (some were completely fluent while others couldn't speak any English). I remember thinking to myself *here I'm supposed to be teaching them variables and quadratic functions and many don't have the supports or know how to advocate for themselves in more general contexts. How is this fair?* I struggled with the inherent tensions of teaching something that may be meaningless to students who are just trying to survive a day at high school, not to mention the more apparent disconnect of mathematics from our daily lives. This is something I have continued to struggle with over the last eleven years. Sometimes I sway one way on the spectrum, *we should transform mathematics education into something more meaningful and engaging. Maybe integrate it into other subjects or focus entirely on projects that use mathematics as support rather than mathematics supported by projects.* My thoughts then swing back to, *well there is a dominant system of how mathematics is supposed to be done and if our students of color and students from poverty are not prepared for the expectations of standardized testing and college level mathematics then we are not doing a good job.* Understandably, these are not entirely exclusive of each other. Perhaps we can do both - make mathematics more meaningful and prepare our students for the intensity and individualism of dominant

mathematics. However, where do I find the time and support to do this type of work? Sure, I did a weeklong project in my Algebra 1 class when the mathematics instructional coach at our school designed and modeled the project, but this is not sustainable. I already dedicate my lunches and three days a week after school to help students, not to mention Sundays to plan and grade, what more can I give?

**Continued Growth and Challenges**

As the years progressed at Regence I continued to learn important lessons within the classroom. There were definitely challenges but my pedagogical and curricular growth was consistent. My lessons became more effective, my ability to connect with students improved, and every year the classroom community we (the students and I) created became stronger. I relied on colleagues as a source for materials and instruction as well as my own willingness to experiment. Surprisingly, though, my family became another source for educational growth. Not only was I fortunate to have a father who was good at mathematics in high school but now both my father and brother teach college mathematics, so our family began a new tradition of engaging in spirited conversations about mathematics education. My father is an experimenter so he is constantly sending us articles about mathematics teaching, trying new pedagogies in his classroom, and offering different visions of what and how mathematics could be at the primary, secondary, and college level. Part of his unique perspective is borne from helping my mom teach her third grade class. I think these experiences provide a hopeful reminder of human's engaging with and enjoying the process of learning. Something we all agree dissipates as students get older. I suppose he often leaves these classes wondering how he might inspire a similar disposition in his students; which to me seems overwhelming

when one considers the content and traditional structure of mathematics education at the community college level.

My brother, on the other hand, provides a thoughtful counter narrative to my father. He is of the opinion that a more traditional approach works the best when teaching mathematics. He, of course, always had a natural gift with mathematics. Again, I am unsure whether this was nurture or nature but he always made it look easy, performing better on standardized tests as a freshman than I did as a senior, which made me slightly jealous. So, for my brother the traditional lecture, practice, assessment worked. I remember when my dad offered the opinion that he felt 'we should teach everyone calculus,' to which my brother responded, 'you are just going to put people in calculus who aren't ready.' I promptly said, *I do that everyday.* My dad offered a different vision of mathematics education, my brother countered with a more conservative perspective, and I help shape the realities of our public education system.

That being said, my family was a nice sounding board for my experiences at Regence High School last year. I'm not going to sugar coat the experience: it was one of the most challenging classes I had in eleven years; I was exhausted and frustrated with the system; and I not only contemplated but made efforts to find a different teaching position. My schedule was, for the most part, enviable. I taught two AP calculus classes, helped out with our new mathematics instructional coach, and taught one Algebra I class. However, it was the Algebra I class that almost broke my resolve to continue teaching at Regence. I'm not sure what variables had the greatest effect creating such a challenging situation but after trying almost everything in my teaching 'tool belt' I was never able to cultivate a purposive, collaborative, and interconnected class.

To begin with the class was large for a freshman Algebra I class. There were thirty-six students at the beginning of the year and it never dropped below thirty-two after the classes were balanced. In comparison, many of the other Algebra I classes hovered around twenty-five students. There were also a lot of males in the class, as I recall the proportion was almost two to one male to female. I am not saying that males are any less capable, but in my experience freshman boys have a tough time conforming to some of the behavior expectations at Regence. I am of the opinion that this is because schools don't take into consideration and shift to meet the psychosocial needs of boys, so within the narrow context and constraints of Regence many of our boys struggle. It was also the last class of the day and, again, for freshman students this is a really difficult time frame to schedule a rigid, content-focused class. I'm almost certain the students entered my class having sat for and been talked at for 270 minutes. How hard would it be to focus as a teenager if four and a half hours of your day was sitting and listening, and then you had to enter a mathematics class where academic requirements, pace, and expectations were strictly mandated; you have historically been told (verbally or nonverbally) that you are bad at mathematics; and you see little meaning or connection to mathematics?

Lastly, the class was almost fifty percent special education. I had seventeen students on individual education plans, meaning I am required by law to accommodate each of their individual learning needs or risk personal and professional sanction. This is already a very difficult prospect, especially considering most teachers at Regence rarely have more than eight students on individual education plans, and then you add a shift in special education support, which makes this prospect almost impossible. Because of budget cuts and evolving approaches to special education Regence High School began

using the ‘push in’ model. This model, in theory, seems to be a great idea. Instead of the historical approach to special education, which emphasized separation, students on individual education plans are now mainstreamed into ‘regular’ classes with additional support classes and personal attention. Then, the special education teacher ‘pushes’ into the class to offer lesson plan accommodations and help students within the classroom. This is the theory at least. In reality my support teacher was overworked and, largely, unavailable to help plan and support students in the classroom. Often she was running around the school checking in with teachers, popping into other classrooms, and trying to keep up with her caseload. When she did manage to drop in I was extremely grateful, but I could tell that she struggled to keep up with the content we were covering and the necessary accommodations for each student.

My practice was constantly in flux as I tried to find out how to teach this class. I established routines so students knew what to expect each day; I limited my ‘talk time’ to 10 minutes per class; I planned lessons that relied on group collaboration and conversation; I grouped students based on assessment results and personality; we reviewed notes, highlighted key points, added summaries, and created glossaries; I regularly talked with families, worked with counselors, and had conversations with the instructional coach; I tried project-based learning, problem-based learning, and discovery learning; we played games and presented on our process; I provided timely feedback, offered my time during lunch and after school, and allowed students the opportunity to reassess as many times as they needed; and I began to read more academic literature on mathematics education. I look back on this list and am not surprised I was exhausted and ready to move on. Unfortunately, but not surprisingly, the special education teacher who

I worked with left after one year at Regence High School. She was an excellent teacher but ended up burning out after one year.

So, what more am I supposed to do with a daunting, almost unreasonable situation like the one described? I did what was needed to move through the curriculum but I hit a point where my health and personal life were being adversely affected by this class. I can only imagine having to teach this class as a beginning teacher. I was fortunate that I had eleven years of experience to help get through the year but to me it really was 'getting through' and not a class I looked forward to everyday. Which is sad, because I love teaching and admitting this makes me feel like I was not doing a good job or that I didn't care enough. However, to what extent could a teacher actually control, guide, transform this context? Whatever the answer to this question I still felt personally responsible for each student who struggled, not because of who they were but because of the situation they were in. I suppose, in the end, this is one of the main reasons that I wanted to leave Regence. I didn't want to be in a place that was forced to put students in this situation. I say forced because I know it's not entirely the administrators fault or, for that matter, the districts fault. There are larger frameworks that govern how students are placed, the support we provide for students, and the priorities we deem worthy for adequate funding and attention. This class was a product of enduring racial and economic disparities, increasing emphasis on standardization and high stakes testing, a misrepresentation and misunderstanding of 'ability,' a misallocation of funding and support structures, and a conception of mathematics education that has remained largely unchanged for over a hundred years. All of these stories were spilling out into my classroom and my students were drowning in their wake.

**The End Is in Sight**

Their shift wasn't in the way I had hoped. I was staring at Tyrone's paper rereading the line over and over again. 'Why should we care about logarithms if we are never going to use them in our life?' I said it out loud and it hung in the air, thick and unmoving. It was a profound question that I didn't have an answer for. It was a question I had experienced every year but now I felt its effect reverberate deep in my soul. I was frustrated and troubled by its implication but ironically pleased that Tyrone wrote something. Somewhere he cared about how mathematics was taught, how school was conceived, how future students would experience the same class. It was probably the most engaged he had been throughout the year, so I sat quietly, contemplating its meaning.

However, beyond this surprising moment, my attempts to engage both Tyrone and Francisco never amounted to much. Both regularly sought me out after school to get extra help but, ultimately, they did the bare minimum to meet proficiency. I suppose in a way they were much like I was in high school; trying to find someone to support them through a challenging, disconnected subject. Even considering my vain attempts to make mathematics more meaningful and teach it differently than my own high school experience, perhaps I never strayed from what I knew. I recapitulated tradition. Or maybe mathematics teaching can never truly be different without extricating itself from the very content it represents. Maybe, mathematics teaching will not change until the notion of mathematics itself changes. I mean, I did teach mathematics differently; we worked collaboratively, used challenging problems, sought understanding rather than the correct answers, valued mistakes and taking risks, and supported everyone's approach, no

matter how different. But, in the end, was that enough? Did I do enough to create a space where all students had the same opportunities to learn and succeed?

I believe I did become for them, in some small way, what my father had for me; I was there for them when they needed me most. Everyday I welcomed them with open arms and, again, after school I opened my doors to help them get through the difficult content and overwhelming moments when life interrupted their schoolwork. Whatever their context I remained optimistic and was determined not to be the roadblock in their aspirations to graduate. I continued to contact their homes, strongly suggest they come in after school, and coach them during class in order to insure they met my expectations for a passing grade. I never doubted that both could do the work, I just realized that they needed a committed advocate to make sure they also believed they could do the work.

In both an ironic and frustrating twist, I saw this belief manifest as school ended. It was the day before school let out and the sun was blindingly hot. The shades were drawn tight because without them the classroom would be unbearable, but as it was we were all still uncomfortable. In a ninety-year-old school this was the best we were going to get. I decided to give my seniors a team test as their final assessment and I would grade what they produced as their final. As they walked in I noticed a difference in their gate; both seemed tentative where before there was youthful confidence. It was almost as if they were anxious at the gravity of this being their final assessment. We started the class with a quick warm up and then I passed out the team test.

A team test is usually comprised of more difficult and comprehensive problems that cover the same material but require the team's collective effort to effectively solve and explain the problems. This was, hands down, the most involved Tyrone and

Francisco were the entire year. Their anxiety quickly dissipated and they both assumed leadership roles in the group, asking pointed questions, demanding explanations when concepts were unclear, and offering suggestions when the group stagnated. For ninety minutes both of these young men were on fire. They rose to a potential I had only dreamed of and then, without blinking, surpassed these expectations. With a childish nervousness they both handed in their team tests. I already knew they had passed my class, but what I didn't realize is how profound this moment was - much like the quote Tyrone had written four months ago. They had both decided today that they would do whatever it takes to perform at a level beyond expectations, and with this decision they both accomplished what they set out to do. I was, again, equally troubled and inspired by this moment. How, then, do we ensure that our students feel this same level of urgency and empowerment as Tyrone and Francisco did throughout the entire year? I won't claim to have emerged from this moment with a better understanding of what this takes. I think, though, that I finally asked this question, which set me in a direction to better understand not what it takes to transform mathematics education but instead what steps I can take to help more Tyrones and Franciscos feel valued, legitimized, understood, and capable of doing what many have told them they can't do.

**Stance(s) in Mathematics Education**

Rebecca's narrative helps us imagine what Cochran-Smith and Lytle (1999) described as *inquiry of stance*. Rebecca's efforts to reflect on her own assumptions, take into account larger sociopolitical structures, understand her student's context, and shift her practice accordingly is evidence of a teacher who embodies *inquiry as stance*. For Cochran-Smith and Lytle (1999) this "teaching as praxis" is a dialectic relationship

between critical reflection and action. Rebecca thoughtfully considers the social and political demands on her students – learning English and navigating a new, demanding culture or trying to graduate high school while working and raising a child – and she changes her practice to better meet their needs. Rebecca opens her doors to offer extra help when the two boys struggle to concentrate in class and she focuses on building a strong community to support her ESL students.

That being said, because of Rebecca's lack of experience with difference her initial efforts with her ESL students were framed by assumptions and misunderstandings. Ladson-Billings (1994) offers that because teachers are products of social and cultural constructions one who has not been part of the community they serve will have a more difficult time making sense and acting on what happens in the classroom. So, for Rebecca, not being exposed to or embedded in communities of color prior to her teaching career resulted in a more difficult transition at Regence. Martin (2007) furthers this argument by positing that teacher's of African American students must understand the lived experience of African American students, seriously consider how teaching shapes the identities of African American students, see the power of mathematics as a tool to critique and 'rewrite the world' for African American students, and take a stance against racist or deficit policies and research within mathematics. From Rebecca's narrative we see a teacher who slowly and deliberately attends to student identity and the lived experiences of her Black, Latin@, Native American, and Asian students. But, developing these skills and practices was a long process and we must consider whether this would have been different for a teacher more experienced with difference.

It's also evident that Rebecca is frustrated by internal and external barriers that

prevent her from connecting mathematics to her students lived experiences. Like Bianca, Rebecca is troubled with providing students access to traditional, structured mathematics while also attending to different learning styles and, potentially – a more social justice orientation (Gutierrez, 2009). Per Martin (2011) Rebecca is subtly questioning who decides what students should learn, how they learn, and to what ends this learning happens as well as how they are assessed and whether these educational decisions are made to replicate existing inequitable structures. However, even within these constraints Rebecca faces these barriers with renewed efforts to try different and more innovative approaches to mathematics education.

# CHAPTER VI

# ADAM'S STORY

Of the three narratives, Adam has the least experience in the classroom. However, Adam is unique in that he has not only taught at Regence his entire career (including student teaching) but he was also a student at Regence. As a teacher, Adam has an exceptional ability to connect with students, especially students who have struggled with other teachers. This connection is due in part to Adam's experiences as a Hmong student but also his understanding and commitment to combating broader social injustices. His own racialized history in school helps him empathize and support students who are going through similar experiences.

Adam's narrative begins with a situation in his classroom that has been building for quite some time but climaxes with two students causing a large disruption in the middle of a lesson. In an effort to reestablish a better classroom culture, Adam takes a risk and uses a restorative justice method to repair some of the damage. As a collective, the students discuss what has happened and what needs to happen in order to move forward. We then transition to Adam's historical context both as a student and within the Hmong community. Here we begin to see how Adam's cultural experiences in the community were largely disconnected from the school. As a result, Adam tries desperately to find some connection with education but is constantly ignored or silenced.

He finally finds a teacher he connects with and begins to shift his perspective on education.

Adam's perspective continues to change as he enters a social justice focused non-traditional teaching program that helps him name the oppression that he and other students experience. As Adam transitions into his professional role he begins to see these oppressive discourses affect both him as a staff member of color and the students of color he teaches. This oppression manifests as a culture of white privilege (Lee, 2005) within the school that paints opposition or difference as a deficit. Finally, we return to the classroom impasse to see what comes of Adam's efforts to democratize student voice and restore a positive, classroom culture.

**Drowned**

I heard a distinctive sound I never thought I would hear as a mathematics teacher; it was the unmistakable sound of a water balloon popping: Sploosh! Followed by the cascade of water off of a desk and onto the floor. Chaos. Students are screaming, laughing, and pointing at the culprits. They instinctively back up, forming a circle around the incident. Profanity becomes interlaced with every exclamation. "Holy shit, did you see that?" "Oh my god, that was fucking crazy!" I stand at the front of the room at a loss. What is going on? Why is this happening in my classroom? I quickly move to the area and see water all over the floor, spreading like my lack of control over this situation. To add insult to injury it was not a water balloon, in the traditional sense, but a condom filled with water. For the students, this detail elevates the apparent humor of the situation. The condom lays splayed on the floor, broken and slowly drifting on the expanding lake. Two students are at the center of this oblong circle, covered in

water. They are laughing unabashedly; the carefree, uninhibited laugh of students who know they are going to be in trouble but also realize they have just pulled off a momentous distraction, one that will live on for days in the conversations and conglomerations of students. My thoughts are initially troubled. I am angry. I am frustrated. I want to lash out at all of my students for what has happened.

I finally get the offenders out of the classroom while somehow managing to also call security to collect the students. *Why did you do that?* I ask, barely able to contain my anger. The humor has now vanished from the pair and one glances down the hallway while the other looks down at his feet. "Come on Mr. Tsa, we were only playing" responds the student who was trying to find solace in his shoes. *I will write a referral for this and call your parents* I respond without much enthusiasm. "Whatever, Mr. Tsa." says the student staring down the hallway, already wedded to his fate. In the moment I can't think of much more to say (later on I will have a lot of *I could have said this* moments) so I leave the pair in the hallway and turn back to salvage what is left of the period. The two students will be taken down to our dean but I am not confident much will be done beyond a walk down to the office. My past experiences point to a lack of consistency and meaningful consequences when it comes to behavior issues so I fully expect the students to either return to my classroom immediately or show up tomorrow without any thought or conversation about repairing the damage that was done. I understand this conversation is a two way street, we need to talk about what happened, why it happened, and how we can all make things better. However, there are no structures to facilitate this conversation. It is left to the teacher to take care of what needs to be done but I'm wondering - as a first year teacher - when this is supposed to happen in my overwhelming

schedule and how am I supposed to begin this process without much experience or support. Ultimately, the students get what they want; they leave class and are absolved of any responsibility in their actions. It also means that the two students will miss whatever instruction remains and I have to work more to help them recover lost time.

My mind is racing as I take a quick second to compose myself before entering the classroom. Beyond the helpless feeling surrounding the immediate situation, I feel a deeper tension thinking about education's current approach to discipline. I know the biased statistics in our district public schools for students of color being suspended; over the last seven years Black students are three to four times more likely to be suspended in comparison to their white counterparts and Latin@ students are twice as likely to be suspended. This is also compounded when you take into account that white students represent almost 60% of the student population in our district. I know that our district is not an outlier and that this demonstrable, national trend lays the foundation for our burgeoning prison population and limits students' future opportunities. But in this dramatic moment what am I supposed to do as a teacher? I realize my pedagogical limitations as a first year teacher and recognize that students' disconnection from mathematics might contribute to behavior issues. But I also want my students to realize the power that comes with understanding and persevering in mathematics. It is a different, often additive, way to see the world, perhaps even a way to look at the statistics about uneven suspensions and reveal the injustices within our communities. I want this so badly it hurts my soul, but I'm struggling to find a way to connect with this class personally and academically.

The water continues to spread and so do the comments “Haha. Those guys are off the chain!” “Can you believe that shit?” I am not completely absolved from what has happened. This moment is the culmination of several smaller incidents that have driven the classroom to a crisis point. Naturally, I am a quiet person. I suppose I would be considered an introvert, so I prefer not to yell during class but at this moment I don't know what else to do. I raise my voice above the continued roar of the students, *I need everyone’s attention up here! Now!* After several attempts I manage to regain a modicum of control over the class, but I am unsure where to go at this point. I try to lay into the class about respect and responsibility *In my classroom if I can’t teach and you can’t learn then there is a problem. I think there is a lot of disrespect going on right now and we aren’t doing what needs to be done.* It’s exhausting for me to hold students attention through anger and it feels inauthentic. But, because of the circumstances I force the issue and try to make the students feel bad for what happened but in my heart I realize that I am just as culpable.

I attribute my immediate reaction towards the class partially due to my inexperience. As mentioned, this is my first year teaching and I am still trying to figure out how to establish a positive classroom culture and set appropriate boundaries. That being said, I’ve given a lot of thought towards how I envision a community of learners in a mathematics classroom and for me it starts with student connections. This was something I didn’t find often in high school so I make sure that my first priority as a teacher is to connect with students, building strong relationships so students feel comfortable and know that someone believes in them. I know many teachers feel they can connect with students through the content but in my experience you first need to

connect at a personal level before you even think about content. If you can't establish these connections then things don't go anywhere. You don't understand them, they don't understand you, and you can't progress beyond that precious moment of establishing and cultivating a strong relationship. After you establish these relationships then everything clicks. You start to have fun as a teacher and the students begin to see value in the content. There is mutual trust; they trust you will help them learn and be successful, and you trust that they will engage in the process. It makes the tough days bearable and the good days exceptional. I don't have a connection with this class. There is a disconnect somewhere and it has contorted into a constant battle. I'm not allowing the students to be who they are - by tightening down on behavior and constantly re-correcting - and they are not allowing me to be who I am - angry, frustrated, and unhappy. As a result, I need to do something drastic to shift our relationship and build a connection.

Because of this moment I turn inward for solutions. I'm Hmong and proud of my culture and traditions. I also have a large immediate and extended family as well as a strong connection with the Hmong community in my city. Our culture lives on through our traditional values and customs; and our traditions live on through a strong connection with each other. So connections are an essential part of my life. As I pack up for the day and think back on what happened I realize that I am unsettled by this disconnection more than I am by the brazen acts of a few rowdy boys. I can handle high schoolers occasionally not following classroom norms; I speak with them quietly about their actions, ask them to take a break in the hall, let them vent their frustrations during class, or call home to involve family. But these proactive conversations and practices are dependent on mutual respect, understanding, and trust. What I can't handle is a

classroom that feels no obligation to take care of each other, allow each other to be who they are, and support each other as we work to understand a difficult subject. So my next steps have to address this complex issue with compassion and courage.

I continue to think about this situation and my approach to teaching throughout the night, sketching out what I might do over the coming days. This obsession is partially due to my thoughtful and intentional approach to teaching. I need to have my lessons, units, and assessments carefully planned because my strength is not improvisation. I'm not sure if this is due to my introversion, but I approach the craft of teaching as a meticulous, organized transaction. I thoughtfully plan the structure of my lesson, develop the materials needed to support the lesson, and anticipate the outcomes of the lesson. I have observed many teachers who can survive and thrive on performance, but for me a classroom is a sanctuary. Granted, I play music while kids work and I encourage students to work together but I don't want to be the center of attention. I want attention to be distributed. So here is the bittersweet tension I find myself in; I need to facilitate an emotionally charged discussion without taking over. I need to carefully craft a lesson that allows for all voices to be heard, including mine, and ends with a purposive shift in our actions as community members of this class. And, finally, I need to cultivate a deeper connection with my students. But I'm a mathematics teacher, how do I do this?

After giving this situation a lot of thought I realize that I need to stop teaching content and we need to reflect on the current state of our classroom culture. I need to connect with my students outside of a stressful academic context. Really, I need to provide space and time for students to express their feelings without Pythagoras or

Hipparchus clouding the issue. So, in an effort to get to the bottom of my own feelings towards the situation I write a letter to my students. Again, not being overly charismatic I feel the need to plan what I say, to carefully frame the direction and tone of the conversation. After starting the letter I realize that the intention of this letter is not to scorn or place blame, but instead it is an offering of fallibility and love. I admit that things are not going according to plan but also that I don't always have the right plan so I need my students' help. The letter becomes an extension of my philosophy on teaching mathematics: that mathematics education is not dictated solely by it's content; that as teachers we must insert ways to humanize an abstract, technical subject; that we must employ creative methods to connect an often disconnected experience; that we must wholly encourage and love our students if they are to believe that they can do mathematics; and that we must collectively set up systems and routines that allow for everyone to engage with the process of education.

It takes several attempts to craft a letter I feel confident with, but the following is what I settle on:

*Everyday I try to create a lesson that will be interesting and engaging for you students. I know that mathematics may not be easy or may not be fun for everyone, but I believe having good mathematical skills and tools is important to have, because it will help us understand ourselves and the world we live in better. However, for the last two weeks, teaching has been a struggle for me. I believe it has also been a struggle for you in this classroom.*

*The reason for this struggle is that we, as a class, are not on the same page. We struggle to get off on a good start when class begins, and we struggle as a class to stay focused. Instead of teaching, I'm constantly asking students to put their cellphones away. When I'm talking to the whole class, others are talking at the same time. When I ask for whole class attention, it's taking too long to get it and therefore, we do not get done with the class work.*

*Lastly, we are not clear what is expected of us in the classroom. I want to be a good teacher to all my students so that we can enjoy and understand mathematics in my classroom. Therefore, I want to help us understand what is not working in the classroom so we can fix it and what is working so that we can continue it.*

*Furthermore, I want to know what I am doing that is not helping you learn and what I can do to help you learn. Lastly, I want to know what you can do to help yourself and us as a class do better. I really hope that we, as a class, can change and make our time together more meaningful.*

The next day students file into class in their typical raucous ways. A warm up is on the overhead projector but students aren't paying attention, instead they are huddled together talking, wandering, and yelling across the room. A few of the boys begin to jokingly push each other and I have to quickly walk over and remind them of our classroom norms. The antiquated bell jolts my senses. I'm nervous as the students finally head to their seats. I'm sure they can hear my voice waver as I plead *Let's all take*

*a seat please and get our notebooks open.* I have them work on a quick warm up reflecting about how they are going in the class. I notice a few compliant students dutifully writing but generally the students are ignoring my warmup. I should pause here and lay out my plan for the next two days. My intention is to start with a short internal reflection, offer my own personal thoughts, and then slowly expand to a whole class discussion about what is working and what needs to improve in our class. We will, in theory, end with a list of expectations or norms that will help guide our class over the rest of the month.

At a deeper level I am trying to restore a classroom culture of collaboration, risk taking, hard work, trust, and learning. This idea of restoration has become a buzzword recently in education; 'restorative justice' is the term many educational reformers are throwing around as the answer for our defective punishment system. The numbers are overwhelmingly bad for our students of color and at a more personal level I see the statistics everyday in our school. Teachers who purportedly fight for Regence students immediately switch into deficit language when talking about the black or brown students in their classrooms. This deficit language is transcribed into deficit action when teachers overwhelmingly discipline students of color (more often than not males of color) for minor behavioral infractions. As an example, it's not unusual for our black and brown boys to receive referrals for 'talking too loudly.' I suppose I would also become disaffected from school if the volume of my voice is regulated. Ironically, the behavior issues are probably a result of the teacher in question, which brings us back to my story. My drive to restore the classroom culture is because I realize I'm at fault for some, if not most, of what has transpired. The students are not absolved from responsibility, but

I need to participate - openly - in the process of repairing what has been damaged. Part of this process involves not only my written letter but also the facilitation of a restorative process and holding everyone accountable after we are finished.

The beginning is notably awkward. I talk carefully about my intentions and then quickly transition to my letter. I am not sure what I expected but the reaction is powerful. As I begin to read my letter some of the students continue to act out but then, as I read on unperturbed, there is a notable shift in the classroom. I clearly articulate each word, pausing for emphasis at the end of each sentence. Students begin to lean in a bit more, some tell others to hush, and I - finally - have the attention of the entire class. Some are looking down at their desks, fiddling with their hands, maybe uncomfortable with my honesty and emotion. Others are glancing at each other, perhaps unsure what to make of the situation and looking for reassurance that they are still in a mathematics classroom. And, a few, still feign disinterest, smirking or rolling their eyes but remaining quiet. My shoulders begin to loosen up as I finish the letter and I quietly take a deep breath to end with a strong plea *I really hope that we, as a class, can change and make our time together more meaningful.*

That last phrase hangs in the air for a blessed moment of silence and reflection. After a few seconds some students begin to stir, glancing at each other, shifting in their seats, wanting the silence to end. I let it hold, though, hoping that it helps engender deeper consideration and reflection on their part. I glance around the room looking at each one of my students, knowing full well that they can do what I am asking and that we can come together as a class to make this a better situation. In that moment I also know that I made the right decision. Mathematics isn't everything and we need to

create time and space for our students to see that we are human beings. We also need to acknowledge their human-ness. Their potential to make mistakes. Their propensity to be kids. But, in the end, we have a collective job to learn and teach mathematics. I feel driven to give these students the same opportunities as the rich white students across town and I believe that part of this opportunity is built in mathematics classrooms. I also know that I can't expect a high level of performance from my students if we don't find some connection, mutual respect, and trust. Hopefully, what comes next will radically transform what has been happening in my classroom.

**Where I'm From**

I was born, raised, and teach within struggle. My parents immigrated from Laos during the 1970's as a result of the U.S. policy to support Hmong rebels fighting the communist incursion. It was a turbulent, unstable, and chaotic time for my parents; a time of forced immigration as a result of political persecution. Fortunately, my parents were able to connect with a religious organization that sponsored their transition to the U.S. and helped support them when they arrived in the Midwest. The sponsorship was through missionaries and my parents accepted the help in order to get out of a terrible situation. However, in great crisis my parents were opportunistic and gladly took the help offered by a Western religion, but in reality they remained committed to their ancestral worship of shamanism. Hearing bits and pieces of these stories over the years, I feel that this connection to our Hmong customs helped our family get through these difficult times. There are moments where I have found myself drifting away from the traditional practices of my culture but these unsettled times are followed by powerful reminders of staying true to my ancestry. It informs who I am personally and professionally, and helps

remind me of what is important in life; the interconnectedness of the world and the need to find balance.

At this point I was happily nestled in my mother's womb with my twin brother when my father began to struggle through an imbalance in his spiritual life. As a result my mother spirited us away to the northwest where we had a large congregation of family. After I was born we moved around a lot but instead of across the country we were jumping from house to house in the same city. Since my father was out of the picture for the time being, my oldest brother became the head of our household. He entered the workforce without completing his education and helped find work for my mother and, eventually – when he reconnected with his spirituality and our family – my father. When I was six or seven years old we finally settled down and I've lived in the same neighborhood ever since.

It was about this time that I began to understand and connect with my identity as Hmong. I, of course, had always been inundated with the traditional experiences of being Hmong; the large family gatherings to celebrate Noj peb caug, the delicious smell of sweet red pork, the beautiful and sonorous outfits, but I had not consciously considered what it meant to *be* Hmong. This emergence and understanding was a result of a more liberated interaction with other Hmong kids. There was a neighborhood group of boys and we began to hang out in our spare time and through the years we all became very close, forming our own little exclusive clique. For the time being this group was a harmless, positive gathering of boys who shared similar experiences but eventually it would morph into something more destructive. I'm not sure what precipitated our clique becoming so close, but reflecting back on this experience I think it was a result of living

in an apartheid city, where the privilege and power was exclusively in the hands of whiteness. So, many of us felt a conspicuous disconnect from our schools and larger community but found refuge and safety in our distinct cultural community.

I can't remember specific moments during elementary school, but I know I was quiet and did my work. I think, again, it was at the point when the group of us was forced to conform to a particular way of being - framed by whiteness - that our group began to find different spaces to resist and proclaim our cultural solidarity. As elementary students this resistance was more subdued; we began to listen to hip-hop, breakdance, and remove ourselves from the larger group when given the opportunity. I suppose it was this discernable comparison of 'us' and 'them' that helped me understand what it meant to be Hmong. Our unique language, tastes, customs, and philosophy were a point of difference that schools were not prepared to deal with. I learned - later - that it was at this time that many school districts and communities were drastically reevaluating their approach to difference including a more sociocultural approach to teaching and learning. However, during this transformational moment my experiences were largely framed by exclusion. As mentioned, I was a good student in elementary school but I can't recall a time where I truly felt connected with school. There were times when we had 'diversity' moments; when teachers tried hard to be culturally sensitive to their diverse classrooms but these moments always felt contrived and disingenuous. However, more importantly and beyond these broad strokes of inclusivity, I never felt a personal connection with any of my teachers.

There was also a tension during this period of time. I remember distinctly *becoming* Hmong, especially when I was with my friends, but also wanting to fit in at

school. I mean, I think we all want to fit in wherever we are and this is especially true when you are a little kid. I was an introverted and passive kid - in addition to being racially and culturally different - so it was difficult for me to feel included. Classes were usually focused on participation, group work, and immersive experiences, which were hard for me. My way of interacting and learning were rarely acknowledged so I had to expend more energy trying to conform. It was exhausting and left me with little energy to venture outside of my social comfort zone. Institutionally, I also felt excluded. I was born in the United States and spoke both Hmong and English fluently, but because schools universally categorized ESL (English as a second language) learners as students who spoke another language at home, I was ignorantly placed into an ESL class during my initial year at elementary school. Perhaps I had bad penmanship or my English wasn't perfect but whose is perfect at that age? So I spent six months in a class that I didn't need because I looked different and spoke a second language. At the time I remember being confused and, again, feeling isolated but now I can only see one more check in the box of institutional oppression. It's sad because you would expect this system to eventually change, but to this day I have cousins who were born in the U.S. but are discriminately placed in ESL classes without proper recourse. This experience helped me realize that marginalization extends beyond ESL. How many students are placed in special education because they had trouble writing or needed more time to complete an assignment? How does this type of tracking affect our students' faith in the system? Because kids are resilient I don't think this experience completely shifted my future disposition as a student, but I can't help but wonder if this placement subconsciously engendered more disaffection towards school. This was my first real

experience with institutional racism and it's partially what motivates me to do what I do.

Transitioning to middle school and high school I became even more isolated from school. Fortunately, I was in what is considered the most racially diverse community in the metro area, which I think helped my experience to a certain degree but our clique of Hmong boys still excluded ourselves from the general population. At this time there were also groups of older Hmong boys forming more organized factions and we were enamored by their defiance and power. We wanted to be like them so we did whatever we could to be accepted by them. This is the point where our harmless clique began to morph into a more destructive crew. The older boys had officially formed gangs and we blindly followed their lead. This led to a more defined exclusion from school and a more attractive draw to participate in activities outside of school. We found little connection with education and those involved in the process of educating decided we didn't care about school, so what was the point? At this time I was still caught between both worlds. I wanted to do well in school but my teachers found little value in connecting with me on a personal level. To them I was not compliant and, obviously, cared little about my success so why should they give me the time of day? The irony of my situation is I continue to hear teachers' frame students in this way, 'Well they obviously don't care about school, so why should I care about them?' Now I see this as a two way street, I should have been more connected to my education but I can't help but feel that I was a kid and needed adults to help me, but according to them I was at fault. I was the deficit. As a result I found other ways to feel connected, which was usually not in school.

An example of this disconnect was my experience in mathematics my sophomore year. I believe the double stigma of being culturally and linguistically 'different' from the norm and outwardly expressing a resistant image (again, associating with hip hop culture made others think that we were not interested in school, obviously) paved a pathway of mediocre expectations. Much like my ESL experience in elementary school, people had a faulty assumption of who I was and what I was capable of before they even got to know who I was or what I could do. As a result, I was tracked into lower level mathematics throughout my middle and high school experience, so when I walked into my class my sophomore year it was disheartening to realize I was, once again, not going to be challenged. So this, compounded with my burgeoning social life outside of school, convinced me not to show up much to class. Also, looking back on this situation I didn't connect with the teacher. There was no meaningful attempt on their part to get to know who I was and what I brought to the classroom. If they had, maybe they would have realized that there was a spark - albeit hidden - that only needed some fuel. I wanted a challenge. I wanted *not* to be bored in my class. I wanted the dignity of someone respecting my intelligence and not assuming I 'couldn't do it' because of the way I looked. It could be said that it was partially my fault for not taking the initiative, but at fifteen years old, how was I to understand how to navigate the expectations of whiteness? What space was there to allow for non-dominant voices into the conversation of education? When I was in school there wasn't room for my voice; it was drowned out by fear of, anger towards, and resistance to difference. I now know that it is *my* responsibility as a teacher to embrace a student's difference and create space for my students to question the norm and advocate for a different path. Ironically, I did well in

the class despite my heavy absences. This, to me says a lot of what the teacher expected from their students.

However, the negative influences and relationships caught up to me during my second year. My twin brother was more involved in the purported gangs and he eventually got caught up in a dispute over who said what to whom. As a result he was part of a big fight at our high school, got kicked out of the school, and fortunately, was extricated from the Hmong group. He went to an alternative school and we didn't see each other much during the rest of high school. It was traumatic to see someone I love get caught up in a cycle of destruction and it shocked me into self-realization. I recommitted myself to school and found a new group of Hmong boys who were more academically focused. But, I can't help but wonder if this cycle was a result of larger structures working against us. What would have happened if we did feel connected with our schools and our teachers? How would our trajectory have changed if our cultural difference was honored, included, and celebrated on a daily basis? What would happen if the boys in our group saw equal opportunities for academic success and future employment as a result of school? These questions continue to shape my approach to the Hmong students I teach. I always encourage them to get involved in school both academically and through extracurricular activities, to take academic and social risks, to advocate for themselves, and to make their mark during their four years. I do this while speaking to them in Hmong and asking about their families. I encourage my students to work and participate in the local Hmong celebrations; often driving them to and from the events. I have created a space where they can come and feel safe, included, and accepted for who they are.

I finally found my groove in school during my junior year and connected with one teacher in particular. Mr. Azeno was a new teacher my junior year and he put a lot of energy on connecting with his students. Instead of relying on content as the force that binds us together, Mr. Azeno decided to really get to know his students. It wasn't anything earth shattering; he talked with us, cracked jokes, and gave us the time of day. It wasn't some *Stand and Deliver* moment where he was spending all his extra time at school and inviting us over for dinner, he simply made a conscious decision to take time for each of his students. He asked about our families, figured out what we were interested in and talked to us about these interests, and most importantly, he respected who we are. We didn't have to change in order to receive approval. He allowed us to be ourselves and he showed us who he was. Thinking back, I'm sad that I can only think of one teacher in my K-12 experiences that I actually connected with, and this is why I work hard to create a classroom culture where students feel included, safe, and understood. I don't want any of them to go through what I experienced.

**Practicing What I Preach**

My pathway to becoming a teacher was, for lack of a better word, nontraditional. During my high school coursework I took a technology and auto-CAD[8] class that inspired me to pursue a degree in the tech field. After my junior year I quickly realized that mathematics and science came pretty easily to me, but after a brief experience with the coursework and a better understanding of the job requirements I quickly shifted my focus. I just couldn't see myself in the daily grind of reporting to work just to sit in front of a computer. I felt a tug towards doing something socially,

[8] AutoCAD is computer software for 2D and 3D design (computer aided design).

culturally, and politically impactful. Perhaps part of the reason for this dramatic change was that during this time period I began working with a local mentorship program that helped tutor and support elementary and middle school students. It was organized through the local Baha'i church and I eventually moved into the project assistant manager position. I was traveling all over the city helping youth - specifically Hmong youth - and more broadly coordinating efforts to empower and support students of color.

During this tenure I also began to work more closely with local schools and was in direct contact with extracurricular public school support networks. I saw both amazing work and deep institutional gaps that needed to be filled. I was excited to see teachers doing incredible things with students but also saddened that the teachers were not a racial or cultural reflection of their students. And, even with all of the support networks, I still worked with students who felt disconnected from schooling. However, the work was inspiring and fulfilling. I felt a satisfaction organizing and providing the systems of support I desperately needed but didn't have access to during my school experiences. This exposure prompted an emotional desire to insert myself into the educational equation so I could become that difference for one kid. I thought back to Mr. Azeno and my sophomore mathematics class and realized that one teacher could make or break a student's experience. The responsibility was overwhelming but how could I not want to take this on?

Alternative teacher programs are all the rage today. Proponents and opponents are always touting new statistics arguing for or against one program or another. I am a product of a hybrid alternative certification program. I say hybrid because it is a traditional teacher education program, but it's alternative in that it aims to recruit and

sustain a non-traditional, diverse teaching core. I was actually in the program for six years but four of those years I was receiving support during my undergraduate experience and two of those years I was engaged in the masters of education program. Beyond tuition support, the program has core values that resonate through every activity we were required to participate in, namely; "self-development, self-discipline, self-respect, leadership, humbleness, integrity and service to others." There were stringent expectations for academic performance, professionalism, disposition, and attendance. We attended colloquia, panel sessions, and academic seminars that covered all aspects of race, class, gender, sexuality, and ableness. There were also special support systems built into the program including peer networking, individual advising, and advocacy support. However, the most important part of this experience was that I was with other teachers of color who had similar reasons for entering education and equity, difference, justice, compassion, community, and love always framed our conversations. We didn't just talk about mathematics education, we talked about what mathematics education could be.

The program had a huge impact on who I was as a person and what I would eventually become as a teacher. Many of the activities started with who we were as a person, understanding our place in a system that is unfair and actively disadvantages people of color. It helped me better understand my experiences in elementary, middle, and high school; that it wasn't entirely my fault that I was disconnected from school but that schooling itself was an oppressive institution. The program gave me the language to name these systems and the experience to work towards breaking down these barriers, many of which are still alive and well. I think partially because of this program I entered

wanting to be a social studies teacher; I saw an immediate connection with what we were talking about and the possibilities within social studies curricula. But, while attending my undergraduate classes I realized that I understood mathematics and felt comfortable with the content. I also realized that perhaps mathematics education needed more people like me in order to make dramatic shifts in how it was being taught. I thought back to my sophomore year in high school and another unsuccessful experience during my undergraduate coursework, both were problematic situations I largely attribute to not connecting with the teacher and how they were teaching. I wanted to be the person students could connect with and find success in mathematics education.

As I transitioned to student teaching and my first year at Regence High School, I had a philosophy towards being a mathematics teacher. I wanted mathematics to be a lens for students to look at the world. Much like Language Arts or History, we can take this lens and view the world from different perspectives and I had a vision that mathematics could be a powerful lens. More importantly, part of this vision was using mathematics as a tool for social justice. So students were taking the content they were learning and applying this to a context that might help them better understand systems of oppression and fight for something better. In this regard, mathematics becomes both a lens and a mechanism for change. Suddenly mathematics becomes more interesting. It becomes more meaningful. It becomes more engaging. And, ultimately, our students can relate to mathematics and see a purpose for learning mathematics. However, I was hit with the harsh reality of mathematics education and have had trouble recovering ever since.

Mathematics education is a world of strict standards and disconnected content. We are asked to cover twenty standards in a semester when, ideally, we would focus on four or five and apply them to real world contexts. As a result I am constantly rushing from one standard to the next, reacting as best I can to students' individual learning needs, but the mounting pressure becomes unbearable. We often move to the next topic without everyone understanding the previous learning target. It is a constant game of 'catch up' for both the students and myself. These standards lead to state assessments, which are tied to graduation and traditional ways of teaching mathematics. It's really hard to break this cycle. Should I cover all of the standards or not cover them and risk my students' not doing well because we didn't practice important concepts? Additionally, most of the textbooks are aligned with this standardization so how are we supposed to teach differently if we don't have curricular support? I find myself stuck with nowhere to turn. My graduate program professed social justice, activism, and equity but how are we supposed to follow through when we don't have the professional support or freedom to enact these prophetic visions of transformative education? I mean quadratic equations, transformations, and solving for variables can be fun, and I am the first to say I enjoy doing pure mathematics, but how can we connect this to the bigger picture? How can we inject some reality or meaning into these concepts? I'll be honest that I'm not really sure. I want to shift, but I don't know how.

**Attending to Difference**

As a result of this unending deluge of content and demands I have tried hard to find those in between spaces where I can infuse a political stance while trying to prepare my students for the eventuality of interacting within dominant system of whiteness. As

I've mentioned, this is most often done through my approach to creating a safe, supportive, and positive classroom culture; building strong relationships with my students; and doing whatever is within my power to help students understand and find success in a traditional framing of mathematics education. Within these current confines I, admittedly, teach in a traditional manner. By traditional I mean that students learn a new concept through direct instruction, practice the concept, and take an assessment on that concept. That being said, within each of these broad categories I push the pedagogical boundaries to meet the needs of every student. I teach note taking strategies - including repetition, highlighting, and summaries; students work in heterogeneous groups to complete problems, and I allow students to reassess on past learning targets. It is within my power to provide the necessary flexibility, structures, and opportunities for students of all abilities to succeed. Our school has gone through a series of dramatic shifts over the last ten years (I've been here for six of those years) and one highly contested change was adopting a proficiency-based model. There were many teachers who railed against switching, claiming their students would do worse because we were focusing more on what they know rather than successful behaviors. In theory, students who had been compliant for years and knew the game of school would now have to prove their knowledge. On the flip side, students who had been traditionally framed as 'non-compliant' could prove their understanding without having to jump through hoops. For our mathematics department it seemed like a gentle transition (which was not the same for other departments) and I saw an opportunity to help support students who had been traditionally not successful in mathematics.

The move to proficiency opened the doors for me to switch my approach towards assessment. With an emphasis on extra opportunities to retake and demonstrate new understanding I now offer students a choice on how they can both demonstrate their knowledge and improve their grade. I'm at school most days until 5:30 so after an assessment - of which I provide timely, targeted, and detailed feedback - students are encouraged to come and visit me in the afternoon. I then pose a question to my students who need extra support: *Would you like to correct your entire test, study, and then retake or would you like to go problem by problem?* Most often students jump at the opportunity to break up the assessment into manageable chunks. This approach to assessment was borne from conversations with our special education teachers and a personal anxiety of meeting the needs of all students in my classroom. I saw many of my students who had been labeled "special education" needing extra support because the traditional framing of assessments was not conducive to their learning needs. They needed more clearly delineated opportunities to reflect, learn, and demonstrate their knowledge that a classroom doesn't often provide. Over the years I saw that most students were "able" to do all of the work, it just had to be offered in a different, more manageable way. That being said, this shift in my instructional practices has benefited all of my students. Now students aren't as afraid to take risks on trying the hard problem because they know there will be future opportunities to learn from their mistakes. However, I still wrestle with this approach. Am I scaffolding too much? Am I providing too much support? Am I lowering my expectations for certain groups of students by having them focus on specific skill sets while others are taking on the whole assessment? I continue to mull over these questions every year but I've realized that for

many of my students I need to hold a malleable line when it comes to learning styles, assessments, and instruction. Let me be clear, this is not flexibility around expectations. I've seen the tragedy of 'lowering expectations' for students of color and students from poverty. If I were to lower my expectations I would be actively proclaiming that Regence students can't do what others can, which is far from the truth. It is simply expanding the ways students might meet our expectations. Not every student learns the same way and not every student should be assessed the same way. My goal, as mentioned, is to provide a space where students can be who they are, so how are we doing this if we ask them to all 'perform' the same way at the end of a unit? How does this allow for different ways of understanding or being? Unfortunately, the constraints in mathematics education hinder my efforts to really expand the notion of difference - high stakes assessments and nationalized standards - but at the very least I can ask students to demonstrate their learning in different ways.

**White Privilege and Deficit Thinking**

Not only do my students fight against a narrative that is framed by deficits and white privilege, but also I find myself also trying to navigate the complexity of being a teacher of color in a school where ninety percent of the staff is white. During unending staff and department meetings, I am constantly forced into conversations about things that make white staff feel good about their job - social justice, courageous conversations, restorative justice, diversity - but rarely do I feel comfortable engaging in these conversations. Granted, these conversations are essential if schooling is to finally stop oppressing and marginalizing certain students, but I get frustrated that we dance around the topic of white privilege, not really naming what is happening in our schools and

community. I also don't want to be the person who names these glaring issues because it shouldn't always be the person of color's responsibility. I've been in this situation so many times and it plays out like this: *Hey, look at me! I'm the teacher of color once again pointing out what is wrong at my own expense.* Other teachers: *Oh my goodness! Thank you for pointing out such a terrible thing. We feel sorry for you and ask what can we do to help you with changing the system. We will also try to change our ways.* My response: *Great! Just like you tried to change last time!* So, not wanting to point out my 'difference' I protect myself and this usually means I don't participate. I'm more than willing to offer my perspective if given the opportunity, but opportunities are rare when others fail to listen or compromise their own white privilege. A staff meeting usually starts with some announcement about a change in protocol or a new idea to spur reflection and it ends with a few dominant voices angrily railing against our students or the system. Not surprisingly these voices are mostly white men who seem to mean well with their commentary but end up falling unapologetically into a deficit framework. Sometimes it's our students fault: 'they need to show up to retake the assessment,' 'they just can't stop talking in class,' 'their behavior is terrible and mom won't do anything,' and 'if they only tried harder.' Sometimes it's the system's fault: 'his family is really struggling to get by right now so cut him some slack,' 'the way mathematics is being taught does not work for our students,' 'if we only had more resources we could help our kids more,' 'those damn tests and standards,' and 'I just don't have the time to support this student.'

So, we either place the blame on students (their deficit) or we fail to acknowledge that our students have some say in how things play out in this unfair system. There are

some students who disengage and need resources beyond what our teachers and school can provide but this is a very small percentage of our students. However, the volume of deficit conversations I hear from teachers is disproportional to the students who need this level of support. As a personal endeavor, I like to buck the system and invite these 'challenging' students into my classroom. Perhaps this is a reaction because I've seen how teachers treat these students - some of my friends were 'these' students - and I want to be clear with students that this is not how it works in all classrooms. I work hard to make them feel included and provide space for them to be who they are while also holding high expectations in regards to their performance. I have rarely regretted this decision. I currently have a student who fits the description of a 'difficult' student. She disengages from the work, distracts others, and actively resists when asked to do something. My approach - which I've mentioned - is to first find some way to connect with her. I've concentrated most of my efforts on building a strong relationship with her so that she knows that I am on her side. I don't nag her about work. I don't disparage her in front of her peers. I find ways to have a conversation, to share stories, and to listen to what she has to say, and she notices what is going on in the school. Most of her other teachers treat her as if she is the problem. To be blunt, her other teachers treat her like shit and after experiencing this all day everyday she has given up. But, she gave up after everyone else gave up on her. I don't blame her, because I would give up too. I almost did. And, how come I know this is happening and others don't? Because we have connected on a deeper level and I actively listen to what she has to say. It's not all butterflies and puppies; there are some bad days and she is still disengaged from the

content but I don't hold a grudge, everyday is a clean slate for my students. Where she may experience disconnect and negativity, I find connections and continue to hope.

There are, obviously, oppressive structures that continue to disenfranchise our students but we should never underestimate their abilities to succeed within these systems. I am a product of these systems so even though I acknowledge and fight against these systems I will never lower my expectations for a student because they are being systematically oppressed. If I did I would be excusing them of the responsibility to learn, grow, collaborate, present, problem solve, think hard, consider multiple perspectives, draw conclusions, analyze, offer suggestions, critique, and be proud of hard work. I cannot do this to my students. Unfortunately, many of our teachers fall into this trap set up and propagated by privilege.

**Full Circle**

As the students begin to fidget and the silence has echoed for what seems like several minutes (but was probably only thirty seconds) I begin the transition to our next activity. Even with the shuffling of bodies and the creak of old desks, the room is unusually silent. In order to facilitate productive discussion I have the students spend some time writing their own thoughts about the classroom culture. I have three questions for them to contemplate during the next five to ten minutes: how is the class going for them? What do they see that is working well and what do they see that needs improvement? And what can we do - together - to fix what needs improvement? The students grumble about writing but after their complaints have been aired they take it seriously and even the most resistant students scribble a few lines. To be honest, there are a few holdouts who write 'I don't care' or 'everything is fine' on their papers but

generally speaking the class writes thoughtful commentary. After giving them some time to process and write I move them into pair conversations. Focusing on the three questions the students have ten minutes to talk about their own and comment on their partner's responses. I circulate the room as the pairs discuss and am, once again, taken aback by the level of engagement: 'I think students need to respect Mr. Tsa and we need to behave better so we can learn some math;' 'I like when we work together in groups and are able to talk about the problems;' 'I feel like we need to go slower, I'm getting confused;' 'I think we need to set some classroom rules so other kids will fall into line.' These conversations bleed past the ten minutes so I let them continue until I feel the productivity wane and see focus beginning to wander. I bring everyone back together and ask for students to share their comments and questions with the whole class. At first it's quiet and students are self-consciously glancing at each other. I'm sure everyone is thinking 'who will go first?' One of the more courageous students raises her hand slowly and offers a thoughtful response 'I think there is a lot of disrespect in here and we need to figure out a way to stop talking so much and pay attention to our teacher more. Mr. Tsa is trying to help us out and all we do is not listen.' I let her comment hang for a second and then ask *What do you think respect looks like in a classroom?* She quickly responds 'Listening when you are giving us instructions and staying focused on our assignments.' Someone else chimes in 'Not shouting out when we are having a group discussion.' Before long the whole class is engaged in detailing what it means to have a productive, safe, and inclusive classroom. From there we move onto finalizing what this looks like in our classroom. I get students back into groups to formulate classroom norms and over the next two days we finalize a document that clearly articulates how

students should behave, expectations of the teacher, and a vision of how we want our classroom to run.

I won't sugar coat this experience. It was extremely difficult to navigate these conversations and not everything went as planned; some of our discussions went in unproductive directions, there was disagreement and conflict, I was very uncomfortable at certain points in the process, and students still acted out when my expectations were not clear. But in the end what emerged was a living document borne from a collective effort to make things better. We identified a problem and worked together towards amelioration. It was worth the extra effort on my part and time away from content to engage in the process of restoring and recreating how our class functioned. The transformation was not overnight but the class slowly became a functioning, safe, and inclusive space for my students. With these agreements in place I was able to connect at a deeper level with each student and, for the most part, all of us were able to be who we were in the class. I can't say that the class became a utopia; there were still moments when I had to remind students of their responsibilities, talk with students individually outside of class, shift my instruction to better meet their learning styles, and constantly reflect on what worked and didn't work. But, to me, this felt like good teaching and learning. The students and I weren't reacting individually to each situation as it surfaced; instead we were working together to proactively making our classroom a better space. I ended up using a similar method for a similar situation three years later. We were struggling to connect and find common agreements so we laid it all out in the open and worked through the challenges, together. Sure enough, the students responded again and the classroom became a more productive, engaged, and enjoyable space.

So, what does this tell me about teaching and learning? I think I've realized how important the 'stuff' beyond content is in effectively teaching. We often focus so much on mathematics content that we forget that our students are human beings and need strong connections with teachers and other students in order to engage. We forget that learning - especially an abstracted and disconnected subject - is hard work and requires making mistakes, reflecting on these mistakes, and trying again. This process is not easy, nor does it come without risk so our classrooms must be inclusive, patient, and supportive. We also forget that our students are being told all day what to do and perhaps we can find ways where they can have some say in what goes on and which direction it might go. We forget that students of color and students from poverty are constantly dealing with unfair systems, structures, and people, which is exhausting. So we need to work hard to not be part of this problem, and even more importantly, we need to listen and stand next to our students in this fight. We also forget that they struggle with how to talk with adults and each other, so we need to nurture this skill and provide opportunities for them to collaborate on content. We also forget that we are teaching kids who sometimes just want to be kids. We need to allow for this and find ways to tap into the beauty, excitement, and creativity that comes with being a kid. And, finally, we need to hold high expectations for all of our students. We cannot compromise on demanding our students meet high expectations in a world that plays favorites. That being said, we must structure our classrooms to provide the support, create tangible goals, and allow for different ways to meet these lofty expectations. Our students deserve nothing less, and it's our job to meet these expectations.

**Stance(s) in Mathematics Education**

A major thread throughout Adam's narrative is how race affects both students and teachers in schools. Adam's initial experiences in public schools as well as subsequent interactions with students and staff reify how race cannot be ignored in the context of education (Ladson-Billings & Tate, 1995). In Adam's context, race is always a looming narrative that regulates how he is perceived by and how he interacts with the world (Leonardo, 2002). As a result of these experiences Adam takes an anti-racist stance with students and staff, he troubles discriminatory perceptions of ableness, and he counters the narrative of white privilege and deficit thinking at Regence. This last point ends up becoming a barrier to Adam's efforts to further transform his teaching – as his energy is devoted to countering a hegemonic narrative of white privilege at Regence he has less time or energy to devote to changing curricula.

Within Adam's narrative we also see his unprecedented efforts to get to know his students and their contexts. He extends himself beyond the traditional 'knowing a little about each student' and truly embodies *conocimiento* 'with' students and their communities (Gutierrez, 2013). As a member of the community himself he has the unique perspective of understanding what challenges the students face and how he might better connect with and support them in the context of school. Lee (2005) suggests that students want and respond to teachers that care for them, respect their context, and know about their lived experiences outside of school. Adam does this and more. He stays after school to tutor students, drive students to cultural events on the weekends, creates space for students to share their stories, and advocates for students in a broader context. In addition to establishing deep, meaningful personal connections Adam also strives to build

a safe, loving, and collaborative community. As evidenced by his efforts to restore his classroom culture after the water balloon incident, Adam is not afraid to extend his own values and vulnerabilities in order to cultivate a strong community of learners.

However, his efforts to radically transform his classroom – in light of more social justice oriented curricula – is often blocked by his desire to also prepare his students for the traditional and rigid college mathematics requirements. Much like Bianca and Rebecca, Adam is confronting the tension of teaching the students how to play but also change the game. On the one hand he feels responsible for his students success beyond high school but on the other hand he wants to (re)imagine mathematics as a powerful tool to critique systems of oppression (Gutstein, 2007; Gutierrez, 2009). In contrast with Bianca and Rebecca, Adam's efforts are perhaps more personal because Adam is both a first generation college graduate and identifies as a teacher of color so he, again, understands the challenges many students at Regence will face in college. He has felt and continues to feel the intimate and oppressive touch of whiteness (Leonardo, 2002) and wants to make sure his students are prepared to face and succeed within this system.

The following chapter explores the similarities and differences among the three narratives. Specifically, the analysis section will identify and justify how each teacher exhibited – what I will be calling – sociopolitical microstances within their practice. This will help us better explicate what 'sociopolitical' looks like within a classroom and what knowledge(s)/experiences might be important for teachers to embody in order to teach mathematics with equity in mind.

# CHAPTER VII

# THREE DISTINCT AND POWERFUL VOICES

The individual deportment that the three teachers in this study exhibit is not transformative in its own right, but taken together their actions outline an ambitious and conscious sociopolitical stance to both help disenfranchised students and subvert an unfair system. I will refer to these interconnected knowledge/practice subcategories as 'microstances,' signifying the individual dispositions and knowledges that lead to sociopolitical decisions in the classroom. Using the term 'stance' is a direct reference to *inquiry as stance* outlined by Cochran-Smith and Lytle (1999). According to Cochran-Smith and Lytle, the literal term "stance" refers to the position of the body, political disposition, and/or research framework over time. Using the term *inquiry as stance*, the authors look to describe a teacher's position (both physical and intellectual) in regards to knowledge/practice that is dynamic and situated within a particular cultural, historical, political, and social context.

*Inquiry of stance*, then, is an umbrella term that signifies how a teacher approaches education, while *microstances* are the real-world manifestations of these orientations: how they plan, how they interact with students, how they build community, how they build context and meaning in lessons, how they handle deficit discourses, and how they make decisions based on inequitable racialized structures. These microstances

are directly connected with the personal practical knowledge of each teacher: their cultural, historical, political, social, geographical, familial, and educational context. Additionally, as *inquiry of stance* specifies, a microstance is deeply connected to teaching as inquiry. Teaching is a process of problematizing, acting, reflecting, and (re)problematizing. From this stance, knowledge is fallible and actions are tentative. So, each microstance is framed through a process of experimentation and action. Although a teacher may know a lot about race or community, until they enter a classroom and interact with students and then reflect on these interactions they will not understand race or community in that context.

What we see through these three stories is that sociopolitical teaching cannot be thought of only in terms of global ideological analysis of teaching or overt activism, but also — perhaps more commonly and substantively— something that happens in the interstices of teaching practice. As such, it seems meaningful to identify the microstances that enable effective sociopolitical mathematics teaching, and from there infer the kind of teacher education needed to support this kind of teaching. One must look to the accessible and highly political micromoments in which a teacher shifts the context to make a student feel more included, connected, successful, energized, and empowered in a mathematics classroom. And these sociopolitical microstances are evidenced in the everyday stories of teachers.

The sonata-form narrative, in particular, presents a strong foundation for cross-case analysis (Rosiek & Chang, 2003). A microstance is not a distilled image of good instructional practices in mathematics education, but instead a complex dance of both teacher ideology and actions. What this looks like may differ depending on the context –

what works in one situation for one teacher may be completely different for another teacher. In order to answer the question at hand, one must compare different narratives of equity-focused teachers to extract what sociopolitical microstances look like in a classroom. What follows is a cross case analysis of the three narratives. This section looks to identify, explicate, and better understand sociopolitical microstances, comparing different moments in each teacher's story that might support a more nuanced understanding of sociopolitical mathematics teaching. Additionally, this section aims to document how these sociopolitical microstances might look different depending on the teacher and context as well as connect their personal history to these moments. The microstances, which will be discussed more fully below, include an anti-racist microstance, a microstance of deconstructing ability, a microstance of community, a microstance of *conocimiento*, a microstance of *Nepantla,* and a microstance of being more than a teacher.

**Race as a Factor Influencing Mathematics Education**

> "Race" is an *ideological construction*, and not just a social construction, because the idea of "race" has never existed outside a framework of group interest. As part of a nineteenth pseudoscientific theory, as well as in contemporary "popular" thinking, the notion of "race" is inherently part of a "model" of asymmetrically organized "races" in which Whites rank higher than "non-Whites." Furthermore, racism is a *structure* because racial and ethnic dominance exists in and is reproduced by the system through the formulation and applications of rules, laws, and regulations and through access to and the allocation of resources. Finally, racism is a *process* because structures and ideologies do not exist outside the everyday practices through which they are created and confirmed. (Essed, 2002, p. 185)

It has been well documented and widely published that mathematics education is deeply affected by discourses of race (Berry, 2008**;** Martin 2006, 2010; Stinson, 2006). However, it wasn't until recent movements in mathematics education research that

scholars have taken a deeper and more critical look at how race is conceptualized. Moving beyond the value-free and neutral conceptions of mathematics education (Ernest, 1992), scholarship has begun to more explicitly name the persistent racial hierarchy in mathematics education and question the undeniable marginalization of certain groups of students (Martin, 2000, 2009). This movement has been largely influenced by a sociological shift to acknowledge and further explicate how racism has shifted since the civil-rights era. For Bonilla-Silva (2002, 2013) this "new racism" has evolved as institutional whiteness that continues to oppress people of color through less explicit ways. According to Bonilla-Silva racism is typically not experienced in overt forms as images we might conjure when we hear racism but instead in less conspicuous behaviors and structures. Bonilla-Silva refers to this 'new racism' more specifically as color-blindness exemplified through the naturalization and minimization of racism as well as a burgeoning form of cultural racism.

Returning to mathematics education, Martin (2009) believes it is important to connect mathematics education with *racialized forms of experience* because they are:

> [E]xperiences in which the socially constructed meanings for race in society emerge as highly salient in structuring (1) the way that mathematical experiences and opportunities to learn unfold and are interpreted and (2) the manner in which mathematics literacy and competency are framed, including who is perceived to be mathematically literate and who is not. (p. 324)

As to the first point, it is undeniable that Black, Latin@, Native American, and Asian students have to regularly navigate white supremacy in mathematics education. This can especially be found in achievement gap discourses (Gutierrez, 2008) where students of color are typically compared to their white counterparts. This framework is dangerous because it accepts gaps between groups as truth and not as a social construction; offers

only a static notion of student identity; does not allow for the experiences of Black, Latin@, Native American, or Asian students to be understood from their perspective, but instead looks to a comparative model which reinforces deficit models in education; and lastly becomes a proxy for talking about students of color without actually naming them. I continue to hear educators and leaders say things like "Well, the 'achievement' of students at Regence High School will be less than _____ (fill in wealthy high school across town)." Or "How do we raise the 'achievement level' of students at Regence?" Beyond being depressingly pessimistic, both phrases are comparative and gloss over the importance of race in education. This comparison leads to Martin's second point that students of color are often perceived as less capable in mathematics education. This can be easily spotted in many advanced mathematics courses in which students of color are - still - highly underrepresented. This is not because African American, Latin@, Native American, or Asian students cannot perform at the same level as their white peers, but because institutional legacies block students from accessing these courses. During my eleven-year tenure as a teacher, I have heard countless stories of 'capable' students of color not signing up for AP courses because of some barrier that was beyond their control.

Within this broad and often under-theorized conversation of race and mathematics education is the connection between a teacher's disposition and the racialized forms of experience for students. Berry (2008) outlines nine aspects that affect African American male's trajectory in mathematics education:

> (a) positive rapport with caring teachers, (b) previous exposure to rigorous mathematics, (c) standards-based instructional practices, (d) positive academic and social peer interactions, (e) positive self-image toward mathematics and school, (f) a countering of negative images of African American males, (g)

> advocacy from adults (parents, teachers, or others), (h) role models, and (i) racialized experience. (p. 466)

It's important to note that teachers can have a substantial impact on a student's experience in mathematics education in each of these aspects. Of course teachers are not, and should not, be entirely responsible for a student's experience, but we should try to better understand how teachers' decisions - framed by race - effect students of color. Other studies have documented how teacher perception and expectations of minority students are factors that affect how students perform in their class (Berry, 2008; Reigle-Crumb & Humphries, 2012). It's safe to assume that most of these teachers are not blurting out racist epithets, but instead working with/in a system of whiteness, perpetuating the biased norms of inclusion and exclusion based on a racially influenced standard of 'success.' The normalized discourse is that white males perform better in mathematics, and many teachers fall into this perpetual self-reinforcing cog. But, we need to also look closely at what teachers are doing to deconstruct this normalization and what decisions are being made in the classroom to go against white supremacy.

In their own ways, the teachers in this study demonstrate different efforts to counteract this "new racism" through their everyday actions. It's important to recognize teachers' critical ideologies and beliefs about race, but I am more interested in the decisions teachers make in the face of institutional and structural racism. What a teacher believes is important and could influence actions, but we are looking for actions as a result of these beliefs. Even though each teacher has had different experiences to draw from, they typically exhibited similar decisions. What follows is a closer look at how race plays out in the three teaching narratives. Two themes that emerged from the

narratives are related to Martin (2009) and Bonilla-Silva (2013) around racial apathy and teachers' attempts to deconstruct 'ability' in mathematics.

### *A Microstance of Naming, Reflecting, and Acting on Race*

According to Foreman (2004) racial apathy is

> the lack of feeling or indifference toward societal racial and ethnic inequality and lack of engagement with race-related social issues. It is expressed in at least two ways: lack of concern about racial and ethnic disparities and an unwillingness to address proximal and distal forms of racially disparate treatment. (p. 44)

All three teachers were far from apathetic towards race. As a result, I would consider each teacher's microstance as an anti-racist praxis. From the very beginning, each narrative is deeply connected to race and mathematics education. Bianca is meeting with a Black female student about support in a college-level mathematics course, Rebecca is working with a Latino and Black male to help them with mathematics and support them through difficult life circumstances, and Adam is working towards a restorative justice model in the face of racist discipline practices. These stories are not unusual at Regence High School, but other teachers still can (and do) remain apathetic towards race. The teachers in this study, however, understand the importance of race and the realities of racism in mathematics education, although there are subtle differences in the way that each names race as a factor in mathematics education and then takes a stance to address the problem.

Bianca is a teacher who is not afraid to name race as an issue. She recognizes that "it's because I know that my students - because of existing structures of oppression - will have to work harder than most in order to have similar opportunities as those with unearned privileges." She goes on to clarify:

> I know because of my privilege that I can't experience what my students face everyday but I am empathetic towards the economic, social, political, and cultural pressures that my students must navigate in order to just get through the day. And, with all of this in mind, I make my students work hard and let them know when they are not working hard enough. In fact, I make them work harder than other students in our district because I know the proverbial deck is stacked. For me, the way to change the system is for my students to have access to the system.

Here we can see that Bianca is both aware of existing structures of oppression - namely race - and is actively trying to address this issue through mathematics education. She is making decisive moves to address racism by demanding excellence, supporting hard work, and being honest when students aren't meeting her expectations. This is evidenced when she meets Amber outside of work to provide support and also when she offers emotional comfort to Deonte while demanding a sustained effort and performance in her class. In both cases, she understands the racialized experience her students face and tries to both support student's identity and prepare them for whatever they might face after high school. While it could be argued that Bianca would have offered this support to any student, her stories and thoughts demonstrate that she is conscious of – and focused on – how race plays out in mathematics education.

Given the understanding that race plays a part in mathematics education there emerges a tension between 'assimilationist' notions and a critical stance. Bianca understands the system is rigged and sees the white supremacy rampant in every aspect of mathematics education, but she also wants to prepare her students to gain access to and be successful in the system. This often means relinquishing more dynamic and interesting projects for more traditional 'college preparatory' models of instruction. For her, opening spaces for access is a way to fight the system.

Adam, much like Bianca is up front with the racial inequities in education when he critiques deficit models from other teachers:

> teachers who purportedly fight for *our* students immediately switch into deficit language when talking about the black or brown students in their classrooms. This deficit language is transcribed into deficit action when teachers overwhelmingly discipline students of color (more often than not males of color) for minor behavioral infractions. Ironically, the behavior issues are probably a result of the teacher in question.

Adam, however, needs to build a connection with others before he is willing to talk about race in mathematics education, but it informs everything he does in his classroom. So, often Adam's anti-racist thoughts are confined to intimate conversations, but his actions with students resonate throughout the building. Because of his own experiences he is adamant about high expectations: Adam holds his students accountable and, subsequently, offers additional support so that students feel confident to meet his demands. He stays after school until the early evening to help students understand concepts, practice problems, and reassess. He creatively uses assessments to meet different ways of demonstrating knowledge and works hard to create a safe, productive, and collaborative mathematical community. His work with Hmong students is particularly noteworthy - looking to their inclusion both within and outside of school. So for Adam and Bianca, race and racism within mathematics education is something that we cannot ignore and the way to address the issue is by holding students to high expectations, supporting them outside of class time, and finding ways to be more inclusive.

Interestingly, Rebecca is not apathetic towards racialized experiences in mathematics education but - and this is important to point out in regards to the nuances of

sociopolitical microstances - she is more apprehensive to name race explicitly as a factor in mathematics education. This could be her personality – as Rebecca is both quiet and introverted – but it could also be a product of not 'bumping into' race as a major issue in education until she began teaching at Regence. Rebecca went to school at a predominantly white school, in a predominantly white community, in a predominantly white city. She then attended a predominantly white university and graduate school. There were a few moments during high school that she was forced to recognize race as something that mattered in education. Rebecca discussed the topic of race with a friend from India after a teacher had presented an awkwardly ignorant lesson on Islam. As she said, "later we engaged in a conversation about race and she vehemently claimed, 'yes, skin color does matter in this country.' And, I responded ignorantly, *No it doesn't. Everyone is treated equally no matter their race.*" At this moment, Rebecca was exhibiting a color-blind ideology that prevented her from confronting racism and white privilege. Rebecca remembers another time at an all-school assembly in the auditorium when an African American speaker blatantly pointed out the whiteness of their school, "This is the whitest school I've ever seen." In both instances it took outsiders - people of color - to name race as something that is real and shouldn't be ignored. This explicit naming was something that Rebecca recognized - in these brief instances - as being important, but she had the privilege to ignore them after they were stated. So, again, there was a discontinuity in her experiences with race until she became a teacher at Regence where she has repeatedly interacted with issues of race everyday for the last fourteen years.

Historically, this was different for both Adam and Bianca. Bianca began talking about race at an early age:

> From the beginning I was always engaged in conversations about race and poverty. I'm not saying my parents were negotiating the complexities of white privilege or systems of oppression, but as a family we never shied away from difficult conversations about difference. 'You are responsible for helping those who have less than you,' was the repeated moral to every conversation.

She saw issues of race play out in her divided town and segregated school system. Perhaps she didn't have the language to name what was going on at the time, but Bianca was aware of race and racism at a very young age and continued to engage in these conversations throughout her university and graduate school experiences. As mentioned, her drive as a mathematics teacher is to make sure that her students of color have the same opportunities and privileges she had as a kid. That being said, there is a fine line in this stance, because - in addition to notions of 'assimilation' - it often falls into the white savior complex that victimizes students of color as 'needing a savior,' and Bianca has had to navigate and wrestle with this fine line throughout her career. She admits to having sometimes fallen into the 'white savior trap, but more and more often she is finding ways to open spaces and provide opportunities for students of color without speaking for them.

Much like Bianca, Adam experienced race from a very young age, but in his case he lived the flipside of institutional whiteness and white supremacy. He lived the low expectations of mathematics educators and exclusionary practices in school because he was Hmong. He felt the overwhelming pressure of institutional whiteness as he tried to navigate his cultural connections and the assimilationist demands of modern schooling. A highly critical education program that focused almost entirely on social

justice and equity then augmented these experiences. As Adam passionately states when talking about his latter, critical education, "the most important part of this experience was that I was with other teachers of color who had similar reasons for entering education and our conversations were always framed by equity, difference, justice, compassion, community, and love." As a result, Adam is quick to name race as *the factor* in mathematics education and his practices, reflection, and disposition are a direct result of this sociopolitical microstance.

***A Microstance of Deconstructing 'Ability'***

For all three teachers, critical consciousness/practice in the face of racism in mathematics education bleeds into their attempts to deconstruct the dominant discourses framing Black, Latin@, Hmong, and Native American students as less capable than their white peers. In literature we find mention in Danny Martin's (2009) work, which addresses the nature of this socially constructed hierarchy that ranks students' "ability" in mathematics education almost entirely by race. He notes that 'White' and 'Asian' students are always placed at the top of the list and Black, Latin@, and Native American students need to change in order to become more like the 'model students.' This is a dangerous framework because it suggests Black, Latin@, and Native American students change who they are in order to be successful, sets a low artificially created standard for students of color to meet, and sets 'White' as the ideal standard. Again, this assimilationist model fails to recognize students of color as dynamic, powerful, brilliant, driven, creative, and most importantly capable of performing beyond their 'white' peers. As a result of this institutional racism we need to further explore what teachers are doing to disrupt this hierarchy. Two interrelated themes that emerged from the stories

related to problematizing this hierarchy were an unfaltering belief in and love of their students coupled with high expectations for students no matter their situation.

First, it's important to note that all three teachers recognizes that there is an existing hierarchy and structure of ranking in mathematics education. All three also recognized and expressed concern with its connection to race. That being said, much of what emerged from the stories does not explicitly name race as a reason to disrupt existing structures. The microstances that each teacher takes is directly correlated with his or her understanding of white supremacy but not necessarily named as such. However, more often than not we might see a more generalized 'high expectations for all my students' or 'belief in every student' but at Regence, with a diverse student population hovering around 80%, 'all students' typically relates to students of color. Bianca jumps right into this disruptive narrative by stating:

> I am also unabashedly honest that I love my students and believe each one of them can be successful in my mathematics class. I dedicate my lunches to help students; I stay after school to, again, help students but also plan thoughtful lessons and contact my student's families (my goal is three students per day); and, most importantly, provide space and time to listen when students need to talk. I am uncompromising when it comes to mediocrity but I'm also willing to put in the work to support my student's success.

For her students, Bianca shows her love by taking the time to listen to their stories, contact homes - not as a punishment but as another way to connect with the student and their families - and dedicating whatever extra time she has to helping students. Along with this dedication comes an expectation to perform. When any of her students fails to meet her expectations Bianca is immediately engaged in a conversation with said student making sure they know that they are both loved and supported. So her conversations start with love and end with I know you can do better. It's an artful dance, interweaving

themes of love, support, belief, and high expectations. Another example of this is evident when Bianca advocates for Amber when she was trying to drop out of her AP science course, "But, as I sat there at the table, all I could think about was how we were lowering our expectations for Amber and the conversation kept orbiting deficit perspectives. *I disagree, I think you can do this Amber. I've seen the work you are able to do and I think that by dropping this class you are allowing yourself to not rise to the challenge.*" Bianca is willing to loudly declare that we need to not only believe in every student but we also need to follow this up with rigorous academic coursework. For Bianca it's our failure to believe in our students - especially our students of color - that leads to mediocre teaching and low expectations, which continue to reify stark inequities in mathematics education.

This microstance for Bianca seems to originate from reflecting on her own experiences in school in which there was an unspoken expectation that she would always perform at the top. Teachers never told her to work harder or convinced her to do more, it was just expected and Bianca performed. Her reflections on this experience, however, show that Bianca was deeply concerned about others' experiences in this system of selected expectations. She points to many friends who were placed into less rigorous mathematics courses because teachers didn't like the student or judged a student based on 'non-academic' qualities. Bianca reflects on this history as an example of what she does not want to happen in her classroom. She is constantly asking herself and others if she is treating her students equitably and looking for ways she can demand more from her students. She understands that the deck was stacked in her favor and wants to change the game so her students run the casino.

Bianca's commitment to high expectations could be read as a color-blind ideology that fails to recognize the racialized experiences of her students as well as a racist institution that is set up to exclude difference. But, the belief in and commitment to every student, high expectations, and her critical reflection on how institutional racism plays a large part in mathematics education counters any evidence that her actions are color-blind. She reflects on how race played a major role to engender a hierarchical view of Deshawn, because in the end, she failed to consider how his race affected her belief in and expectations of him. However, her efforts with Deonte point to a mathematics teacher who understands the oppressive and racialized discourses of 'ability' and actively teaches against them. It is in this respect that Bianca is teaching with equity rather than equality in mind.

Rebecca similarly never falters in her belief of her students. Although her experiences with Francisco and Tyrone were undoubtedly frustrating, and she expressed some concern as to their situations outside of school, she never faltered expressing her belief that they could do the work:

> Whatever their context I remained optimistic and was determined not to be the roadblock in their aspirations to graduate. I continued to contact their homes, to strongly suggest they come in after school, and to coach them during class in order to ensure they met my expectations for a passing grade. I never doubted that both could do the work; I just realized that they needed a committed advocate to make sure they also believed they could do the work.

So, Rebecca worked after school with Francisco and Tyrone, tried to engage them in meaningful curricula, contacted homes, worked with counselors, and learned the stories of both students. But even in the midst of this experience she struggled with her expectations and the difficult context of each student.

> What I did find out was that Francisco was also attending night school four nights a week and, as a result, missed my class frequently. I would then email his counselor who would chase him down and he would be in class the next day. This pattern repeated itself for the entire year. So, do I give him a break? How do I balance the desire to hold Francisco to high expectations - maintaining the integrity of the class - while showing compassion for his situation?

Rebecca is not saying that Francisco could not do the work, she was more concerned with his health and wellbeing in relation to her expectations. So, Rebecca's concern for Francisco is not purely academic, she cares for him beyond the content. She was also deeply concerned that Francisco would overextend himself and not do well in any of the classes he needed. But, in spite of these challenges, Rebecca worked during and outside of class to make sure both Tyrone and Francisco received the support they needed in order to meet her expectations. Ever modest about her experiences Rebecca reflects on this moment as a way to move forward,

> How, then, do we ensure that our students feel the same level of urgency and empowerment as Tyrone and Francisco did throughout the entire year? I won't claim to have emerged from this moment with a better understanding of what this takes. I think, though, that I finally asked this question, which set me in a direction to better understand not what it takes to transform mathematics education but instead what steps I can take to help more Tyrones and Franciscos feel valued, legitimized, understood, and capable of doing what many have told them they can't do.

She recognizes after this experience that it takes an enormous effort just to convince students they can do the work, an effort that includes unquestionable belief in students and a dedication that counters the 'ability' discourse that black and brown kids can't do mathematics on their own terms. Like Bianca, Rebecca takes a microstance that actively deconstructs racial constructions of ability and because of her conscious actions, counters the color-blind ideology of equality.

Adam lived low expectations as a student at Regence High School. As a result of this negative experience, Adam has an even more apparent drive to destabilize assumptions about ability and make sure students are prepared for what comes after high school. Unlike Bianca and Rebecca, who saw the benefits and privilege of high expectations, Adam lived the nightmare of being categorized as not able. He felt the boredom, disrespect, and meaninglessness of education when a teacher decided he wasn't worth challenging. The result of this experience is a clear and direct passion to expect the most from his students and a critical reflection to make sure his instruction is meeting this goal.

> Let me be clear, this is not flexibility around expectations. I've seen the tragedy of 'lowering expectations' for students of color and students from poverty. If I were to lower my expectations I would be actively proclaiming that Regence students can't do what others can, which is far from the truth. It is simply expanding the ways students might meet our expectations.

From his own story, Adam makes a conscious decision that all of his students can perform at whatever level he decides to set. This is not to say that Adam doesn't differentiate or accommodate as needed. He varies his instruction and assessment methods to make sure students understand the mathematics, as exemplified by his reassessment policy. Furthermore, among all of the mathematics teachers at Regence, Adam is most often the one we find staying after school to help students reassess or after the semester ends to ensure students make up incompletes. Unlike Bianca and Rebecca, however, Adam never really questions mathematics as the end goal. Instead, he sees mathematics as a force for social justice that will ultimately help students gain access to a culture of power. As he says, "in the end, we have a collective job to learn and teach mathematics. I feel driven to give these students the same opportunities as the rich white

students across town and I believe that part of this opportunity is built in mathematics classrooms." We find hesitation and tension with Bianca and Rebecca. Where they problematize the end goal of education and mathematics education, Adam sees the whole system as a problem and the way to undermine the system is by learning how to play in the system. He sees access as resistance. Perhaps this drive is born from the experiences that Adam can speak to and Rebecca and Bianca cannot. He has seen what happens to students, friends, and family when they aren't pushed in mathematics education and he knows that mathematics education can hinder or help a person's goals.

Like Bianca, Adam also believes that high expectations are intricately connected to a belief and love of his students. He articulates this sentiment clearly, "…we must wholly encourage and love our students if they are to believe that they can do mathematics…" He knows from his own stories in high school that without a connection to the teacher - and by proxy the subject - you can't expect anything from your students. He knows that Regence students need to trust a teacher and know that teacher believes in them before they will work and meet a teacher's expectations. Adam knows this because he was once in their shoes. As a sophomore he felt the hopelessness and frustration of those in power making unfounded assumptions about who he was and as a result demanding less of him. Despite the fact that mathematics came easy to him, the teacher failed to recognize his gift, a gift that was overshadowed by a racialized system. As Adam reflects on his sophomore year:

> There was no meaningful attempt on their part to get to know who I was and what I brought to the classroom. If they had, maybe they would have realized that there was a spark - albeit hidden - that only needed some fuel. I wanted a challenge. I wanted *not* to be bored in my class. I wanted the dignity of someone respecting my intelligence and not assuming I 'couldn't do it' because of the way I looked.

So he stopped showing up to class (but still passed.) It turns out that these assumptions were intricately tied to the teacher's connection with Adam. How would this experience have been different if the teacher made a connection? How would his expectations and belief in Adam shifted as a result of this connection? The following year, Adam finally connected with a teacher that worked to establish a rapport with him and the results were startling. He enjoyed the class, attended often, and did well academically. In part because of this experience, Adam believes in and loves every one of his students, no matter the circumstances. He talks vividly of 'difficult' students but always includes his desire to have these students in his class because he knows he can provide something that other teachers might not. He can show these students that he truly cares about them and that he will never give up on their ability to do mathematics.

**A Microstance of Community**

There have been great strides in mathematics education research to study the social elements of teaching and learning and respond with a more collaborative, group-centered pedagogy. Lerman (2000) traces the social turn of mathematics education research, which in turn influenced mathematics education practice, and found that there was a shift in the late 1980's and early 1990's in learning theory that supported a more collective, social approach to teaching. This shift was in response from a series of learning theorists who pushed against Piaget's individualized cognitive theories and focused more on a Vygotzkian social theory of learning. There was also a groundswell of new theoretical paradigms that troubled the traditional Eurocentric (individualism, rationalization, mathematization, etc.) ways of knowing and, as a result, opened new

spaces for research and practice in education. This is especially true in mathematics education where teaching and learning had remained largely stagnant for over a hundred years. As these ideas have percolated and diffused beyond academia, more and more mathematics teachers are shifting their own practice to build a more communal, collaborative, and connected classroom. Instead of focusing purely on the mathematics content, teachers are trying to create classrooms of sharing, inquiry, and collective efforts. However, I want to reiterate that although there have been great strides in mathematics education - varying widely depending on school district, school, and teachers - the majority of students continue to experience a solitary, traditional mathematics classroom.

We must also consider the extent to which community is infused as a constant part of the classroom. Spending one or two days at the beginning of the year to create classroom norms and do some icebreakers is a great start but it does not create a safe, trusting, and collaborative community. Community is something that takes time to nurture and develop. It is messy, involves conflict, and needs constant revisiting. So a teacher who has a microstance of community is willing to work towards unraveling social complexities engaging with conflict, and courageously engaging in meaningful dialogue. The three teachers in this dissertation exemplify – in their own unique ways - this deeper sense of community and each prioritizes the work it takes to create powerful and productive communities. Each teacher explicitly states – without hesitation - that building relationships with students and helping them build relationships with each other is the most important aspect of their mathematics classroom. The expectation in mathematics education is to focus on content – a safe haven for those uncomfortable with

engaging in this difficult work – but as Adam points out, the work won't get done and no one will enjoy themselves if we aren't in it together.

Bianca immediately identifies the power of community in a longitudinal example, describing what happens when a teacher takes the time to build a strong community and what happens in a more traditional classroom where relationships and collaboration are neglected. When Regence split into small schools, Bianca was in charge of the Algebra I classes in one of these schools. Through a slow and deliberate process she was able to cultivate a strong community of students who wanted to take on new challenges, were willing to make mistakes and talk about them, and welcomed new ideas and students without hesitation. This type of classroom was an exemplar of learning. As she states:

> While students were presenting their ideas other students were listening intently and asking poignant questions; students were willing to take risks, trying different methods to solve problems; and students were willing to help each other out, no matter how much a student struggled. It was busy, it was loud, it was fun, and it was beautiful.

As she recounted this story Bianca had a smile on her face, a physical representation of how important it is to develop a collective classroom culture. Not only did students feel safe to engage in the work but also – without prompting – they welcomed and helped new students get situated. Her emphasis on building strong relationships and a meaningful sense of collective purpose engendered a larger movement towards inclusion.

However, there is also a sadness that emerges as she finished the story because she knows what happened to the class the following year. After finishing the year strong the students transitioned to a geometry teacher who had no desire to build community or get to know the students and as a result the class devolved into a culture built on fear,

individualism, competition, and mathematics as a right of passage. Students came back to Bianca to report their hopelessness in their current situation and nostalgia for what once was; a place of deep, meaningful connections and learning. Not surprisingly, the students who fit this 'mold' of success - white, middle class, male - were successful while the rest of the students struggled to even make it through class.

As with Bianca, Rebecca spends a lot of time thinking about and enacting ways to strengthen the community within her classroom. Especially in a place like Regence where the students need to feel a connection before they will focus on the work, Rebecca sets a tone in every class that everyone is together on this journey. That being said, Rebecca imbues a more consistent and subdued approach. She gets to know her students over a longer period of time and helps them work together through consistency, routines, and modeling. Students have roles, responsibilities, and frequent conversations with her if things aren't working out. Her microstance of community is more subtle, but no less effective. It is also creative, with Rebecca using a unique class 'beat' to get everyone back together and focus the students. Her attention to community is best exemplified when she describes her sheltered class:

> Not only was there a stronger teacher-student relationship but I also think there was a stronger student-student relationship. Students trusted each other, were able to support each other, and were not afraid to make mistakes in front of their peers. This sense of collectiveness – entirely dependent on the strong relationships we had developed – helped this class emerge as both a place of learning but also a place where identity and mathematics were cooperative. One was not exclusive of the other. Students began to see themselves as doers of mathematics *and* unique representatives of cultural difference.

It is especially important that students learning English in addition to mathematical (or any) content feel included and part of a collective effort. Without a connection to each

other and their peers, students will be apprehensive to take risks and truly engage in the work. As Rebecca sums it up, "I need to have a community of other learners who are willing to take risks, make mistakes, and try different ways of doing mathematics." More importantly than doing mathematics, however, strong communities provide English language learners with the opportunity to connect with something beyond content that is meaningful in school. Although Rebecca struggled with whether or not mathematics was really the end goal when students were simply trying to figure out how to get by in an English dominant society but she never doubted that having an inclusive, safe, and collaborative community is a worthy end goal.

Again, unlike Rebecca and Bianca, Adam's reason for building community is because he lived the antithesis in his experiences at school. For Adam, community was something he found outside of school; with his friends, family, and culture. His identity as Hmong was the center of his community and the teachers and school struggled to provide anything resembling the connections he felt beyond the walls of Regence. As a result of his past experiences, Adam strives with every fiber of his being to engender connections with his students. As he pointedly states,

> I've given a lot of thought towards how I envision a community of learners in a mathematics classroom and for me it starts with connecting with students. This was something I didn't find often in high school so I make sure that my first priority as a teacher is connecting with students, building strong relationships so students feel comfortable and know that someone believes in them.

Again we see that a priority is not content, instead it's a focus on connecting with students and helping them connect with each other. As he continues,

> If you can't establish these connections then things don't go anywhere. You don't understand them, they don't understand you, and you can't progress beyond that precious moment of establishing and cultivating a strong relationship. After you

> establish these relationships then everything clicks. You start to have fun as a teacher and the students begin to see value in the content. There is mutual trust; they trust you will help them learn and be successful, and you trust that they will engage in the process. It makes the tough days bearable and the good days exceptional.

So for Adam learning is interdependent on community; without one you will not have the other. He works hard to establish and maintain this sense of community. Definitely unique among mathematics teachers and different from Bianca and Rebecca, Adam does not shy away from the complexity and conflict inherent in community. He uses the process of restorative justice (before the term was coined) in order to repair damaged relationships in his classroom and restore a healthy, collective focus. This is not to say he wasn't anxious of instating that process and what the outcomes might be, but he felt that it was important enough to merit the risk. He offers his own story to his students so they can, perhaps, connect with him, and he provides space for others to share their stories. As a result, his classroom, even in the midst of seeming disaster becomes a more productive, collaborative, and democratic place.

Because the teachers in this dissertation recognize that building community requires more than a solitary instructional technique or a disconnected series of group activities, community as a more comprehensive, nuanced vision serves as a microstance. It is not to discount those solitary or disconnected efforts, because they too have value and could be considered part of microstance of community, but it's instead to argue that community in connection to the research question is evidenced by more conscious efforts to create spaces that value and empower difference. For these teachers community requires careful consideration, constant attention, and a more distributed model. In some

contexts, like Rebecca's, community was built through consistency and reflection where in others, like Adam's it needed a more transformative moment to restore a democratic and participatory community. A microstance of community is not singular or one-dimensional but instead a complex and polyvocal transaction between students and teachers.

**A Microstance of *Conocimiento***

Rochelle Gutierrez (2013) refers to *conocimiento* as an essential part of teacher knowledge in mathematics education. In reference to Gloria Anzaldua, Gutierrez uses *conocimiento* as a way to describe a deeper and different meaning to the word knowing. In English there is no distinction between *to know* someone and something, but in Spanish the word *saber* is to know something (related to facts and content) and *conocer* is to know someone or something through experience. This differentiation allows us to see that when teachers embody *conocimiento* their knowledge extends beyond the facts of teaching and becomes more entrenched in the lived experiences of their students and the community in which they teach. For Gutierrez (2013), *conocimiento* is a way to highlight "connected/embodied" ways of knowing and a knowledge "with" rather than "of" students. It is also important to point out that Anzaldua (2013) uses terms like "connection with others," "solidarity," and "being receptive to others" to describe *conocimiento*.

Each teacher in this study strives for and often embodies *conocimiento* with their students. The stories they told were not the type of stories one would expect from a teacher who 'just' knows their students' names or 'just' teaches mathematics. These teachers attempt to learn about their students' fears, dreams, family, community, culture,

behaviors, and strengths. They proactively shift their pedagogy to meet a student's needs - perhaps before a student realizes they need a change - and they take the time to reflect on what worked and what didn't. They don't call home to correct behavior, they call home to better understand their students, talk with family, and see if they can answer any questions. Bianca often refers to cousins, grandmothers, stepfathers, and friends in casual conversation; Rebecca lives in the Regence community and is able to better serve students after relating to their, often difficult, stories; and Adam grew up, graduated from, and returned to Regence because he has always seen himself as deeply connected with and committed to the students at Regence. So, for these three educators a microstance of *conocimiento* is a deeper more substantial knowledge of/with their students.

Bianca quickly develops strong, lasting relationships with her students. She has an uncanny ability to break down barriers with students and make students feel comfortable being in her class. As she says of Amber:

> So, when I had her in class, I knew that I had to be strategic: first, I concentrated on developing a strong student-teacher relationship; and then I provided a space and structure for her to channel this energy. And she thrived. Amber taught the class how to use algebra tiles. Amber helped with tasks around the classroom. Amber always presented for her group. A trait that might be construed as a deficit by many teachers was an asset in my class.

Perhaps it's Bianca's willingness to talk *with* students rather than *at* students. She does not patronize or talk down to them. She is both kind and to the point. If a student disappoints her academically or behaviorally she takes them aside and has an honest and caring conversation about what is going on, why is it happening, and what they can do - together - to solve the problem. This is evidenced by her interaction with Deonte.

> 'You need to take yourself seriously and practice these concepts more Deonte' I say directly, having the hard conversation that many avoid. 'You mean I need to

> practice because I'm stupid' Deonte responds quickly, not looking at me during this conversation. 'No, Deonte,' I replied. 'You are not stupid. You need to practice because we all need to practice to get better at things. What can we do to make sure you feel supported and can work in class?' I offer.

Many teachers fear these emotional conversations with students, especially engaging in honest and open dialogues with students. Bianca does not shy away from these interactions; instead she realizes the power of stripping away the superficial and often power-laden language directed at students in order to begin working *with* students. So, when she works *with* a student to evaluate and repair a situation, a stronger and more meaningful relationship materializes, a transactional *conocimiento.* Through this uncertain and sensitive interaction emerges a mutual respect and stronger relationship.

These conversations are not always formalized events that involve taking students aside to converse. Sometimes it's just a passing quip or a quick chat about how things are going. Regardless, Bianca is always present with the student. By present I mean Bianca takes the time to really listen to what a student is saying and is honest if she does not have the time to listen (which is not often) or dropping back into content as a safety net. Bianca becomes an "active listener," she sits quietly without responding, asks clarifying questions, and then follows up with probing questions. She creates the space and time to really hear what a student has to say. This was, again, evidenced with Deonte who was unwilling to do the work if he did not have a connection with the teacher. Bianca patiently listened to Deonte when he was having trouble at home, worked with him when he struggled with confidence, and demanded more of him when he gave up. As she mentions after listening about a problem at home, "our conversation never devolves into school or academics but unfolds as another moment that signifies

how relationships can make the difference in teaching." Deonte needed someone to listen to what was going on in his life and Bianca provided the opportunity for this interaction. As a result, Deonte did fantastic in her class but struggled with other teachers.

As part of her microstance of *conocimiento,* Bianca understands the importance of knowing students beyond the walls of Regence. This involves regular, honest conversations with families and friends. Her standard has always been to contact three homes a day, to provide updates and reminders, check in on families, and build connections with a student's support system. I often find that other mathematics teachers hesitate to call homes or feel that contact should only be made when things are problematic, but for Bianca it's a purposive interaction that leads to more meaningful and productive relationships. I see echoes of Jane Addams idea of 'lateral progress,' a term that refers to the idea that instead of looking at progress as vertical, we should instead look to broadening and deepening our connections with others as progress (Pratt, 2000). Bianca is extending her reach laterally in order to be a more knowledgeable, supportive, and compassionate teacher. This perspective and her willingness to extend her knowledge with students is perhaps best summed up by her comments on building relationships with students:

> And, to be more specific, I'm not talking about just knowing my students' names; I know their families, important memories, their dreams and aspirations, their hopes and fears, and what makes them tick in my classroom. I know when a student feels uncomfortable reading in front of the class and which students are energized by presenting to their peers. I know when to push a student hard and when to back off because they are at that tipping point; that delicate moment when a student retreats instead of perseveres. To me, knowing a student goes beyond the words to know; for me it is a deeper, more complex, and more intimate understanding of a student and their context.

Bianca's knowledge with her students heavily influences her pedagogical and curricular choices and as a result it is one of the foundations of her teaching. To her, *conocimiento* is essential, without it mathematics education does not happen.

Rebecca quickly discovered the importance of building strong relationships and knowing her students during her first year at Regence. Taking on the sheltered mathematics classroom, Rebecca faced difficult questions about the broad intentions of mathematics education and more specifically her place within this often-inequitable system. She realizes that her intent doesn't matter. If she doesn't have a connection with her students and their context, mathematics is an exercise in frustration, fear, and exclusion. That being said, Rebecca's reasons for connecting with students seem different than Bianca's. Rebecca believes that teaching mathematics and students' learning of content is the end goal, so for her *conocimiento* has a purpose beyond getting to better know your students. In other word, a teacher gets to know their students in order to increase mathematics learning. Bianca, on the other hand, seems to feel that *conocimiento* is the end goal and learning mathematics is part of the process or, that you get to know your students well because that is part of being a teacher. Rebecca says,

> Over the last twelve years I have realized that in my classroom relationships are the most important part of teaching. If I cannot connect with the students then the mathematics doesn't work. I believe that because there is risk involved with learning and practicing abstracted content – that generally lacks a clear connection with physical reality – if there is no relationship to support these risks then many students will not even take that first step.

Again, she refers to 'mathematics not working' if you don't get to know your students as opposed to getting to know your students because it should be a priority separate from the content. As a result, this position I would argue is not necessarily a politicized

microstance. Rebecca exemplifies strong mathematics teaching but her stance fails to truly humanize mathematics education or destabilize the traditional norm that mathematics is the end goal. Rebecca still builds strong relationships and her students are by in large successful in her classroom - we can see this evidenced by her story about Francisco and Tyrone and all of the extra time she dedicated towards helping them - but her vision is content rather than connections.

Adam on the other hand truly embodies *conocimiento*. Because he has felt the painful edge of disconnection throughout his experience at Regence High School he fights against the formalized, individualized, and technocratic approach to mathematics education. He is genuine with his students. He shares his personal experiences and feelings when talking with students. He is compassionate and listens to what students have to say. He opens up space and time for students to express their emotions and criticism. He spends time during and after school working, talking, and being with students to better serve them. He lives and spends time in the community; attending cultural, political, religious, sports, educational, and neighborhood events. He fights for his students whenever the need arises. Adam knows what students are interested in (music, sports, games, etc.) and is distinctly aware of a student's situation beyond school. His microstance of *conocimiento* is a tireless drive to make connections with students, families, and the community. He, of course, also wants students to succeed mathematically, but this is distinctly separate from his being 'with' students.

On many occasions Adam has let go of the content in order to help a student feel safe and included. He mentions one student who was labeled as 'difficult' but within his class she became a valued member of the community. Instead of falling into the trap of

labels he got to know this student, listened to her experiences in/out of school, and helped her feel connected.

> I've concentrated most of my efforts on building a strong relationship with her so that she knows that I am on her side. I don't nag her about work. I don't disparage her in front of her peers. I find ways to have a conversation, to share stories, and to listen to what she has to say.

He admits that this was difficult and, often, there was conflict, intense conversations, and emotional disequilibrium. He was often stressed with this relationship. And, in the end the student did not always do the work but at the very least, the student attended his class, which was uncommon in other classes. So, Adam saw the value of a student finding some connection, some reason to attend school beyond the classic "well you need this content when you get to college" response. This is also apparent when he takes the time to hold a community meeting with his students. Instead of victimizing the students and falling into the deficit trap, he creates an experience in which both students and teacher can repair what has happened and build on the conflict to grow stronger, more meaningful relationships. Adam let go of his prescribed 'curriculum' to refocus on what was important.

According to Gutierrez (2012) *conocimiento* is a political act; it is a stance of "solidarity and commitment" with students. Adam never waivers in his commitment to students both inside and outside of class, and this commitment extends beyond the simplistic framing of getting to know your students in the context of school. For all three teachers, a microstance of *conocimiento* is a way of interacting with students, creating space and time to laugh and cry, being honest with students and families, empathizing when students struggle, and acknowledging that power and identity play a part in

mathematics education. All three reiterate time and again that human connection is the most important part of their teaching. As evidenced by their narratives, when a teacher does not truly understand their students, good teaching – teaching with equity in mind – does not happen.

### *Nepantla*: A Microstance of Uncertainty, Critical Reflection, and New Possibilities

In addition to *conocimiento* Gutierrez (2013) also includes the concept of *Nepantla* as an essential piece of teacher knowledge in mathematics education. This is another term drawn from Gloria Anzaldua's work and *Nepantla* flows directly from *conocimiento* in that the more we are 'with' our students the greater uncertainty there is about what is the 'best' for any given situation. *Nepantla* can also be connected to Cochran-Smith and Lytle's (1999) *inquiry as stance*. The *conocimiento*/*Nepantla* relationship and *inquiry as stance* both describe a constant cycle of uncertainty and new ways of knowing that emerge from this uncertainty. The explicit connection between *inquiry of stance* and the microstances of *conocimiento/Nepantla* further explicates how sociopolitical teaching involves a commitment to the process of inquiry as central to teaching for equity.

*Nepantla* acknowledges an interstitial space of being a part of something but still feeling disconnected, of knowing and then not really knowing, and teaching but always living in tension. This uncomfortable and often troubling space helps open new understandings and different realities. *Nepantla* helps destabilize our current notions of what is, so that we might create a different *what could be*. In mathematics education this means that when teachers embrace *conocimiento* and open their stance to *Nepantla* they may realize that their practice does not fit their context. So, not only must mathematics

educators be 'with' their students, but also they must be open to a constant stance of uncertainty and discomfort. Often this is the opposite narrative of mathematics education – which is framed by the dualisms of correct/incorrect, right/wrong, know/not know – so it's particularly meaningful for mathematics teachers to reflect on their own position, push against these dualisms, and understand and embrace *Nepantla*.

The teachers in this dissertation embrace the idea of Nepantla as a source for improving practice. It's important to note that although Gloria Anzaldua was referring to a deeply personal experience of being forced into uncertainty and unknown belonging, one does not have to be from this third space in order to embrace Napantla. Both Bianca and Rebecca come from white, privileged backgrounds but they are distinctly aware of the tensions and uncertainties that follow *conocimiento.* Rebecca struggles with what is really important in her sheltered mathematics class after realizing that our traditional mathematical framework may be inappropriate for students who are learning English and a new culture. Bianca wrestles with the purpose of mathematics education and her role as a teacher as she continues to see students struggle both in and after high school. Adam on the other hand – much like Anzaldua – is from this third space. He knows what it's like to be separate but a part of something. So he intimately understands that through struggle, discomfort, and uncertainty there are opportunities to grow, learn, and approach teaching differently.

Part of being in a state of *Nepantla* is also reflecting on your own position in regards to the students and community you teach with. So, in addition to accepting and learning from uncertainty, teachers must also be able to reflect on their own privilege and struggle in relation to a student's context. Part of this cycle is a deeper understanding of

unfair systems in education and a teacher's role within these systems. So Rebecca and Bianca must interrogate their own position of privilege in order to embody a state of *Nepantla*. To embrace uncertainty or see possibility in the in between spaces both must be comfortable stepping away from privilege, distributing power, and acting against the best interest of both power and privilege. They must critically examine their lived experiences and see the power that emerges from the disequilibrium when their experiences clash with students. Within this moment of uncertainty Bianca and Rebecca should find new ways of teaching and new ways of being 'with' their students.

Bianca thrives in this state of reflection and new understandings. Part of this ability may stem from the significant changes that she experienced during her twelve-year tenure at Regence High School. She has taught all of the different courses offered, cycled through countless administrations, and seen large structural transformations play out (comprehensive to small and back to comprehensive high school). These external situations have influenced her disposition as a teacher but her attention to Nepantla goes deeper. She is constantly questioning her approach to teaching and interacting with students. As she states:

> When I recount this story I want to be clear that I do not have all of the answers, I have had many lessons that mimic what I just described as an 'old school' and, potentially, damaging experience for some students. However, what I will not waiver on is that I am constantly working to improve my practice and develop a classroom culture that honors the individual but holds the community as essential.

It is in this "constant working" that Bianca embodies the cycle of *conocer/Nepantla*. She recognizes how her position (privileged, white, female) plays out in her practice but also acknowledges that the better she understands her students and where they come from the better she can teach mathematics. Bianca is not afraid to 'not know' and is often the first

to jump at opportunities to talk through the complexities, tensions, and uncertainties of mathematics education. She is thoughtful when challenged (by students and fellow teachers) and open to the possibilities of new interpretations. Her conversations are reflective of her actions; her thoughtful and critical approach to teaching, her constant attention to students needs, and her tireless efforts towards growth. We see this evidenced in her brief interaction with Ahmad. Although the interaction itself lasted less than two minutes, the state of uncertainty for Bianca remained for some time:

> I suddenly feel unsure. Did my directness scare him away? Was I creating an inclusive space for students to worship and learn? Why had Ahmad chosen my classroom instead of other teachers? I don't have the answers to those questions but Ahmad showed up the next day during my prep time to pray.

Ahmad was not even in one of Bianca's mathematics classes, but she immediately reflected on her interactions and how they might play out towards creating a safe, inclusive space. This experience also demonstrates how she is willing to live in uncertainty to see how the new and different might emerge. Through this interaction, Bianca put herself in Ahmad's shoes, she was willing to look past her own position and try to understand what needed to shift in order for him to feel comfortable in her classroom. At that moment she was not asking 'how can I better teach mathematics?' but rather 'how can I create a space that supports Muslim students at Regence?' Her brief interaction with Ahmad is a snapshot of what Bianca tries to emulate as a mathematics teacher. She is always doubling back on her approach to both teaching and relationships with students. Whether it's an interaction that was negative or a lesson that didn't connect with her class, she sits patiently in the discomfort with the knowledge that she will learn from this experience. In a world dictated by certainty and logical reasoning, *Nepantla* is

difficult for many mathematics teachers to embrace, but it seems to be quite easy for Bianca to accept and practice.

Rebecca appears to have had little experience with *Nepantla* when she grew up. There were a few brief moments at her school where she may have felt some discomfort but generally she was never forced into a continuous space of discomfort or uncertainty. She always felt like she belonged where she was or at the very least it was easy for her to find a place where she connected with the people around her. Growing up in a middle class white neighborhood with supportive parents and a system of schooling that valued her identity, Rebecca – beyond the typical challenges of academics – didn't have to contend with the possibility of rejection or isolation. At Regence, however, she quickly became aware of what it feels like to be in this interstitial space. Within a few minutes of starting her sheltered Algebra class Rebecca realized that what she thought she knew was completely wrong. When her 'traditional' lesson flopped, all of her previous understandings of teaching and learning were shaken to their core. At this point Rebecca could have forged ahead. She could have ignored her students' reactions and their obvious disconnect towards her and the curricula. Instead, Rebecca embraced the uncomfortable, uncertain moment and looked for new ways to teach that aligned more closely with her students' context. As she got to know her students more, she began to see new realities of how to teach and how they learned. As Rebecca recalls, "with Carol's support, this class became a lab for sheltered instruction. We tried different approaches to see what worked and what didn't and the students – because we had developed a mutual trust and respect – were empathetic when I made mistakes and were patient when a lesson didn't pan out." Rebecca embraced a microstance of *Nepantla* by engaging in a

cycle of trying something; hearing, seeing, sensing a reaction from her students; and then learning from a collective reflection on what happened.

At the same time Rebecca was also wrestling with her place in mathematics education. She saw students struggling with disconnected, abstracted concepts like quadratics when they were just trying to survive a day as an English language learner or avoid falling asleep because they had been working all night. She couldn't help but ask what is the purpose of all of this?

> I struggled with the inherent tensions of teaching something that may be meaningless to students who are just trying to survive a day at high school, not to mention the more apparent disconnect of mathematics from our daily lives. This is something I have continued to struggle with over the last eleven years.

Rebecca did meaningful projects, made problems more relatable, scaffolded exercises, had a fully collaborative classroom, and created space for creative responses and novel approaches, but still there was something larger that was making her question if this was a good idea. The true purpose of a mathematics education remains a constant presence for Rebecca; it sits close by as she designs, plans, and executes her lessons. As a result of this tension, Rebecca seems to always feel the presence of *Nepantla* as a mathematics teacher.

Rebecca could have easily fallen prey to becoming a jaded educator, blissfully plowing ahead without regard for her students. But, even though she feels a perpetual state of uncertainty she works to constantly innovate in her classroom and she never looses faith that there is a better way to do things. In her more recent experiences with the challenging Algebra 1 class, Rebecca was frustrated, angry, sad, exhausted and often felt lost, but she never gave up hope. For her, in this interstitial space, she found

inspiration and possibility. I think this is an important part of *Nepantla* that is often left unspoken. Even at the peak of teaching's uncertainty – a time when things can look really bleak as a teacher – Rebecca has an unwavering disposition of hope and amelioration. She knew that if she works hard enough, gets to know her students better, and reflects on her practice she can figure out a better way to teach.

Much like Rebecca, Adam is someone who never gives up hope in times of disconnection, uncertainty, and unknowing. More importantly because of his historical experiences he sees the potentiality of being in this state of *Nepantla*. As Adam becomes more in tune with his students, he sees new opportunities through discomfort. In fact, Adam often wants the challenge of discomfort in order to improve his practice; I have heard him mention on multiple occasions that he 'wants the challenging students' or he wants to continue teaching the more challenging ninth or tenth grade courses in order to become a better teacher. However, again, different from Bianca and Rebecca, Adam grew up with/in *Nepantla* so this willingness to engage in discomfort and learn from it is not a surprise. As an immigrant's son and teacher of color in a majority white city, Adam lives in a state of belonging but not belonging. During elementary, middle and high school he had his community, friends, and family but school never felt like a place he could connect with. Furthermore, it seemed like the school was actively trying to force Adam into this third space,

> I was born in the United States and spoke both Hmong and English fluently, but because schools universally categorized ESL (English as a second language) learners as students who spoke another language at home, I was ignorantly placed into an ESL class during my initial year at elementary school. Perhaps I had bad penmanship or my English wasn't perfect but, who's English isn't perfect at that age? So I spent six months in a class that I didn't need because I looked different and spoke a second language.

These experiences continued to happen to Adam throughout his public school and professional experience. As a student, he was constantly forced into a space that was neither here nor there. He didn't belong in the ESL course but when he was placed in regular classes teachers didn't make an effort to challenge or connect with him. He lived and breathed Nepantla. Even when he finally decided to play the part of a compliant student – the school never changed to meet his needs – there was still an echo of 'why am I here?' As a result of these experiences, Adam carried a strong sense of *Nepantla* into his teaching.

This is exemplified by his work to facilitate a communal space and time for students to participate in how the classroom culture is shaped. When an incident threw Adam into a state of uncertainty he had to make a decision whether to ignore this experience or to find a way to collectively repair what was damaged. Instead of shying away from the unknown, Adam embraced this uncomfortable and uncertain moment and engaged with his students. He put his own emotions and – more importantly – his purported 'power' as a teacher on the table and created an opportunity for democratic participation. In an effort to convey his emotions, Adam wrote a letter to his students and as he notes,

> After starting the letter I realized that the intention of this letter was not to scorn or place blame, but instead it is an offering of fallibility and love. I admitted that things were not going according to plan, and also that I don't always have the right plan so I needed my students' help.

This democratization demonstrates a willingness to engage with and find solutions from a *Nepantla* microstance. Adam entered the unknown *with* his students (*conocimiento*),

progressed through *Nepantla*, and ended the cycle with a living, fallible document. As he expresses

> I won't sugar coat this experience. It was extremely difficult to navigate these conversations and not everything went as planned; some of our discussions went in unproductive directions. There was disagreement and conflict, I was very uncomfortable at certain points in the process, and students still acted out when my expectations were not clear. But in the end what emerged was a living document borne from a collective effort to make things better.

I believe part of Adam's efforts and willingness to engage in these challenging situations stem from his experience as a student who lived constantly in *Nepantla*. Unlike Bianca or Rebecca who were able to find comfort, safety, and a place to belong growing up, Adam had to learn from and accept the unknown and uncertain. He was, as Anzaldua (1990) states in "el lugar no lugar."[9] Adam has, from a very young age, lived within this interstitial space, a place between words and knowledge(s) that allows him to see different possible outcomes from uncertainty. So, uncertainty is not a place to fear but a place of opportunity. It is not to say that his experiences as a student were not part of a painful and oppressive experience, but Adam now is able to use this to better his teaching. As exemplified by his efforts to restore a more communal and participatory classroom, Adam had to take a risk, move to uncertain ground, in order to both see and create a different reality. Although there was some trepidation before using this restorative model because of his own experiences with/in *Nepantla* he never doubted that it was needed. And, as a result of this and other instructional moves Adam demonstrates a microstance of *Nepantla* in an effort to better meet the needs of his students.

[9] Neither here nor there.

**A Microstance of Being More Than a Teacher**

There seems to have been a notable shift in the news and public perception that teachers are to blame for education's shortcomings. From test scores to biased discipline, teachers are increasingly the scapegoat for what's wrong in education. Part of this discourse is a misconception and ignorance of what teachers actually do as part of their job. I can't remember how many times I've heard people say "Teachers! Overpaid and underworked!" Often these comments are in jest, but I can't help but wonder if the people who 'joke' truly understand what it takes to be a good teacher. I find myself feeling angry when I hear these comments (among the deluge of other diatribes aimed at teachers) because after ten years I can attest that good 'teaching' takes someone who is willing to go way beyond perceived job description. Granted, there are many teachers – like in all careers – who float on by and are unwilling to give more than the contract dictates, but I'd argue that these teachers are largely ineffective as educators and have little to show for their efforts. Furthermore, teachers who dedicate their time to teach in schools that serve poor and marginalized communities have to offer much more of themselves (time, energy, money, etc.) than teachers in white, wealthy schools. Let me be clear, this is not to say the students at Regence High School are less capable or more trouble, but students at Regence High School face unprecedented challenges (racism, poverty, discipline, etc.) that often makes school less meaningful and more difficult to navigate. The students at Regence High School are constantly experiencing trauma ranging from economic insecurity to police brutality, and that trauma finds its way into a classroom. As a result, teachers need to be able to listen, empathize, counsel, control, engage, direct, restore, deescalate, collaborate, invigorate, and empower thirty students,

all of whom have different life experiences and different contexts when they enter the classroom.

Because of the demands of teaching at a school like Regence, a good teacher must have a microstance of being more than a teacher. I suppose we could use the word extraordinary, outstanding, or exceptional, but I think when we condense this phrase we lose some of what I found when talking and working with these teachers. Bianca wouldn't describe herself as extraordinary in the classroom; in fact, she might feel uncomfortable if someone said this outside of a sarcastic remark. But she wouldn't argue that she works with students before school and through her lunch, often was found at school until seven at night, finds time to listen and talk with students about their lives outside of school, and is able to navigate different roles as she counsels and listens to students. Rebecca is exceptional but again like Bianca, I think this descriptor would make her blush in embarrassment. Rebecca is more than willing to help students after school, teach night school and Saturday academy, lead key club and coach tennis, help seniors finish state requirements to graduate, and morph into social worker, counselor, or demanding mother in order to help students. Adam may balk at the word outstanding but he stays at Regence almost every afternoon until six working with students, he connects with the students other teachers can't, he drives Hmong students to local cultural experiences on the weekends, he is often at athletic and cultural events, and he never shies away from becoming a cultural ambassador, advisor, or a student's biggest fan in order to build relationships with students. It is difficult to categorize what 'being more than a teacher' is, but suffice it to say that the teachers interviewed in this dissertation are often social workers, counselors, mothers/fathers, friends, family, allies, political agents,

financial advisors, health consultants, cheerleaders, accountants, and students. They don't hesitate to drop everything for a student in need or spend time with a teacher who is struggling. They are always 'on call': planning, devising, detailing, typing, emailing, connecting, and worrying. They express their exhaustion in private but turn around and effusively lead a classroom through ninety minutes of mathematics without dropping a beat. They are, in short, far more than teachers.

What makes this microstance particularly compelling is the continued framing of mathematics education as an a-cultural, a-political, and individualized endeavor. So the thought of a traditional mathematics educator taking on the role of counselor or parent is foreign and, to some, offensive. But if we reframe mathematics as a humanizing and collective model then we need examples of teachers who are able to navigate and assume these more personal and emotional roles. When teachers enact this microstance they are declaring that mathematics education isn't the only thing that is important in life. I can't help but think of a recent conversation I had with a government official focused on mathematics education. During that interaction, he proclaimed that what he thinks teachers and students need to do more of in the classroom is the common core strand that describes 'modeling with mathematics.' For me the statement was particularly troubling because it missed the point that at many high schools it is more important to create space for reality to infiltrate the classroom than to apply mathematical equations to reality. Sure, kids need to model with mathematics, but more importantly they need compassionate teachers who are willing to listen, console, and advise. They need teachers who are more than teachers.

Bianca has worked at Regence for twelve years but she didn't know what she was getting into when she first started teaching.

> Because our students continually face overwhelming inequities – well beyond what one might find in an economically advantaged and predominantly white school – I had to quickly learn how to be a mother, counselor, activist, social worker, friend, and mathematics teacher. I couldn't drive up to Regence High School and expect to just teach mathematics and call it a day. In order to be effective I had to become something beyond what we might think of when we hear 'teacher.'

Bianca has consistently and graciously dedicated her afternoons and weekends meeting students, much like she did for Amber. Somewhere deep inside she understands that a 'good teacher' extends well beyond the walls of Regence. She expresses her uncertainty with these roles but realizes they are necessary:

> I wasn't quite sure what to do at this moment. I was desperately searching for the correct piece of advice or the appropriate question to ask but couldn't conjure anything worthwhile. My roles were shifting - mom, friend, teacher, counselor, activist - but I couldn't find what role fit and how this might help Amber.

Even with her hesitation, Bianca showed up to help Amber and, in the end, just showing up is both a social and political statement as a mathematics teacher. It says to Amber, 'you are not just a mathematics student, you are a human and I care about your success in life.'

Bianca's desire to do more is heightened because she is a mathematics teacher. The constant negative attention on test scores framed by words like 'low performing' or 'failing school' adds to her desire to go above and beyond.

> From the very beginning I would often put in twelve-hour days at Regence in addition to working Saturday morning and most of Sunday. I don't say this to elicit sympathy or to assert an *I'm better than thou* attitude but merely to describe the time needed to do a good job teaching mathematics. I think this is especially true for mathematics education at a school that is often described - in the same breath as 'diverse,' 'poor,' 'black,' 'immigrant,' etc. - as being an underperforming or failing school. So my job is not only to teach mathematics (in

> addition to all the other duties I describe above), but also to fight a system that continues to tell our students they can't do mathematics.

Instead of finding the barrage of negativity as a deal killer Bianca defines it as a motivator. She focuses on preparing her students to face the academic and social challenges they will face throughout high school and into college. It's important to note that students from affluent, white schools are already preprogrammed for success in education because they represent the 'ideal model,' so education has been created in their image. At Regence, where racial, cultural, and economic difference prevails, Bianca's job is not limited to academic content. Her content includes demystifying unearned privilege, navigating the complex metacognitive skills post high school education expects students to know already, and being open about the traditional framing of mathematics education beyond high school. She becomes a college advisor, mathematics coach, metacognitive tutor, and professor.

We also see Bianca morph into sociopolitical advocate when she is arguing on Amber's behalf to stay in the advanced placement course. The dominant narratives in the room addressing Amber are deficit assumptions of 'ability,' 'woman,' and 'student of color.' Instead, Bianca only sees 'possibility,' 'success,' and 'passion' and she has the courage to express this sentiment. Her political awareness – racism, poverty, patriarchy – gives rise to her dedication beyond the normal constraints of teaching.

Rebecca has a similar take on putting in the extra effort in order to make sure students succeed. Her work with Tyrone and Francisco is evidence that she is willing to assume different roles in order to help them succeed. Her role shifted depending on what each student needed. When Tyrone disengaged in class, Rebecca became his private

tutor after school, acting in much the same way that her father did when she was in high school. When Francisco failed to show up to class she became a concerned family member, talking with counselors, parents, night school staff, and other teachers to figure out better ways to support him. Extrapolating her efforts we can start to imagine what this might be like if you have two, three, four, or more students who need extra support in every class. For Rebecca this wasn't a one time conversation with a counselor or family member, it was a continuous transaction that kept everyone informed. Not only do these efforts take valuable time but they also weigh on one's emotions. Rebecca was spending a lot of time helping Tyrone and Francisco but one can't forget that she was also dedicating a lot of her personal energy towards their well-being. The care, compassion, and love she shows for her students is another part of being a teacher that is often not stressed as an essential part of mathematics education. No one told her this is what she needed to do (and many do not) but in part because of this microstance, Tyrone and Francisco passed her class and graduated high school.

Much of her time with Tyrone and Francisco was spent outside of class, but it's also important to provide insight as to what Rebecca does to ensure she is a good mathematics teacher in the classroom. Let's be clear that just because a teacher tries something out in the classroom does not mean that most of the work was done minutes before the class started. Many successful teachers plan on the weekends and during the evenings because there isn't enough time to plan during the day. Even with a 'prep' period Rebecca often spent her time helping other students, responding to emails, organizing her classroom, grading (providing feedback), calling parents, talking with instructional coaches or administration, providing feedback, and checking in with special

education teachers so there is little time to actually plan lessons. In one example Rebecca expresses her efforts to engage her challenging Algebra 1 class,

> My practice was constantly in flux as I tried to find out how to teach this class. I established routines so students knew what to expect each day; I limited my 'talk time' to 10 minutes per class; I planned lessons that relied on group collaboration and conversation; I grouped students based on assessment results and personality; we reviewed notes, highlighted key points, added summaries, and created glossaries; I regularly talked with families, worked with counselors, and had conversations with the instructional coach; I tried project-based learning, problem-based learning, and discovery learning; we played games and presented on our process; I provided timely feedback, offered my time during lunch and after school, and allowed students the opportunity to reassess as many times as they needed; and I began to read more academic literature on mathematics education. I look back on this list and am not surprised I was exhausted and ready to move on.

All of these teacher moves were carefully planned and considered. She talked with the special education teacher every week to figure out better ways to address her students' diverse learning needs, worked with the instructional coach often to figure out different ways to approach mathematics so it might be more inclusive, and critically reflected on her own practice to improve her teaching. The mere act of teaching was challenging and time consuming, but layering on the extra roles teachers needed to ensure student success quickly can make an instructional situation overwhelming. Despite this reality, Rebecca does what needs to be done to meet the needs of her students.

Much like Bianca and Rebecca, Adam is often found in his classroom working with students well after the rest of the staff has gone home. I remember sitting with him as he worked patiently with a student from Ethopia who was struggling to explain her reasons for answering a question the way she did. On top of the normal challenges of high school this student had an undetermined period of interrupted schooling, still struggled with the English language, and showed signs of needing special education

services but her parent refused to consider extra support. She was in Adam's geometry class as a senior without much outside support, and she needed the credit in order to graduate. I don't want to romanticize the moment, but his efforts were heroic after a long day of teaching. He patiently listened to her explanation, thoughtfully considered how she might have misinterpreted the math problem, and then reviewed the concept with her again and again until it started to make sense. It was a painful process and I found myself getting frustrated even just watching, but Adam never hesitated when she needed help. He supported her all year long and often this was while he helped several other students. As he notes, "I'm at school most days until 5:30 so after an assessment – when I provide timely, targeted, and detailed feedback – students are encouraged to come and visit me in the afternoon." Adam is the teacher who always has the most students coming in to seek extra help and support. Not only does this happen after school but on teacher planning days, when I will often see Adam filing papers with five to ten students working diligently to fix a test or work on a concept. Is it because Adam demands that much more of students? Possibly, but I think more importantly the students know that Adam will spend the time needed to help them succeed. He is willing to sacrifice time at home and planning days to help students with mathematics.

Adam is also someone who has taken a political and activist stance to support the cultural, linguistic, and racial diversity of Regence. In department meetings he offers a novel, thoughtful, and often-critical perspective on something we take for granted. Once when we were all sharing as a department something that really ticked us off as a team icebreaker, he quietly mentioned how angry he was about Ferguson. This gave pause to everyone in the department. We were all going around naming silly student behaviors,

traffic, the weather, and various other topics that had to do with us. Adam immediately saw the racist crisis in Ferguson as something worthy of our anger. He told me later that he was surprised no one else had mentioned what was going on in Ferguson – especially because there had recently been a police brutality incident involving one of our students – but as it often happens he was the lone critical voice in the room. Adam is also a keystone of Regences' cultural and linguistic difference. His classroom is always an open and safe space for students to pray, talk, or relax. Because he felt the pain of disconnection he pays special attention to include the Hmong population at Regence, extending himself to include them in conversations and encouraging them to engage with all the school has to offer. Adam helps organize local Hmong celebrations and not only does he drive his students to these events, he also has the students help organize and run the celebrations. Again, it becomes apparent that Adam is more than a teacher; he proudly embodies the activist, political agent, cultural ambassador, counselor, and mentor role in order to help his students succeed.

**Sociopolitical Microstances in Mathematics Education**

The narratives in this dissertation present a unique and complex picture of teaching mathematics with an equity focus. Although *inquiry of stance* is a broad term that might describe a teachers' overarching perspective on knowledge in teaching, the narratives reveal more specific microstances that capture what the teachers are actually thinking and doing in classrooms with traditionally marginalized students. The microstances identified in the narratives include: anti-racist, deconstructing ability, community, *conocimiento, Napantla,* and being more than a teacher. These microstances suggest that we need to broaden our current understandings of the knowledge(s) it takes

to be a political mathematics educator – looking at how other microstances might affect teaching in a particular context.

# CHAPTER VIII

# CONCLUSIONS

**Overview**

This research first outlines how philosophical pragmatism can augment the current sociopolitical turn in mathematics education by linking critical problematization with purposive action. This proposition is valuable because it provides a theoretical grounding for the sociopolitical turn to offer practical, albeit tentative, solutions to mathematics education's persistent problems. This dissertation then transitions from philosophical pragmatism to narrative inquiry in search of a better understanding of teacher knowledge in mathematics education, presenting the narratives of three mathematics teachers within an urban, economically-disadvantaged school. The intention of these narratives is to capture a more nuanced understanding of sociopolitical teacher knowledge in a traditional high school context. These stories – which journey beyond classroom walls – help to paint a more comprehensive picture of teachers' personal practical knowledge, how this knowledge connects to pedagogy, and how their stance evolves over time as they encounter new discordant experiences. Finally, this dissertation expands our understanding of political teaching in mathematics education through the identification of sociopolitical microstances.

Engaging with the narratives, we can see that each teacher possesses a unique history involving race, poverty, mathematics education, public schools, culture, and

community. However, despite these differences, teachers exhibited similar political microstances: (1) an active anti-racist stance, (2) the deconstruction of 'ability', (3) a focus on community, (4) the ability to be with students (*conocimiento*), (5) the ability to live in and learn from uncertainty (*Nepantla*), and (6) the commitment to assume many roles and become 'more than a teacher.'

It seems important to note that each teacher exhibited the identified microstances in different ways. Some were more vocal about their understanding and more outgoing with their actions; others worked in more subtle ways to shift mathematical practices. The narrative format provides an avenue to live these experiences with the teacher so we might see more than what is blatantly apparent. Identifying these microstances was part of an effort to refocus the sociopolitical conversation on the lived experience of teachers, and the existence of microstances suggests new ways of understanding teacher knowledge.

In the literature review, several different visuals of knowledge were proposed and explored, including one perspective by Gutierrez (2013) (Figure 4) and another from Cochran-Smith and Lytle (1999) (Figure 3). Leveraging these two views together into a single understanding, one can benefit from Cochran's inquiry of stance – which is a broad term encompassing many facets of teacher knowledge as well as an approach to knowledge as an inquiry process – alongside the more specific terms that Guiterrez offers. Combined the visual helps clarify what aspects the authors consider important for teacher knowledge (Figure 5).

Given the additional data discussed in the narratives and the cross case analysis, I believe that we can (and should) go further to include microstances in a more complete

visualization of teacher knowledge. Based on my research, I propose the following visual diagram, described more fully in Figure 6:

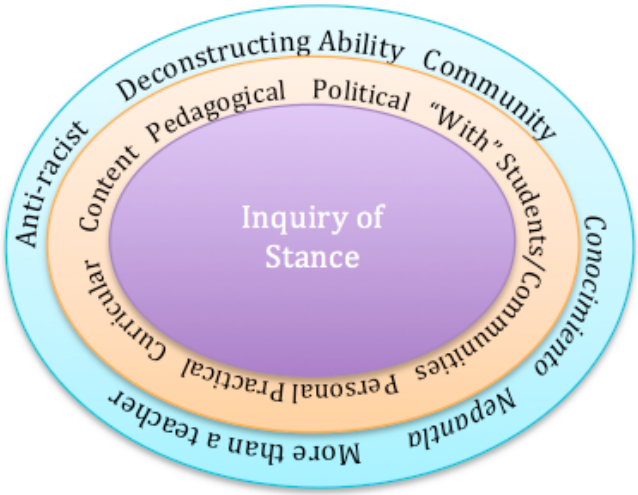


***Figure 6. A More Complex Visualization of Teacher Knowledge***

In this model, *inquiry of stance* is located at the center with each subsequent ring representing more specificity in describing teacher knowledge. Again, a circle is used to flatten any tendency to 'rank' knowledge(s), so no knowledge is more important than the other. The representation, instead, shows us the specificity of each level. *Inquiry of stance* is the most inclusive term, 'political' and the other terms occupy the next level of specificity, and the microstances detailed in the outer ring are an attempt to further detail what specific knowledge(s) are needed to promote equity within mathematics education. The circular visual is also used to indicate that each level – and knowledge within the levels – are intricately tied to the other. A teacher who has a microstance of community still needs to consider pedagogical content knowledge, and pedagogical content knowledge cannot be fully developed until a teacher has established a strong community in the classroom. The six microstances identified in the outer ring are by no means an

exhaustive list of microstances nor are they intended to be the final ring of specificity. Instead, this visualization acts as a foundation for future considerations when researching teacher knowledge in mathematics education.

**Inhibitions**

The question remains, what is preventing teachers from enacting more transformative instruction or curricula in their classrooms? What follows is a closer look at what structures – both internal and external – might be preventing teachers from enacting greater change. I call these barriers 'inhibitions' because although many of the forces that prevent transformation are external, 'inhibition' captures how external barriers can manifest in deeply personal ways.

To invigorate the urgent and necessary work that is being done in the classroom, we must address the structures that inhibit more overt transformation. Narrative accounts of teaching mathematics are particularly useful in this endeavor because they can bring to light barriers to progress that may have been overlooked by more traditional macrosocial or quantitative methods of education research inquiry. Only by focusing on inhibitions that teachers face when shifting their practice towards more critical and justice-oriented practices can we as a community of educators address those challenges to catalyze a transformation towards more equitable teaching.

All of the teachers in this dissertation explicitly state they would be willing to make more dramatic changes in curricula and practice if they weren't constrained by standardization, strict and narrow college requirements, and their own personal limitations. One of the participants cited structural limitations – in the form of too many standards to cover – that prevent him from connecting content to a more liberating and

meaningful curricula. Others mentioned overt structural barriers that include state testing requirements, college course requirements, a lack of professional development, and meager graduate school experiences. Earlier studies have certainly documented barriers that overtly or covertly prevent teachers from shifting their practice (Leonard, Brooks, Barnes-Johnson & Berry, 2010). However, these studies frequently adopt a macro view, evaluating only how structures affect teaching mathematics globally, without fully exploring the underpinned reality of how these limitations play out in a teacher's lived experience.

All three teachers in this dissertation also expressed regret and sadness that they couldn't do more to embody the 'sociopolitical teacher.' When I discussed some of the visions and politicized statements from sociopolitical literature, all of the teachers were inspired by the ideal but frustrated by the reality. Adam desperately wants to do more social justice lessons but struggles to find the time and support in the current test prep educational structure. Rebecca loves the idea of project-based learning but couldn't find the time it requires in a condensed and highly regulated schedule. Bianca tried a critical mathematics project from Rethinking Mathematics (2013) but afterwards felt guilty that she wasn't preparing students for the rigidity and structure of college level mathematics. These are just a few of the many obstacles teachers expressed during our conversations and time together. I believe that if we identify and problematize these inhibitions – no matter their place in the education research – we can better dismantle their hold on mathematics education and create space for new ways of teaching and learning mathematics. Following are some of the most obvious inhibitions that emerged from the teachers' narratives.

### *Time and Emotional Energy*

There are limitations to what a teacher can do, especially in a demanding school like Regence. I documented how each teacher is willing to dedicate enormous amounts of personal time and emotional energy towards ensuring student success. Often these experiences prevent teachers from spending more time with family, friends, or recuperation. This signifies that there is a heavy toll that comes with teaching that often leads to burnout. Bianca has dropped down from full time to three quarter time, and this year she will only teach half time. She candidly says that she will only teach if she can do a good job and, for her, teaching full time means a lot less time that she gets to spend with her family. Rebecca, sadly, has moved on from Regence, accepting a different position at a private school. After thirteen years, she couldn't keep up with the emotional and physical exhaustion her position entailed and needed a change of pace. Even with a prioritized schedule, she was concerned she couldn't keep up with what being a good teacher at Regence demanded. Adam is still at Regence full time, but I have had several conversations with him in which he expressed how hard it was to teach mathematics at Regence. With all of the different roles that he plays and the amount of effort that he puts into his classes, he looks more and more exhausted as the year progresses. He struggles to keep up with the needs of his students and the community. The time and emotional obstruction is not unique to mathematics education – as teachers of other subjects would undoubtedly mention these constrains – but there is likely an added gravitas because of the pressures to perform on standardized tests. This suggests that we need to consider the emotional and temporal constraints of teachers as they try to change what it means to teach mathematics.

***Local/State/National Requirements***

To teach mathematics often means navigating a plethora of local, state, and national standards, curricula, and constraints. At every level there seems to be a long list of requirements that narrow the possibility of teaching mathematics. The introduction of common core was intended to introduce teacher accountability in the name of equity, but I have only seen these standards inhibit what teachers are able to do in the classroom. Instead of exploring more meaningful, integrated, or critical mathematics, teachers are forced to teach highly traditional and often disconnected concepts. Bianca notes:

> Perhaps Deonte needs something different than traditional content to find connection and meaning, but I feel enormous pressure to prepare students for a system that continues to hold 'traditional' as the only way. At least, this is the discourse that our district and local universities continue to push.

She sees what the singular focus is doing to her students but doesn't have the support to shift her instruction.

Rebecca has struggled with state and national requirements from day one. As she states:

> Sometimes I sway one way on the spectrum: *we should transform mathematics education into something more meaningful and engaging. Maybe integrate it into other subjects or focus entirely on projects that use mathematics as support rather than mathematics supported by projects.* Then, my thoughts then swing back to: *well there is a dominant system of how mathematics is supposed to be done and if our students of color and students from poverty are not prepared for the expectations of standardized testing and college level mathematics then we are not doing a good job.*

Both Bianca and Rebecca struggled with what was expected versus what their students needed. Rebecca often talks about how a weeklong project we did in Algebra I engaged

students who don't normally connect with mathematics, but it put us behind the district's mathematics calendar and we had to eventually find a way to catch up. This meant speeding through content in a more traditional manner to meet the district's requirements. Adam has also vented his frustration with the bureaucratic constraints, saying:

> It is a world of strict standards and unrelatable content. We are asked to cover twenty standards in a semester when, ideally, we would focus on four or five and apply them to real world contexts. These standards lead to state assessments, which are tied to graduation and traditional ways of teaching mathematics. It's really hard to break this cycle. Should I cover all of the standards or not cover them and risk my students not doing well because we didn't practice important concepts?

Adam and I often talked about using lessons from *Rethinking Mathematics* or *Radical Math,* conversations that ultimately led to frustration. On the one hand, Adam desperately wants to use critical mathematics lessons and have students use mathematics to better understand and critique the world, but he also wants his students to be successful on state assessments and college courses. He feels he is doing a disservice to his students if he doesn't cover content because he spent time doing a project. For these teachers – and, I'm sure many others – the requirements from the local, state, and national governments seem to inhibit teachers efforts to transform their classroom in ways that are most meaningful to students and life.

### *Traditions: Structures and Rigidity of College Requirements*

In addition to local, state, and national requirements, the teachers in this study often referred to the demands and structures of college-level mathematics as an inhibition to greater shifts in their practice. Regence recently piloted a dual credit college program in which students can earn college level mathematics credit for their high school coursework. So, now the precalculus class at Regence is aligned with the local

community college. This has been a bittersweet addition to our mathematics program. It is amazing that our students can now earn college credit, but it has shifted the conversations of the teachers in the department. Instead of finding ways to better meet the needs of our students, the mathematics teachers are instead talking about the best ways to prepare our students for college courses. These conversations are not bad – in fact they are valuable to have – but they tend to promote the teaching of a very narrow set of skills for a very traditional mathematics experience. Students take notes, practice problems, and take comprehensive tests, and the college mathematics department dictates these routines. As Bianca notes:

> As a mathematics teacher I find myself at a crossroads…I want to prepare my students for 'what comes next' but what should I do if 'what comes next' is unfair? Do we train our students to function in this narrow system of 'success'? Or do we teach in ways that engage students, build strong relationships, focuse on collaboration and communication, and look for ways we can individualize learning so every student is an asset rather than a problem?

Bianca, Rebecca, and Adam all must weigh their options to either prepare kids for the strict and traditional college requirements or significantly change what and how they teach. Sometimes preparation for college courses and sociopolitical mathematics are not mutually exclusive. However, although there are small spaces in which teachers may be able to push against traditional frameworks, by and large college courses demand traditional ways of teaching and learning, regardless of whether those skills truly benefit the student or facilitate their engagement.

### *Disconnect from Academia*

A fourth barrier identified by the teachers is a disconnect between the academe and the classroom: in research themes, in the vehicles needed to transmit knowledge, and in the provision of tangible, applicable content.

Teachers remain concerned that academics may not wholly understand, appreciate, or integrate the day-to-day realities of teaching in research, a concern that makes them question whether academic knowledge is relevant to their work. As Rebecca states:

> My experiences with academia were – and still are – largely frustrating…I'm not saying [that] academia doesn't have a place in education or that it hasn't helped mathematics teaching, I just haven't found much that has transformed my practice….I can't help but remain skeptical of publications that rely almost entirely on people who are seemingly disconnected from the places they write about. There is a stark difference between being deeply embedded and committed and observing, and writing about being deeply embedded and committed. Not all academics are like this but…who are [the ones who make an effort to include teachers' input] and what journal do they publish in? My main source of academic literature has come from consultants who blow into Regence High School with a trumped up savior complex only to leave a year later disappointed and bitter. Their literature supports whatever method they think will work and, often, is very similar to something I read several years back.

Even when teachers agree that academic content is relevant to their work – and this was certainly the case with the teachers interviewed for this dissertation when the topic of sociopolitical research emerged – important content frequently doesn't have a path to arrive to educators that could use it. Bianca and Rebecca have attended almost every professional development opportunity the district has offered over the past ten years, but few, if any have included a discussion of sociopolitical scholarship. So too, academic journals remain inaccessible to everyday teachers. As Rebecca states:

> The reality…is that I don't have time to sift through all of the different journal publications and read through the different articles among these journal publications to decide what is actually worth a subscription. And, if I did have the time I surely don't have the money to pay for a subscription to one of the major publications.

The lack of an appropriate vehicle of communication between the academe and practicing teachers prevents the two groups from collaborating more closely to resolve present-day issues in education.

Finally, there appears to be a lack of classroom-applicable academic content that teachers can immediately employ to transform their classrooms. Adam, who frequently looks beyond standard professional development experiences to connect with current academic content, expresses his frustration with the lack of available resources:

> My graduate program professed social justice, activism, and equity but how are we supposed to follow through when we don't have the professional support or freedom to enact these prophetic visions of transformative education? I mean quadratic equations, transformations, and solving for variables can be fun, and I am the first to say I enjoy doing pure mathematics but how can we connect this to the bigger picture? How can we inject some reality or meaning into these concepts? I'll be honest that I'm not really sure. I want to shift but I don't know how.

Adam has read some of the Rethinking Mathematics book, which is an excellent resource for ideas but is still limited in what it can offer. There are only so many lessons one book can provide, and a lot of high school mathematics content is not covered. There are other fringe elements trying to push the boundaries (blogs, tumblr, websites, etc.) but these are patchwork, require time to locate, and are not always reliable. Rebecca expressed a similar frustration in trying to develop more transformative curricula:

> Sure, I did a weeklong project in my Algebra 1 class when the mathematics instructional coach at our school designed and modeled the project, but this is not sustainable. I already dedicate my lunches and three days a week after school to help students, not to mention Sundays to plan and grade. What more can I give?

Teachers struggle to shift their practice because they need exposure to 'takeaways' of what a different version of mathematics might look like. Whether the topic is social justice, critical, or project-based mathematics, teachers need tangible, accessible ideas to use in their class beyond a single publication focused on social justice mathematics. In addition to useable content, teachers need access to professional development that can support them as they teach these powerful lessons and, eventually, create their own curricula.

***Confronting Whiteness With-In/Others***

Lastly, although not all of the teachers in this dissertation named whiteness as an inhibition, they all alluded that privilege and racism are barriers that mathematics teachers must overcome. These barriers are both internal and external. After years of teaching at Regence, Bianca and Rebecca have expressed their frustrations with staff conversations that are frequently dominated by angry white males, many of whom slip into deficit language about students and their families. Instead of working together as a school to make things better, they feel like we continuously spiral into 'the student is the problem' conversations. Both suggest that recognizing (white) privilege is key to the transformation of educational practice, and that the absence of this recognition forms a barrier to more political and equitable teaching.

As Bianca passionately recounts, "For six months I had lowered my expectations of Deshawn because I made dangerous assumptions of who he was based on a cursory and simplistic understanding. Instead of seeing an engaged, brilliant, complex human being I saw the path of least resistance." Today, Bianca is a thoughtful and vocal

advocate for anti-racist policies and more equitable practices, a contrast from a time in which she did not have the knowledge, vocabulary, or experience to see what was happening in her own classroom and trouble her own assumptions. Rebecca outlined a similar experience of confronting her whiteness during her first year teaching:

> I was forced into a dissonant situation, not propagated by the students but instead by my own dangerous assumptions and after I problematized these misunderstandings my teaching changed to meet the students' needs. I remember feeling like I could pin this on the students, which I would later recognize is a deficit model, or I could change what I do and see if that helps.

It took years of experience at Regence High School and several professional development courses before Rebecca and Bianca were able to confront their own privilege and shift their practice based on these critical self-reflections. Until they did, their abilities as teachers and the possibilities of transformation within their classrooms were hindered because they didn't have the necessary tools to recognize their internal biases.

As a teacher of color, Adam has to confront whiteness every day. As he states:

> Not only do my students fight against a narrative that is framed by deficits and white privilege but I find myself also trying to navigate the complexity of being a teacher of color in a school where ninety percent of the staff is white. During unending staff and department meetings I am constantly forced into conversations about things that make white staff feel good about their job – social justice, courageous conversations, restorative justice, diversity – but rarely do I feel comfortable engaging in these conversations.

Adam is inhibited by a pervasive and overwhelming privilege of those around him. His voice is muted. His contributions are silenced. White staff members demand to learn from his experiences as 'the other' so his opportunities for growth are limited. He would like to move forward in transforming education at Regence but feels that conversations quickly drift back to safe, comfortable ways to talk about difference (multiculturalism,

diversity, etc.) rather than naming the issue and finding ways to make things better. In these experiences, growth and transformation are inhibited by white privilege that fails to recognize Adam's context and contribute to the conversation.

### *A Summary of Inhibitions*

This dissertation identified five inhibitions to enacting more transformative curricula and pedagogy in mathematics education. Again, the five inhibitions identified were:

- Time and emotional energy
- Local/State/National Requirements
- College course requirements
- Disconnect from academic scholarship
- Having to confront whiteness within and with others

The narratives provide a unique look at not only what the inhibitions are, but also how they play out in a mathematics classroom. To see, hear, and feel the toll that inhibitions take on teachers within their stories provides a different and more powerful insight. It helps us better understand what the primary inhibitions are, how it affects teachers, and what could happen if the barriers were removed. In truth, there are far more than five barriers that prevent teachers from including more equitable practices and liberatory curricula. However, it is my hope that the inhibitions identified above help begin the conversation regarding ways that we can work together as an educational community to obviate or dismantle these inhibitions. What follows are the implications of this research and what should change in order to facilitate more transformative mathematics education.

## Implications

### *Teacher Education*

Not surprisingly much of what was discussed as important educational experiences in the narratives were not focused on teacher education programs. In fact, only one teacher (Adam) purported to have a teacher education program that helped him critique inequitable systems and name institutional oppression. However, Adam also struggled to translate these political understandings into instruction. Even with the language of sociocultural critique, he expressed frustration with his program because there was a lack of practical experiences creating and implementing social justice lessons. So why didn't a social justice focused teacher education program help him focus on ways of injecting social justice into the classroom? Beyond this overt example the other teachers expressed equal frustrations with their own preparation in relation to the complexity of teaching at Regence High School. Adam, at the very least, was exposed to the powerful ideas of social justice and equity. Bianca and Rebecca received little if any exposure to these ideas and how they connect to education in general.

I think this political disconnect and lack of preparation is especially poignant for teachers who have had little experience with racial, cultural, linguistic, and economic difference. How can a teacher take an equity stance if they do not have experience with difference and the subsequent oppression of difference? The microstances that were named in this dissertation are some of many sociopolitical ideas that should be included in teacher education programs. How do we build strong and inclusive communities in a mathematics classroom? How do we focus our efforts on knowing our students, their context, and the communities they live in? What ways can we better understand our

students' racialized experiences and how this plays out in the classroom? There have been efforts to inject a more critical edge to teacher education programs, and in some cases these efforts are both inspirational and effective. However, this shift has been minimal within mathematics teacher preparation, which still largely looks at good teaching as content and pedagogical. We need to expand the definition of what it means to be a mathematics educator and acknowledge that perhaps content isn't the most important factor in our classrooms.

***Teacher Continuing Education***

It's also apparent that teachers need more ongoing politicized professional development if there is going to be substantial transformation in mathematics education. I use the word political because there is little if any professional development in mathematics education that focuses on how power and identity play out in the classroom. Content and pedagogy - often framed through content - are important but continuing education experiences need to also help mathematics teachers understand how possibility emerges from uncertainty (*Napantla*), shift from knowledge 'of' to knowledge 'with' students and communities (*conocimiento*), develop and implement social justice and critical mathematics lessons, and contextualize mathematics to better meet the needs of students and their communities. Sure, social justice lessons are great but they won't be effective if a mathematics teacher cannot build a safe and supportive classroom or navigate difficult conversations about race, class, ableness, sexuality and gender. So, in addition to offering practices that support 'academic success,' I feel it is equally as important – if not more so – to include a sociopolitical framework in teachers' continued educational experiences. Teachers don't want a dilute form of 'best practices' separate

from their professional context but instead something substantial and sustainable that transforms their approach and shifts their conception of teaching mathematics.

***Academic Connections***

There needs to be a sustained effort to break down the academic/classroom divide that persists despite efforts to the contrary. This includes support from academic institutions and meaningful partnerships that aim to create spaces where educators (at all levels) can intermix, co-develop, co-envision, and reflect on what works and *what could be* in the classroom. Many scholars including Cochran-Smith and Lytle (1999) explicitly call out this problematic framing and try to reframe the terms we use to describe teaching (novice, expert, researcher), but the reality is that there is a vast chasm between educational scholars and K-12 teachers. During this dissertation there were many conversations regarding the sociopolitical turn in mathematics education research, which has been producing scholarship for almost twenty years in mathematics education journals, and all three teachers had no idea this body of literature existed. Some of these reasons can be attributed to teachers' access to academic literature without college and university sponsorship (academic journals are expensive), the overwhelming amount of articles available, and what methodological focus or theoretical frameworks are prioritized for teacher consumption. Mostly, those supported for wide distribution fall into the 'immediate fixes' (best practices) and quantitative data research funded by government organizations. This focus ignores the more political and equitable research that is being done. Finally, even despite some successful partnerships, researchers remain largely outside the K-12 sphere. There needs to be more researchers imbedded in K-12 schools; doing research with teachers and students as well as creating supportive

spaces for teachers to do their own research. For deeper connections to happen, programs need to (re)prioritize their goals as educational institutions, offer flexible and sustained support for working teachers, and find ways to create space for collaborative research and empowerment.

***Academic Research***

Part of the intent of this dissertation was to provide a different way of conceptualizing academic research in mathematics education, namely, a nudge towards more arts-based and non-traditional research methodologies. Much of the research in mathematics education continues to focus on quantitative research, which is not necessarily bad or good, but shouldn't be the only way we make decisions in mathematics education. Additionally, mathematics education research needs more methods that are on the methodological fringes in order to push the field to think differently about what knowledge counts in mathematics education research and, ultimately, how mathematics is taught. This is especially pertinent for the sociopolitical turn in mathematics education research where efforts to (re)conceptualize truth, knowledge, and power are at its theoretical core. As Leavy (2009) notes "On a theoretical level, the emergence of these new methods necessitates not only a reevaluation of 'truth' and 'knowledge' but also of 'beauty'" (p. 17). To truly envision a transformation in mathematics education that is inclusive of difference, focused on justice and equity, acknowledges the nuanced and political practices of teachers, and explores the creativity and possibility in mathematics education we must first re envision what it means to research mathematics education.

# APPENDIX

# SAMPLE QUESTIONS

| *Question* | *Purpose* |
|---|---|
| **Intro: Establishing a Baseline/Primer Questions** | |
| How long have you been teaching? How long have you been teaching math? | Determine experience level |
| How would you describe your teaching methods when it comes to mathematics? | Elicit an unprompted description of how the teacher summarizes their own teaching instruction methods |
| How frequently do you utilize:<br>(a) lecture-style instruction,<br>(b) solving problems together as a class on the board,<br>(c) worksheets,<br>(d) working individually on book problems in the classroom,<br>(e) project-based learning - if so what kind,<br>(f) student-led learning-if so, what kind,<br>(g) computer games,<br>(h) working in groups,<br>(i) other- if so, what kind | Crystallize the methods that the teacher currently uses in teaching mathematics |
| How did you come by this mix of instruction methods? | Uncover previous influences on instructional methods and any predisposition towards those methods |
| Do you find that certain kinds of kids respond to certain types of instruction particularly well or particularly poorly? Can you give me an example? | Determine if teachers evaluate instructional effectiveness by method, create data set to support conclusions; assess how teachers draw the boundaries around 'groups' of kids |
| How frequently do you ask students for feedback regarding past/future classes? Do you think this is - or could be - a useful tool? If not, why? | Gauge level of student direction over class |
| What does the term "classroom culture" mean to you? | Establish teachers' definition of this term to facilitate analysis |
| What creates classroom culture in your classes? | Determine whether, in the teacher's perspective, the classroom culture is 'top down' (teacher-setting) or co-constructed with students |
| In your opinion, what is the purpose of teaching math? What should it be? | Start the sociopolitical conversation and getting an unbiased opinion before introducing the topic |
| Do you believe that mathematics is a "gatekeeper" ? If so, in what way. If not, why not? | Preliminary gauge of whether teacher is aware of one type of power structure inherent in mathematics education |
| How important is equity in math education to you? | Will facilitate analysis re: quote that is introduced later in the interview |

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| **Potential Explanation 1: Teachers may be resistant to change at a more general level** | |
| Do you think that it is useful to integrate new content and practices into your classroom? If so, why? If not, why? | Gauge willingness to integrate new content |
| In a perfect world, how frequently would you integrate new content and practices into your classroom? | Gauge willingness to integrate new content |
| Is that cadence different from your current practice? If so, why? | Determine current/future roadblocks to new ideas/curriculum/etc |
| For you personally, how much effort does it take to integrate new instructional practices or curriculum content into the classroom?<br>(a) On a level of 1-10, with one meaning little work and 10 meaning a lot of work, how much planning time does it take?<br>(b) On a level from 1-10, with one being very uncomfortable and 10 being very comfortable, do you feel comfortable teaching new content or trying out new methods? | Determine teachers' perception of the level of effort needed to integrate new content/ideas/practices/curriculum |
| Do most teachers that you know consistently work to improve their teaching practices? If so, why do you think they do? If not, why? | Gauge teacher perception of peers |
| If you were to receive regular emails with age-appropriate lesson plans based on new developments in education research, would you be inclined to use them? If not, why? | Test potential delivery methods of this study's conclusions |
| **Potential Explanation 2: Teachers may have had a bad experience with a prior effort to instate innovative practices** | |
| Talk to me about a time that you tried a really innovative lesson? What was it? How did it go? Did you learn anything from the experience? | Determine whether teachers have implemented "innovative" lessons. Determine what teachers think is "innovative." Understand kids' and teachers' reactions to a single experience. |
| How do you typically react when a lesson doesn't go the way that you hoped? | Determine if a bad experience has made/would make teachers reticent to try new content/ideas/practices/curriculum |
| Does fear of "failing" at a new or different lesson ever hold you back from teaching in a different way or teaching new content? Do you think it does for other teachers? | Determine if a bad experience has made/would make teachers reticent to try new content/ideas/practices/curriculum |
| **Potential Explanation 3: Teachers may not have the flexibility to go outside mandated curriculum** | |
| How much flexibility do you have to establish your own classroom curriculum? | Determine level of teacher autonomy. |
| Can you explain the process through which your math curriculum is currently created? | Understand the methodology being used to establish lessons, curriculum, etc. |
| What are the primary goals of your current math curriculum and lesson plans? | Understand teachers' priorities in establishing curriculum, lessons, etc. |

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| How much of an impact do standardized tests have on your lesson plans, with one being little impact and 5 being a great impact? | Determine to what degree teachers feel that 'teaching to the test' overrides their ability to introduce new idea/curriculum/etc |
| **Potential Explanation 4: Teachers may face student resistance to new ways of teaching** | |
| How open do you think students are to new ways of teaching? | Gauge student willingness towards change (and teachers' perception of that willingness) |
| Generally speaking, do students proactively tell you when they like or dislike certain teaching methods or classroom content? | Gauge level of student resistance |
| How much impact does student feedback have on your teaching presentation or content? | Gauge impact of student resistance |
| **Potential Explanation 5: Teachers may face parent resistance to new ways of teaching** | |
| How much feedback do you receive parents regarding your teaching/classes? Is this formalized - like through a website or at student-teacher conferences? Is it informal (random phone calls, etc). | Gauge what type of feedback mechanisms exist and parent utilization of those mechanisms. |
| Do you feel pressure from parents to teach a certain way or to teach certain content? | Determine bearing of parental presence on creation of ideas/content/practices/curriculum |
| How concerned are you that parents might disagree with your lesson plans or teaching style? | Determine importance of parental resistance to teacher |
| **Potential Explanation 6: Teachers may lack support and encouragement from their peers** | |
| On a scale of 1-10, with 1 meaning little support and 10 meaning lots of support, how supported do you feel by your teaching peers? | Determine if teachers feel supported by peers (personal assessment) |
| Do you feel that your peers are willing to go 'above and beyond' to help you succeed? | Determine if teachers are encouraged by peers to set stretch goals |
| Do you currently participate in any teacher learning communities? If so, which ones? How frequently do they meet? | Gauge level of involvement in these communities across pool of teachers being interviewed |
| If not, would you ever participate in a teacher learning community? | Gauge potential of these communities as a potential support |
| What would make a teacher learning community worthwhile to you? | Gauge need to target topics or dissemination of info, should this research suggest that new communities are needed |
| **Potential Explanation 7: Teachers may lack opportunities for professional development** | |
| How frequently do you participate in professional development activities? | Determine what teachers construe "professional development" to mean and level of involvement |
| Do you feel that there are adequate resources available for teachers when it comes to professional development? If so, what are they? | Establish what resources are available to teachers (in their opinion) |
| Where do you turn for teaching inspiration as far as lesson plans, innovative teaching practices, etc? | Determine what sources of inspiration teachers most frequently use (related to potential conclusions of this study) |

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| Do you think it should be the responsibility of teachers to stay informed of new education research? Should the administration help connect teachers to new education research? | Understand what level of assistance teachers desire from administration. |
| What, if anything, would you like to see the district do to improve professional development? | Elicit concrete examples of what teachers need and want when it comes to professional development |
| **Potential Explanation 8: Teachers may lack exposure to the academe, generally speaking** | |
| How connected do you feel to education research that's being conducted in universities, with 1 being not connected at all and 10 being very connected | Determine the depth of connections between the academe and practicing teachers from the teacher's perspective |
| Do you think the conclusions of those studies could be useful to you as a teacher? | Better understand the "filter" through which teachers would understand university education research |
| Are there any topics, specifically, that you would like to hear more about? What is most interesting to you? What would be most useful to you? | Reveal topics/subjects that are most interesting to teachers |
| How would you like to hear about university research in math education - Email? Work groups? Education Research Journals? Guest speakers? Wiki? Other? | Determine dissemination preference |
| Which one of these methods are you most likely to interact with? | Determine likelihood of use with recommended dissemination method |
| **Potential Explanation 9: Teachers may disagree with sociopolitical conclusions** | |
| In the books that I've read for my program, there's a term that comes up alot: equity. When you look it up in a dictionary, equity literally means "the quality of being fair or impartial" and it is contrasted with the terms "bias, discrimination, and prejudice."<br>(a) Do you think that we currently teach math as a community is equitable or inequitable? How so?<br>(b) On a scale of 1-10, with 1 being not very important and 10 being very important, how important is it for mathematics teaching to be equitable? | Gauge teacher understanding of equity; gauge relative importance of this term |
| I'd like to read you a quote by some of those same scholars that I've ready, and have you tell me your knee jerk reaction. This is what one of them says: "If mathematics techers [are serious about]... the goal of equity, then they must question not just the common view of school mathematics, but also their own taken for granted assumptions about its nature and worth"<br>(a) What does that quote mean to you?<br>(b) Do you think it's fair or useful to say that math teachers should question their assumptions and their school's assumptions about the nature and purpose of math?<br>(c) Is that something that you and your fellow teachers currently do? Is it something that you communicate to your administration? Why or why | Determine level of buy in to sociopolitical conclusions |

| | |
|---|---|
| not? | |
| Some of people that I've been studying in this PhD program say that the way we teach math today is based on a very unique historical intersection of language, social, political, and economic practices. They think that - even though the way we teach math right now is pretty widely accepted - that it's actually biased towards the state of the world during a single moment in history.<br>(a) What do you think about that idea? Can you think of any biases that might be inherent in the way we teach math? | Get initial feedback re: the crux of sociopolitical reasoning. Determine if teachers are resistant to this hypothesis. May potentially willingness to hypothesize re: biases as a proxy to gauge support for sociopolitical conclusions |
| Do you feel that race, gender, or cultural background impact the way that teachers teach or the curriculum that they put forward - either for math or other subjects? | Determine level of buy in to sociopolitical conclusions |
| Do you feel that race, gender, or cultural background impact the way kids learn - either for math or other subjects? | Determine level of buy in to sociopolitical conclusions |
| How frequently do the projects that you work on in class involve the local community? | Determine if teachers have put sociopolitical suggestions into practice |
| Do you think it's possible to use school math to better the world around us? | Determine if teachers have put sociopolitical suggestions into practice |
| How hard do you think most kids work to learn math? | Determine teacher perception of student effort |
| Why do you think some kids struggle with math? | Determine teacher perception of math roadblocks; gauge of any sociopolitical critiques enter here |
| Do you think certain types of instruction may privelege some kids over others? If not, why? Either way, could you give me an example? | Determine level of buy in to sociopolitical conclusions |
| Do you think that most kids in your class find the math that you are teaching meaningful? | Proxy of student connection with math |
| Do you think that math that you are teaching is meaningful? | Determine level of teacher "buy in" to current methods/curriculum/practices |
| Do you think that the math that you are teaching will be useful for most of the kids in your class? | Determine teacher perception of practicality of current math |
| Do you like the idea of using mathematics education to solve social issues? | Determine level of buy in to sociopolitical conclusions |
| How important do you think math is in decisionmaking? Can you talk with me about an example that's on your mind? | Determine teacher perception of math applicability outside of the classroom |
| Ok. This is a brainstorming question. What, in your opinion, does "authentic" math education look like? How do you think your students would answer this question? | Tease out what teachers think math should look like, proxy for student voice |
| **Concluding Questions** | |
| On a scale of 1-10 with 1 being infrequent and 10 being frequent, how often do you think of the topics | Determine level of (unprompted) self reflection |

| | |
|---|---|
| that we've talked about today? | |
| How do you believe we can use mathematics to best empower all students? What should we do differently? | Solicit ideas for recommendations |
| Do you have any other comments regarding anything that we've talked about? | Secure final feedback and buyin - give them the last word |

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