

High School Mathematics Teacher Conceptions of Equity

by

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Abstract

Equity in education is an ideal that is both desired and misunderstood. The overwhelming majority of high school mathematics teachers would express the desire that mathematics education be equitable. The conceptions of equity of high school mathematics teachers, however, seem to vary greatly. Teachers cannot be expected to promote within their classrooms a concept they do not understand. It is therefore essential that high school mathematics teachers understand their own conceptions of equity. This dissertation contains two studies examining high school mathematics teacher conceptions of equity.

These conceptions are viewed through the lens of critical race theory, making use of a four-dimensional model of equity developed by Rochelle Gutiérrez. First, the development of my own conception of equity is examined in an autoethnography. Second, the conceptions of equity of a sample of high school mathematics teachers from a suburban school district in the southern United States are examined. Together, these two studies give a rich description of the conceptions of equity of high school mathematics teachers. Understanding these conceptions can inform both professional development and teacher practice to improve equity in high school mathematics education.

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CHAPTER I

INTRODUCTION

Often, the career of a teacher is defined by a search for the ideal teaching setting - a school full of bright students, eager to learn and motivated to succeed. If you are lucky, you might even be given the opportunity to teach advanced classes, where the clientele is carefully controlled, weeding out students who struggle academically or exhibit problematic behaviors. At lunch or in the lounge, you listen to teachers bemoan the unprepared state of the students in their classes, blaming previous educational experiences and student backgrounds for the academic difficulties of students. All the while, you struggle under the weight of standardized tests that will determine the success of your students and your value as an educator.

In numerous professional development meetings, you are encouraged to strive to guarantee that all students succeed, regardless of race, gender, or socioeconomic background. You examine data to see which students are performing below expectations and discuss best practices for improving the achievement of all students. Words like equity and equality are spoken with little explanation of what they actually mean. After all, is there a teacher alive who would not want education to be fair and just? However, hidden beneath the surface, or sometimes in plain sight, is the ugly truth that you are not certain that *all* students are capable of succeeding, and even more damaging, you think you know what *those* students who will struggle look like.

The previous paragraphs provide a glimpse into my first twenty years of teaching, as I searched for the ideal school with an ideal student population. I found myself teaching math in a suburban high school, and as math department chair, I was

teaching AP Statistics and AP Calculus to bright, motivated students. I went to professional development sessions where issues of equity were discussed, almost always framed in achievement gap language, and listened as other teachers wondered why *those* students were at our school. I am certain that my views of equity were dominated by deficit thinking, as were the views of most of my colleagues, often wondering how we could be expected to teach students who were *deficient* in basic math skills and whose parents were seemingly *uninvolved* and *unable* to assist.

After twenty years in the classroom, I moved to a large city and began teaching mathematics in a high school whose student population was made up almost entirely of students from disadvantaged populations. The experience radically changed my views of education, especially when it came to issues of equity. I was made acutely aware that the educational system was not as fair and just as I had believed. I witnessed extreme inequity and disparities, and my sense of justice was awakened. I also began to understand that in many ways, as a white educator, *I was part of the problem*.

The research described in this dissertation is motivated by two key observations about issues of equity gleaned from my teaching career and reinforced by research. First, the concept of equity is ill-defined in the minds of most high school mathematics teachers. Even in the National Council of Teachers of Mathematics' (2000) *Principles and Standards for School Mathematics*, there is an acknowledgement of the ideal of equity in mathematics education with little to no explanation of what is meant by equity or how this equity can be achieved (Jackson & Cobb, 2010). Teachers cannot be expected to promote within their practice a concept

that they do not clearly understand. Second, and perhaps more importantly, teacher attitudes and beliefs are lived out in the classroom. Research has shown that there is a correlation between teachers' beliefs about students, especially students from marginalized groups, and their ability to effectively educate them (Fang, 1996; Kagan, 1992; Lynn, Bacon, Totten, Bridges, & Jennings, 2010; Nespore, 1987). If teachers have incomplete or incorrect conceptions of equity, these will be reflected in their treatment of students in the classroom.

As a result, I argue that one of the most powerful ways to advance the cause of equity in education is to understand and impact the attitudes and beliefs of teachers concerning issues of equity. In this research, the focus is on understanding the attitudes and beliefs of high school math teachers through an autoethnographic exploration of my own teaching experience, as well as examining the attitudes and beliefs of high school mathematics teachers in a large suburban school district with a diverse student population. It is hoped that this increased understanding of teacher conceptions of equity can be utilized to improve the equity of mathematics education in the high school.

Understanding Teacher Attitudes and Beliefs About Equity

In the political and social climate today, issues of equity are in the forefront, and one realizes that now more than ever, society is polarized, especially regarding issues of race. From police treatment of black people and the *Black Lives Matter* movement, to Charlottesville and the ugly stain of white supremacy, to the immigration battles and the "crisis" at the border, it is hard to ignore the seemingly countless reminders that our nation is grappling with, often unsuccessfully, issues of

inequity. Education is not immune, as issues of school choice and scandals within the college admissions process challenge our notion of fairness. The nation is struggling to fulfill the promise echoed in the words of the *Declaration of Independence* (US, 1776), “We hold these truths to be self-evident, that all men are created equal.”

So why does equity in mathematics education matter? At a deep level, mathematics knowledge is often seen as a proxy for intelligence (Gutiérrez, 2013). It is seen as a source of truth, albeit truth from a Eurocentric perspective, and as such, it is oblivious to the perspectives of differing cultures or groups (Walkerdine, 1994). Further, mathematical truth is often a construct of the dominant culture, taught by members of that culture, and used (either knowingly or unknowingly) to preserve the social structures and hierarchies that exist, only amplifying issues of inequity (Martin, 2015).

Practically, mathematics achievement, often demonstrated by courses taken, has several important implications for students. The level and type of math courses affects student earning potential, with higher level math classes such as calculus resulting in larger gains in income (Rose & Betts, 2004). Rose & Betts found that these effects occur across lines of race, ethnicity, gender, or socio-economic background. Additionally, courses taken in mathematics and math achievement serve as a gatekeeper to outcomes in higher education as well as a conduit for social mobility (Douglas & Attewell, 2017). Finally, mathematics courses often serve as a valve governing flow into the STEM pipeline and into STEM careers (Tyson, Lee, Borman, & Hanson, 2007).

Teachers, policymakers, parents, and students are concerned with leveling the playing field and ensuring that opportunity in mathematics is not restricted based on socio-economic level, ethnicity, gender, or any other issue (Graven, Secada, Valero, & Atweh, 2011). Recognizing the importance of equity in mathematics education, it is imperative that teachers understand the concept, as well as acknowledge its importance. Personal experience has shown me that teachers are not fully aware and do not adequately understand issues of inequity. In this research, I seek to gain an understanding of high school math teacher conceptions of equity in mathematics education. While much has been written about equity, there is little written about math teacher attitudes and understandings of the concept of equity.

Gaining a clearer understanding of teacher attitudes and beliefs regarding equity in mathematics education will allow teacher education programs as well as individual districts to design interventions to promote a more robust understanding of equity among high school math teachers. Several studies (Campbell et al., 2012; Kinloch & Dixon, 2017; Post & Cuban, 2004) have shown that engaging teachers in work around equity can affect teacher practices, and more importantly, serve to make mathematics education more equitable.

The two studies included in this research will investigate high school math teacher conceptions of equity, expressed in the words of high school math teachers.

Taken together, these studies will attempt to investigate the following ideas:

- High school mathematics teacher definitions of the concept of equity
- Barriers to equity in mathematics education identified by high school mathematics teachers

- Interventions high school mathematics teachers identify as addressing issues of equity in mathematics education
- The concepts of race, racism, and white fragility as expressed within the conceptions of equity of high school mathematics teachers

As previously mentioned, this research will consist of two separate studies: 1) an autoethnography addressing the development over time of my own personal attitudes and beliefs about equity, and 2) a qualitative study of the conceptions of equity of a sample of high school mathematics teachers in a large suburban school district in the southern United States with a diverse student population. The autoethnography will be the subject of Chapter II, while the qualitative study will be addressed in Chapter III. Chapter IV will summarize and synthesize findings from the two studies, as well as offer suggestions for practice stemming from the research findings.

In Chapter II, my personal teaching experience will be examined using autoethnographic methods as an exemplar of mathematics teacher conceptions of equity. In an autoethnography, research methods are employed to interpret cultural assumptions and describe their impact on lived experiences using autobiographical data (Chang, 2008). An autoethnography is more than an autobiography or a memoir. Personal anecdotes are triangulated with other data sources to create a picture of lived experiences. In this case, the arc of my teaching career will be examined to provide insight into high school mathematics teacher conceptions of equity, as well as the forces and structures that impact those conceptions. Additionally, how my conceptions have changed over time will be discussed.

In Chapter III, a sample of high school mathematics teachers will be examined to gain a better understanding of high school mathematics teacher conceptions of equity. In the qualitative study, data will be collected using an online survey of mathematics teachers. The online survey will consist of open-ended questions, probing teacher conceptions of equity in mathematics. Teacher opinions about obstacles to equity and interventions to promote equity will also be addressed in the open-ended questions. These open-ended questions will be analyzed using qualitative methods to gain a clearer understanding of teacher conceptions of equity in mathematics.

This research will be viewed through the lens of critical race theory (CRT), and teacher conceptions of equity will be analyzed utilizing the four dimensions of equity proposed by Gutiérrez (2012). In the remainder of this chapter, I will briefly discuss CRT and the four dimensions of equity in order to build a working definition of the concept of equity to be utilized within this research.

Definitions

In response to *A Nation at Risk* (Gardner, 1983), with its assertion that education in the United States was in crisis, the National Science Foundation (NSF) commissioned a study, *Multiplying Inequalities* (Oakes, 1990), to examine what science and mathematics were being taught to whom and by whom. The study indicated, as the title states, an uneven distribution of educational resources and outcomes, and a picture was painted of the uneven playing field in science and mathematics education (Oakes, 1990). Access to quality teachers, resources, and challenging curricula was found to be unfairly distributed (Oakes, 1990). Additionally,

tracking and other forms of ability grouping were found to favor certain groups of students and disadvantage other groups (Oakes, 1990).

Understanding and addressing this uneven distribution of educational resources, processes, and outcomes is the goal of distributive justice, a set of social psychological theories or principles concerned with the values, rules, and decisions involved in the allocation of resources (Deutsch, 1975). The concepts of *equity* and *equality* form the basis of distributive justice and are often used by policymakers, practitioners, and researchers interchangeably and with little context (Espinoza, 2007). For the purposes of this study, the differences between equity and equality must be discussed, and the meaning of both terms in educational settings must be defined.

Groups Impacted by Inequity

Before fleshing out a working definition of equity, though, it is important to understand what groups have traditionally experienced inequity in mathematics, and more importantly, the groups addressed within this research. Generally, inequity in mathematics education is found to exist in regard to race, ethnicity, gender, and socioeconomic status (SES). This research will focus specifically on issues of race and ethnicity viewed through the lens of critical race theory (CRT).

First, a few notes about terms referring to issues of race and ethnicity. Although the two terms are similar and often used interchangeably, they are fundamentally different. According to Markus (2008), race and ethnicity are both socially constructed ideas that serve to divide people into groups. In describing the difference between race and ethnicity, Markus (2008) claims that race is based on perceived physical and behavioral traits, and is often used to justify oppression, while

ethnicity stems from linguistic and cultural similarities, providing meaning and a sense of belonging.

The socially constructed nature of both race and ethnicity is contrary to the beliefs of many in society who see race and ethnicity as biological constructs (Markus, 2008). According to Smedley and Smedley (2005), historically in North America, race has been viewed as stemming from biological differences and used to arrange society in hierarchies. Importantly, these differences have been considered permanent and have infiltrated cultural and legal systems (Smedley & Smedley, 2005).

Within this research, I will use the phrase *students of color* to refer to black students and LatinX students as a collective, as the interplay between white students and students of color will be examined through the lens of CRT. I do this with the full acknowledgement that black is a term of race while LatinX is a term of ethnicity. Since this study examines conceptions of equity, which are often impacted by both race and ethnicity, the two will be examined together, looking at the impact of these racial and ethnic identities within mathematics education. Even though CRT was originally concerned with issues of race involved in the black/white dynamic, other writers have applied its tenets to describe the racism experienced by LatinX persons within society (Valdes, 1996), allowing CRT to be used as a lens to consider both the experience of black students and LatinX students.

LatinX students represent the largest ethnic group (other than white) in the student population of the suburban district in which the teacher survey will be administered, as well as in each of the districts in which I have taught during my teaching career. It is important to recognize that the term LatinX is a broad term,

referring to any group of people whose heritage emanates from Latin America (Comas-Diaz, 2001), and is preferable to Hispanic, a term which is strongly identified with Spanish culture and language (Morales, 2018). Part of the ambiguity of this term is that it fails to acknowledge the differences between the various groups included in this designation. A vast majority of the LatinX students in the district in which the teacher survey will be administered would consider themselves to be either Mexican or Mexican American. This is also true of the majority of school districts in which I have taught, the exception being a large, metropolitan district in the northeastern United States, in which the LatinX population was made up primarily of Dominican and Puerto Rican students. Also note that I will not capitalize black (or white for that matter) since the term denotes a race of people, not referring to a geographic origin, but rather describing a large and varied group of people (Perlman, 2015).

Next, I must acknowledge the position of SES within discussions of issues of equity. It has been firmly established that low SES students are not treated equitably in mathematics education. Poverty is related to many factors shown to negatively affect both student health and student academic performance (Petrilli & Wright, 2016). While there is a temptation to view inequities solely as the result of economic factors, it is important to note that persons of color are more likely to be low SES than non-Hispanic white persons (Venkatesan, 2018). Specifically, black persons and Hispanic persons are twice as likely as white persons to suffer the effects of low income level (Reeves, Rodrigue, & Kneebone, 2016). Note that the studies previously referenced utilize the term Hispanic instead of LatinX. Thus, considering SES as a source of inequity in education without acknowledging this wealth disparity is akin to treating

cancer by choosing instead to focus on treating pain. The effect is a colorblindness that actually serves to further oppress persons of color (Dovidio, Gaertner, & Saguy, 2015).

Critical Race Theory

As previously mentioned, this research will be viewed through the lens of critical race theory (CRT). In the 1970's many civil rights activists, feeling as if the civil rights movement had stalled, began to question the very foundations of American society, as well as examine legal processes and case decisions, with the intent of eradicating racial injustice and inequality (Delgado & Stefancic, 2017). Led by writers like Derrick Bell and Alan Freeman, they sought to repair the court system, which Bell (2008) referred to as a leaky boat, by understanding the social structures at work behind court decisions and opinions. In using the analogy of a leaky boat, Bell (2008) highlights the difficulty of pursuing civil rights through the courts, recognizing the systematic forces of racism embedded within the court system itself, while acknowledging the necessity of litigation and the courts to advance the cause of civil rights. The work of Bell and many other social activist legal scholars form the basis of CRT.

CRT scholars provide a critique to two opposing ideological stances, one on the right and one on the left, which have served to slow the pace of social reform (Crenshaw, 1988). According to Crenshaw (1988), on the right, neoconservatives call for colorblind politics, insisting that equality for all regardless of color has already been reached through the passage of civil rights legislation. On the left, civil rights

activists focus on legal remedies without considering the impact of racism on inequality, thus producing gains that are hollow at best (Crenshaw, 1988).

CRT originated from critical legal studies (CLS), and exists both as an outgrowth of CLS, as well as a critique of CLS (Crenshaw, 1988). CLS scholars were liberal leaning law scholars who emphasized the social, cultural, and political nature of the law (Tushnet, 1991). CLS scholars were concerned with legal processes and paradigms but lacked a strategy for real social transformation (Ladson-Billings & Tate, 1995). In contrast, CRT refuses to passively comment on legal issues of inequality, but actively seeks radical transformation of society.

CRT is a branch of legal scholarship resting on four pillars: 1) race as a prominent factor in society, 2) whiteness as property, 3) interest convergence, and 4) intersectionality (Delgado & Stefancic, 2017; Ladson-Billings, 1998). First, CRT begins with the belief that racism exists as an ever-present reality in society. This belief stands in stark contrast to the beliefs of many Americans, who believe that racism has actually declined and are hesitant to admit that further work needs to be done (Crenshaw, 1988). Second, there is economic, social, and personal value in being white, and racism advances the material and positional well-being of whites (Harris, 1993). Third, advances in achieving equality only occur when those advances are beneficial to *both* black people and white people, and these advances will be halted when their results begin to threaten white supremacy (Bell, 1980). This is known as interest convergence. Lastly, intersectionality refers to the multi-layered nature of identity. For example, the experience of black women differs from the experience of

all black persons because of the combination of the experience of being black in addition to the experience of being a woman (Crenshaw, 1989).

Finally, CRT values the voices of people of color, recognizing the ability for those with minority status to more effectively communicate the truth about oppression and injustice based on lived experiences (Delgado & Stefancic, 2017). This experience is communicated through storytelling, seeking to magnify the voice of the oppressed and eradicate injustice in society. As a white researcher, I must acknowledge that this research focuses on the conceptions of equity of white educators, as the majority of the participants in the research and of educators in the United States in general, are white (Loewus, 2017). These conceptions form a story that is undoubtedly different from the counter-narrative reflected in the experience of students of color but has a tremendous impact on that experience.

These high school mathematics teacher conceptions of equity will also be viewed in light of white fragility, which can be seen as a characteristic of whiteness, serving to reinforce white supremacy in society (DiAngelo, 2011). According to DiAngelo (2011),

White Fragility is a state in which even a minimum amount of racial stress becomes intolerable, triggering a range of defensive moves. These moves include the outward display of emotions such as anger, fear, and guilt, and behaviors such as argumentation, silence, and leaving the stress-inducing situation. These behaviors, in turn, function to reinstate white racial equilibrium. (p. 57)

Examining high school mathematics teacher conceptions of equity in the light of white fragility will provide evidence of the effect of race on these conceptions of equity, reaffirming the pervasive effects of racism.

Equity and Equality

Next, I will develop a working conception of equity that will be used within this research. In order to understand equity, however, the notion of equality must be discussed. Equality is considered a hallmark of American society. The Founding Fathers, however, were arguably more interested in abolishing forms of inequality that existed in Europe at that time, namely religious and aristocratic privileges that permeated society, than they were in addressing inequalities that existed in the fledgling nation itself (Hyneman, 1980). Their commitment to equality for all was arguably not as expansive as a cursory reading of *The Declaration of Independence* (US, 1776) might indicate.

The zeal of their commitment to equality was immediately tested at the Second Constitutional Congress as the delegates wrestled with the issue of slavery in the infant nation. In *And we are not saved: The elusive quest for racial justice*, Derrick Bell (2008) tells a story in which a fictional character, Geneva Crenshaw, is magically transported to the Constitutional Congress and dialogs with the delegates deep in debate over issues of slavery in the drafting of the Constitution. In her dialog, this black woman warns them of the future consequences of the compromises concerning slavery that they were considering. Bell uses the story to demonstrate the fault lines that exist in the foundations of the criminal justice system and society as a whole. The three-fifths compromise only served to entrench these battle lines, eventually contributing to the onset of the Civil War.

At the end of the Civil War, the focus turned to equal protection under the law, as the rights and privileges of citizenship were not necessarily a practical reality for

most black people. To address this, the Fourteenth Amendment was adopted, providing a *guarantee* of equality in the eyes of the law (Tussman & TenBroek, 1948). This clause began to be debated by the courts which seemed to consider equality under the law in terms of political equality, equal opportunity, and economic equality (Wilkinson, 1975). Wilkinson suggests that in general, court decisions have affirmed the judiciary's commitment to political equality, suggested a duty to promote equal opportunity, and exhibited a hesitancy to intervene in issues of economic equality.

This battle for equality has often been waged in the nation's schools. In *Roberts v Boston* in 1849, segregation of public schools in Boston was upheld by the Massachusetts Supreme Court and the doctrine of "separate but equal" was established as a legal precedent (Ficker, 1999). This precedent was cited in several cases in various state courts as well as the United States Supreme Court, beginning to establish "separate but equal" as the legal standard for education (Ficker, 1999). Eventually, *Roberts v Boston* became the precedent for a legal case which would undergird segregation for decades.

In *Plessy v Ferguson*, Homer Plessy, who was seven-eighths white, bought a seat on a train, attempted to sit in a car reserved for white persons, and was forcibly removed from the car and arrested (Medley, 2012). This case broadened the "separate but equal" mandate, and with the words of the opinion below from Justice Brown, the educational doctrine of separate but equal was strengthened and broadened to include all public spaces:

Laws permitting, and even requiring, their separation, in places where they are liable to be brought into contact, do not necessarily imply the inferiority of either race to the other, ... The most common instance of this is connected with

the establishment of separate schools for white and colored children, which have been held to be a valid exercise of the legislative power even by courts of states where the political rights of the colored race have been longest and most earnestly enforced. (*Plessy v Ferguson*, 1896)

Separate but equal was the legal standard until struck down by the courts in the landmark case, *Brown v. Board of Education*, at the height of the Civil Rights Movement. In fact, many of the legal battles fought and won during this movement focused on equality in education, with issues such as curriculum and assessment, funding, and desegregation at the forefront of legal battles (Ladson-Billings, 1998). As the Civil Rights Movement wound down, the belief grew among conservatives that equality in the eyes of the law had been achieved, the crisis had been averted, and there was no longer any need for further work to achieve equality (Crenshaw, 1988). Legally, all considered equal, but were they really?

Equality in education. In education, examining inequality has most often centered around equality of outcomes, most often measured by achievement. Predominantly looking at achievement outcomes and gaps in achievement can have devastating effects on teachers as this focus can produce a deficit mindset that views issues of inequality seen in achievement gaps, as arising from deficiencies in the groups themselves (Gutiérrez, 2008). This achievement gap language further polarizes discourse and reduces individuals to nothing more than their race or socioeconomic status (Carey, 2014). Ladson-Billings (2006) challenges us to avoid deficit thinking and achievement gaps, in favor of looking at the educational debt, considering a debt that has been accrued over time, the result of years of educational inequality.

Inequality can better be viewed as a lack of opportunity - an opportunity gap as opposed to an achievement gap (Flores, 2007). In sociology, opportunity structure theory recognizes that opportunities are not equally distributed among all people and attempts to investigate the sources of these inequalities (Merton, 1995). Looking through an opportunity structure lens focuses on equality of processes as opposed to equality of outcomes. This is a question of access - access to quality teachers, challenging curriculum, and resources.

Access to quality teachers, however, is not equal for all groups of students. For example, low SES students, particularly those in metropolitan areas, have been shown to have less access to highly qualified teachers, with students of color being overrepresented in metropolitan student populations (Oakes, 1990). Humphrey, Koppich, and Hough (2005) found that National Board Certified teachers, a subset of teachers often considered the most qualified, were unequally distributed with very small numbers serving low SES students and students of color.

Access to challenging curriculum or advanced mathematics classes is also not equally distributed. Often a disproportionate number of students of color are diverted from advanced mathematics classes as a result of tracking (Gamoran, 2010). Historically, it has been much less likely that a student of color will attend a school that offers algebra in the eighth grade (Raudenbush, Fotiu, & Cheong, 1998). Additionally, students of color have less access to AP courses in high school, and those that have access, pass those classes at a lower rate (Zarate & Pachon, 2006).

Educational resources are also not equally distributed. The Education Law Center (Baker, Sciarra, & Farrie, 2014) described funding levels in *Is School Funding*

Fair? A National Report Card. They found that students of color were concentrated in metropolitan districts with lower levels of funding. This lower level of funding was found to be even more troublesome as the authors claimed that increased funding levels was necessary to combat the effects of poverty.

Equity

In general, then, equality refers to sameness of outcomes, processes, or treatment. The concept of equity, however, is associated with fairness or justice (Espinoza, 2007). Equity can be seen as a concept that is larger than equality, moving past sameness and addressing the higher plane of justice and fairness. Castelli, Ragazzi, & Crescentini (2012) summarize several definitions of equity by defining equity in terms of three equalities: 1) equal opportunity, 2) equal results, and 3) equal treatment. Equal opportunity addresses issues of access while equality of results addresses issues of achievement. Equal treatment seems to imply sameness, with all people treated identically.

This understanding of equity seems to assume that equality guarantees fairness. Espinoza (2007), however, argues that achieving equity often requires inequality. As Gutiérrez (2002) describes, equal opportunity may involve ensuring that students have equal access to high level mathematics, high quality teachers, and resources, but this equal access does nothing to address the effects of differences in culture, experience, or identity, only serving to preserve the existing hierarchical structure. In order to achieve justice, some students may require more resources. Gutiérrez (2002) further argues that achieving equality of achievement or equal results, although appealing on the surface, may not be just to students because no

consideration is given to their desires or cultural identities. In other words, understanding equity requires more than just consideration of issues of achievement and access. Power structures and identity issues must also be considered.

Dimensions of equity. In this study, I will examine equity by considering four dimensions: *access*, *achievement*, *identity*, and *power* (Gutiérrez, 2012). Achievement refers to measures such as standardized test scores, grades, patterns of course selection, and types of degrees, to name a few. Access is concerned with availability of resources such as teachers, courses, technology, and funding. The picture Gutiérrez (2012) uses to describe identity is that of a mirror and a window. Mathematics is a mirror when students can see themselves in the mathematics. Connecting to CRT, mathematics is a property that the student is allowed to own. Mathematics as a window means that mathematics opens up opportunities and new horizons for the student. The power dimension connects to CRT in that issues of power and structures that serve to disadvantage groups are acknowledged within the process of learning mathematics. Mathematics is used as an agent of social change.

In the model proposed by Gutiérrez (2002), access and achievement are placed along an axis called the dominant axis, as they form a view of mathematics education

that reflects the status quo in society, that gets valued in high-stakes testing and credentialing, that privileges a static formalism in mathematics, and that is involved in making sense of a world that favors the views and perspectives of a relatively elite group. (Gutiérrez, 2002, p. 150-151)

Identity and power are placed along an axis called the critical axis, as they are dimensions of mathematics education

that squarely acknowledge students are members of a society rife with issues of power and domination. It takes students' cultural identities and builds

mathematics around them in such ways that doing mathematics necessarily takes up social and political issues in society, especially highlighting the perspectives of marginalized groups. This is the mathematics that challenges static notions of formal mathematics, as embedded in a tradition that favors the West. (Gutiérrez, 2002, p. 151)

A diagram of this model is shown in Figure 1.1.

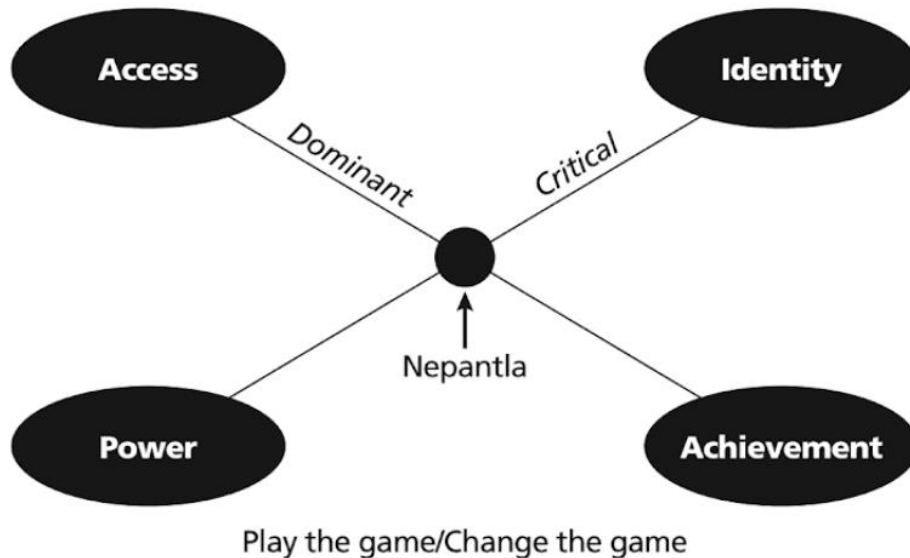


Figure 1.1

Diagram of dimensions of equity. Reprinted from ‘Political conocimiento for teaching mathematics,’ by Gutiérrez, R., 2017, *Building support for scholarly practices in mathematics methods*, IAP, p.22.

In this model, we see Gutiérrez in essence critiquing the dominant or traditional views on equity, namely access and achievement, infusing issues of power and cultural identity into a discussion where they are generally ignored. Examining access and achievement on the dominant axis can be thought of as playing the game by the rules that have been set in motion by society, while examining identity and power on the critical axis can be thought of as changing the game, challenging the power structures set up in society (Gutiérrez, 2017).

Gutiérrez (2012) also describes the intersection of the dominant and critical axes as *Nepantla*, a Spanish word that literally means the space between, signifying the tension between these dominant and critical perspectives on equity in mathematics. She also uses the Spanish word *conocimiento*, which refers to knowing something, but takes on the meaning of both the Spanish verbs *saber* and *conocer*. Both of these verbs refer to knowledge, *saber* meaning to know something and *conocer* meaning to know someone. Gutiérrez (2012) draws on these meanings to illustrate knowing as acquisition of knowledge as well as connection to others. This *conocimiento* cannot be described by only considering dominant modes of thinking about equity in mathematics.

At its core, the model proposed by Gutiérrez, involving these four dimensions of equity, can be seen as a critique of traditional or reform mathematics in the CRT tradition, seeking to promote radical change by calling out and challenging issues of power and identity that are largely ignored in most equity discussions (Gutiérrez, 2012).

Teachers and equity. Most government policy efforts to address inequity have taken the form of accountability systems. In general, accountability systems focus on the achievement dimension in pursuit of equity. The *No Child Left Behind Act* of 2001 (NCLB) sought to hold schools accountable to reaching accountability levels by use of a measure called adequate yearly progress (AYP), designed to measure progress towards accountability targets (Simpson, Lacava, & Sampson Graner, 2004). Critics argued that the subjective nature of the calculation of AYP, as well as the punitive nature of the law itself, was damaging to the very groups the law

was designed to help (Guisbond & Neill, 2004; Owens & Sunderman, 2006).

Answering the critics of NCLB was *Race to the Top* (RTTT), which shifted the focus from punitive to incentive-based with a competitive grant program for educational funding (McGuinn, 2012). While this initiative is more incentive-based, the attachment of student achievement to teacher accountability systems and pay structures is troubling, as is the emphasis on charter schools, serving to privatize education (Onosko, 2011).

The predominant one-dimensional view of equity, with its emphasis on achievement and fixation on achievement gaps, permeates the educational system and creates an environment which “moves us toward short-term solutions that are unlikely to address the long-term underlying problem” (Ladson-Billings, 2006, p.4). The response of teachers to this achievement data is the critical factor in addressing issues of equity in mathematics. Attribution theory proposes that actions are influenced by perceptions of cause (Bertrand & Marsh, 2015). For example, teachers often perceive student characteristics to be critical factors in student outcomes and the way teachers make sense of data (Bertrand & Marsh, 2015). Thus, teacher assumptions about student characteristics often impact teacher expectations, and these expectations can affect student achievement (Jussim & Harber, 2005).

This leads back to the purpose of this research. What are the conceptions of equity of mathematics teachers? How are these conceptions operationalized in schools and classrooms? Since *A Nation At Risk* (Gardner, 1983), we have been pursuing (or at least talking about) equity in mathematics education. Are we getting closer to its expressed ideal?

All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost. (p. 9)

CHAPTER II

JOURNEY TOWARDS JUSTICE – AN AUTOETHNOGRAPHY

It seems it is often at the end of the road, looking back on where you have been, that you can see the twists, turns, and undulations on the path you have traversed, gaining a clearer understanding of the events that have transpired to bring you to where you are. Frequently, you come to the realization that you have arrived at a place far removed from your intended destination. Such has been the case in the twenty-five years of my career as a white high school mathematics teacher. I did not begin my teaching journey as an advocate for social justice, particularly concerning issues of equity in mathematics education. Not that I was an opponent of equity - surely all educators desire for all students to succeed - but rather, I was ambivalent, or maybe more accurately, unwilling to acknowledge the issues of inequity swirling around me.

Recently, an event occurred that brought into focus my newly discovered passion for issues of inequity. I found myself in a discussion with one of my fellow teachers. As a teacher that had been recently hired at a suburban high school in the south with a diverse student population, I was seeking insight into issues students were having with a particular topic within the Algebra 1 curriculum. A well-meaning colleague, who was a veteran algebra teacher at the school remarked, “We don’t teach that to *our* students. *Our population* will not be able to understand that, and it will just confuse them.” I knew the code that was being spoken. I was teaching at a school with a large population of students from *marginalized* populations, and the expectations for *those* students needed to be managed. Just make sure they are able to *pass* the state

exam. I was witnessing an example of the hidden curriculum of poverty (Levin, 2006). I was immediately uncomfortable and began to think of how I could speak into the situation and advocate for our students.

Simultaneously, my mind flashed to a myriad of similar conversations throughout my career as a high school mathematics teacher. Though the settings were different (I have taught in four different states in rural, suburban, and metropolitan settings), the conversations were strikingly similar. What interested me, however, was my response. None of those other situations had elicited the discomfort that I felt in this instance. In fact, ashamedly, in some of the conversations, I was the teacher commenting on the abilities of *those* students. I realized that my attitudes and beliefs had been transformed somehow. I was definitely travelling down an unfamiliar road. I began to ask these questions:

1. What are my beliefs about equity?
2. How had my conception of issues of equity changed so radically?
3. Could my lived experience be instructive to address questions about teacher conceptions of equity?
4. How could I best communicate this lived experience?

Roadmap

In order to understand the path of my teaching career, I decided to turn to autoethnography, a qualitative research method that uses personal experiences to interpret social phenomena (Chang, 2008). It is more than an autobiography or a memoir. As Chang (2008) describes, autoethnography “combines cultural analysis and interpretation with narrative details” (p. 46). Chang goes on to explain that the

autoethnographer is not just writing his or her own story but is casting that story in the light of a larger cultural context, employing the thoughts of others, as well as connecting that story to the body of research literature. Ngunjiri, Hernandez, and Chang (2010) describe autoethnography as focused on self, but simultaneously conscious of the context of the researcher. They maintain that autoethnography is concerned with the research process, culture, and self to varying degrees. In this case, the emphasis will be on my personal experience, which will be connected to the broader context of high school mathematics teachers via research literature as well as conversations with present and former colleagues.

In reflecting on my own experience, I hope to gain valuable insight into the construction of high school mathematics teacher conceptions of equity within the educational system, particularly those of white high school mathematics teachers. I do not, however, wish to present myself as some sort of hero or savior, saving the day through my herculean efforts promoting social justice. Conversely, I do not wish to portray myself as a villain, in some self-deprecating attempt at penance for my lack of action. Truthfully, I must admit to having tried to be the hero at times, patting myself on the back for working in difficult school settings with populations that my colleagues would label as *at risk*. There have also been times where I have closed my eyes and refused to see the inequity around me, choosing instead to see *deficiencies* in certain groups of students. It is my desire to honestly examine my life as a white high school mathematics teacher grappling with issues of inequity.

It is also not my intention to portray other teachers in a negative light. The vast majority of teachers I have encountered throughout my career are well-intentioned,

thoughtful, caring individuals who have given their lives to enrich the lives of their students. While the forces impacting their conceptions of equity may be similar to mine, I am sure that the journey of each educator is unique. Thus, it is not my intent to characterize their conceptions of equity, only mine.

Navigational System

To this end, I offer key moments in my teaching career, intersections on the road if you will, each contributing something powerful to my understanding of equity in mathematics education. These events will be viewed through the following lenses: 1) critical race theory (Delgado & Stefancic, 2017), 2) white fragility (DiAngelo, 2018), and 3) the four dimensions of equity proposed by Rochelle Gutiérrez (2012). Each of these lenses provides a perspective from which to view my conceptions of equity. Additionally, these lenses also allow me to chart the development of my conceptions of equity, identifying obstacles and barriers hampering this development. Before I share my journey, I must briefly describe these lenses and their interaction, together serving as a sort of navigational system along the way.

Critical race theory. First and foremost, these experiences in my teaching career must be viewed through the lens of critical race theory (CRT), as it undoubtedly reflects the most pronounced transformation in my conception of equity. CRT is a form of legal scholarship that hinges on the premise that racism exists as a prominent force in society (Delgado & Stefancic, 2017). This assertion forms a powerful counter-narrative to the myth of the meritocracy - a belief that political institutions are neutral, people are colorblind, standards of performance are the same for everyone, evaluation systems are consistent and fair, and everyone is rewarded on their merit in an

equivalent fashion (Ladson-Billings & Tate, 1995). Teachers often see education as a meritocracy, as Vaught and Castagno (2008) found that individual teachers do not in fact see themselves as racist and are unable to recognize the structural and systemic factors privileging white students at the expense of students of color.

Additionally, CRT recognizes that there is value in being white, and this value is carefully guarded (Harris, 1993). This white privilege that Harris (1993) describes is often unnoticed by white people and is *earned* by their membership in the white group. One of the ways white people protect this white privilege is by governing who can be granted membership in the white group (DiAngelo, 2018). In *Dred Scott v. Sanford*, a former enslaved person returned to a slave state after living in a free state and petitioned the court for citizenship in this slave state. The court found that, regardless of whether black persons were enslaved or free, they were only entitled rights granted them by white society, effectively institutionalizing white supremacy (Tate, 1997).

Consequently, CRT sees advances in civil rights and equality as occurring only when the interests of both white people and black people align (Bell, 1980). This is known as interest convergence. Interest convergence can be thought of in two parts as described by Bell (1980). First, advances in achieving equality only occur when those advances are beneficial to *both* black people and white people. Second, these advances will be halted when their results begin to threaten white supremacy. Bell (1980) cites *Brown vs. Board of Education* as an example of interest convergence. Bell questions why the court decided to strike down separate but equal, when for decades, black people had repeatedly questioned its legitimacy, and the court had repeatedly

addressed this by demanding improvement of facilities for black students. He suggests that in *Brown*, the court acted to further white interests by 1) asserting that integrating schools would assist in the struggle against communism, 2) offering a measure of equality, ensuring that black people would continue to fight in wars, and 3) recognizing that the end of segregation would assist in the industrialization of the south, offering an economic benefit to whites (Bell, 1980).

CRT also recognizes that identity is very rarely a singular concept.

Intersectionality refers to the combination of multiple identities and sources of inequality. Crenshaw (1989) delineated the importance of intersectionality by discussing the treatment of black women by the courts, noting that the courts struggled to deal with both the discrimination experienced as a result of being black and the discrimination encountered as a woman. From this platform, she argued that often identities combine to form a multi-layered system of identity and must be considered as such, avoiding a single axis interpretation of identity.

Originally, CRT was concerned only with issues of race involved in the black/white dynamic, but other voices of color have adapted the CRT tradition to address their own issues of race or ethnicity. For instance, LatCrit is concerned with the specific issues of inequity experienced by LatinX persons in society, recognizing that LatinX is a term of ethnicity, referring to those who culturally belong to a conglomeration of many distinct groups such as Mexican-American, Dominican, or Panamanian, to name a few (Valdes, 1996). Throughout my teaching career, I have taught in settings with students who were predominantly white, Asian, LatinX, or black. In my experience, the LatinX students and black students most often bore the

burden of racism in the education system, particularly in mathematics. As a result, the CRT lens will focus on the consequences of this racism experienced by black students and LatinX students, who will be referred to as students of color.

White fragility. For much of my teaching career, I was either unaware of or ambivalent to the impact of race in education, specifically mathematics education. My feelings about issues of race were in line with many Americans who believe that racism has actually declined and are hesitant to admit that further work needs to be done (Crenshaw, 1988). My actions could best be understood by considering white fragility, providing another important lens through which to examine my experiences.

White fragility can be described as a state of defensiveness triggered by circumstances involving racial stress (DiAngelo, 2018). The goal of white fragility is to protect the status quo, reinforcing white supremacy and strengthening white privilege (DiAngelo, 2011). It can be seen, for example, in the attitudes of white people toward affirmative action in which white people, while acknowledging the history of enslaving black people, argue that they are not personally responsible for the damages and should not be asked to give up the advantages that are inherent in being white (Harris, 1993). They further argue that not all white people are the same, while at the same time viewing all black people as a group (DiAngelo, 2018).

Often, as was true in my case, this white fragility expresses itself in a denial of racism. DiAngelo (2018) contends that white people view racism through the lens of overt acts of racism, instead of societal structures that serve to privilege one group of people in society while oppressing other groups. This binary view of racism allows white people to avoid recognizing the truly racist nature of American society, focusing

on their own morality compared to members of hate groups. Instead of recognizing racism, they retreat into colorblindness (Delgado & Stefancic, 2017). I was no different. I did not see race as an issue for me since I grew up in a family environment without openly racist actions or attitudes on display.

Dimensions of equity. Finally, throughout my teaching career, my definition of what it means for education to be fair and equitable has changed dramatically. In general, I would describe my conception of equity as moving from a traditional view based on access and achievement to a view that takes into account issues of identity and power. Looking back through my teaching career, a four-dimensional model proposed by Gutiérrez (2012) provides a third lens through which to examine the path. In the model shown in the previous chapter, Gutiérrez (2012) places access and achievement on one axis, called the dominant axis, as they reflect components that are accentuated in traditional views of equity, while power and identity are placed on a second axis, called the critical axis, reflecting their connection to CRT. These two axes exist in a natural tension with one another, and one cannot fully deal with issues of equity in mathematics without dealing with both axes (Gutiérrez, 2012).

The Journey

Taken together, CRT, white fragility, and this four-dimensional model of equity form a navigational system which can be utilized to traverse the path of my teaching career. It has been a rewarding and humbling journey, full of peaks and valleys, times of triumph and failure. Obviously, it would be impossible to fully encapsulate the entirety of my twenty-five years as a high school mathematics teacher in the pages that follow. These scenes form a Cliffs Notes version of the journey.

Good students = Good teacher

It was May of my first year as a high school mathematics teacher. I was teaching in a large metropolitan area in the south with a diverse student population and loving every minute of my job. As a young and inexperienced teacher, I was, of course, assigned to teach the lowest level mathematics students at the school, teaching the second year of a two-year Algebra 1 course. I loved working with these students and helping them feel successful at mathematics, many for the very first time. I felt like I was making a difference, and I loved it, even though there were some difficult moments.

Since I was a beginning teacher, I was called into an appraisal meeting with the building principal and my mathematics department chair. The meeting started off well enough, with both the principal and my department chair complimenting my professionalism and ability. The focus of the meeting then turned to the achievement of the students in my class. There were some successes discussed as many of the students had made significant gains in mathematical ability and achievement. I was feeling affirmed and valued, and then the hammer dropped.

The principal turned to a discussion of the passing rate of my students on a standardized test taken by all Algebra 1 students. My students had a passing rate below the passing rate of the students in the district as a whole. The fact that the most advanced mathematics students in the district were taking Algebra 1 in the eighth grade and were included in the district passing rate for this exam was never acknowledged. Even in the school itself, the Algebra 1 classes were leveled with the

higher achieving students taking Algebra 1 in one year. It was obvious to me that we were comparing apples to oranges.

The questions from the principal began coming - what could I have done differently? I suddenly felt attacked and devalued as a teacher. I began to question all of the good work that I thought I had done during the school year. The principal then began to praise the achievement of the students of the department chair (who taught AP Calculus), none of which even took the exam in question, and asked her for any input that might help my students perform like hers. The department chair's response indicated that the way to make my scores more like hers was to exchange students!

It became obvious to me that evaluation of my ability as a teacher was to be forever linked to the performance of my students. More importantly, if I wanted to be viewed as a success, I needed to find a way to teach higher level students. This observation was further confirmed in the weekly department meetings as the honors precalculus and AP calculus teachers were repeatedly lifted up as shining examples of quality teaching and often looked at me incredulously as I sought assistance with various classroom management issues I was encountering. More than once it was explained to me that they did not have to deal with *those* problems because of the student population they were teaching. I began to long to teach *those* students.

The trajectory of my teaching career was set as I began searching for opportunities to teach the *better* students. I was assigned to teach honors precalculus in addition to Algebra 1. The achievement levels of my students increased and I began to notice that my evaluations seemed to also be more positive. The stress level of my job began to decline as it seemed that discipline issues decreased, and positive feedback

from students, peers, and administration increased. I was hooked. I continued to look for chances to teach students in upper level courses. I had become a teacher in pursuit of *good* students.

At this time, *good* students were students in the advanced mathematics classes. These were the students who took Algebra 1 in seventh or eighth grade. They were on track to take a calculus class before they graduated from high school. These were the *seminar* or *GATE* (Gifted and Talented Education) or *honors* kids. The *good* teachers got to teach classes filled with these students, while the teachers that were *less capable* were left to slog away in classes with the *regular* students. Although I did not realize it at the time, I was trapped in a professional environment that extolled the values of equity, while at the same time normalizing or even promoting inequity. Perhaps more accurately, I had become a willing participant in a system promoting inequity.

As I pursued the *good* student, I can honestly say that I was completely unconcerned with issues of equity. Those were legal issues that were beyond my reach. I would teach who was placed in my classroom. While I was aware of demographic differences between honors and regular classes, this was not at all a focus. At the time, I would have considered myself to be colorblind, insisting that the color of a student did not matter to me, only ability and effort mattered. I longed to teach students who were intrinsically motivated and had support structures around them that encouraged and nourished success. Before I knew it, I found myself teaching advanced placement courses in both calculus and statistics in a high-performing suburban high school on the west coast. I was teaching classes full of *good* students. I had arrived.

Good student = white student

It was in this suburban setting that I suddenly became aware that within the confines of the educational system, being a *good* student was often associated with being a *white* student. The population of the school was predominantly white, with a large number of Asian students. As the department chair, I was responsible for guiding the mathematics department as we examined student performance at the height of the No Child Left Behind (NCLB) era, with its emphasis on accountability. Although I had taught in other school settings with students of color, I had managed to avoid associating race with academic performance and ability. Up until this point, I had associated poor academic performance with poor *effort*, poor *attendance*, and *lack of parental support*.

As a high-performing school, my school was a school of choice for students from several low-performing metropolitan schools. Under NCLB mandates, students from schools that had been repeatedly underperforming were allowed to choose to attend a high-performing school. As a result, my school had a large number of students who were bussed in from several neighborhoods with demographics much different from those of the school's attendance zone. *These students* seemed to struggle at the school, especially in mathematics. As a department, we were charged with improving the performance of the *choice* students, as they were called by members of the school faculty and staff. This term was not a positive term, as if schools were lining up to fight for them, but rather a term highlighting their decision to come to the school, as if this decision somehow exempted us from responsibility for their academic struggles.

It was during this time that I was introduced to a term that perverted my view of a *good* student: *subpopulation*. Under NCLB, schools were required to break down achievement data by groups, with special interest being paid to traditionally *underperforming* groups of students. At my school, the majority of members of the *subpopulations* were *choice* students. These students were almost entirely LatinX students and black students. The performance of these students seemed to threaten the school's status as an elite academic institution. In faculty meetings where academic performance was discussed, there were always four data sets shown: white, Asian, black, and Hispanic. Graphically, the *gap* between the white and Asian performance data and the black and Hispanic sets of data was always highlighted, with the goal being to reduce the size of that gap. This was undoubtedly in response to NCLB accountability mandates.

As department chair, I felt ambushed by the tension between my mathematics teacher colleagues and the school administration. The administration was fixated on achievement gaps, and more importantly, how to lessen those gaps, while my colleagues were obsessed with what was lacking in these *underperforming* groups - a lack of preparation, perceived lack of effort, and a lack of parental support.

In the midst of this storm, I felt like the voice of reason trying to bring these sides together. I was constantly trying to justify the struggles of the *choice* students to the administration, hoping that they would understand the struggles that the teachers in the department were going through. At the same time, I was trying to help teachers empathize with the pressures being placed on administrators to meet NCLB mandates and eliminate achievement gaps. I began to hear administrators and teachers alike ask

how we could lessen the impact of the *choice* students on school accountability ratings. I could sense the resentment toward these students for their effect on the academic standing of the school.

Although I did not recognize it at the time, the group I was not advocating for was the group actually most affected - the *choice* students. Instead, I let the pressures of accountability and the *deficit* language of *achievement gaps* and *subpopulations* push me toward a regrettable conclusion: *good* students were most often *white* (or Asian) students. I still wanted mathematics education to be equitable for these *choice* students, whatever that meant, but I felt like socio-economic backgrounds, family situations, and previous educational experiences created obstacles to equity that were very difficult, if not impossible, to overcome. I was now aware of inequity and saw it connected to race, viewing this inequity as emanating from factors within the *subpopulations* themselves.

Introduction to inequity in education

It was at this point that my teaching career took a sharp, hairpin turn, radically altering my views about equity. I had begun to realize that the *good* students I was teaching in my high-achieving, suburban high school did not need me in order to succeed, and often seemed to be unappreciative of my assistance. I had found the ideal setting, full of *good* students, and something was lacking. Simultaneously, my family and I made the decision to move to a large metropolitan area on the east coast, and my search for employment led me to a setting where the student population was more diverse. I found myself teaching in a metropolitan high school with a student population that was almost entirely (more than 95%) students of color. Additionally,

essentially the entire student population had scored in the lowest category on the standardized mathematics exam administered to them in the eighth grade. I was no longer teaching any *good* students, and I was no longer teaching any *white* students.

I entered this situation excited about the opportunity to assist students who were most definitely in need of assistance. I was determined to teach with high expectations, helping my students get the most out of the opportunities in my classroom. I was also confident that my teaching ability would transform mathematics education at the school. It felt like I was fulfilling a calling, teaching in a setting in desperate need of mathematics teachers. Many family members and friends did not understand my choice to teach in a school that was so *difficult*, thinking that I was insane, but at the same time, viewing me as some kind of saint. Unknowingly, I began to develop a hero complex, seeing myself as some kind of *white savior*.

Needless to say, my first months at the school were shocking, as the challenges faced by both the students and faculty in the school dwarfed anything I had experienced up to this point in my teaching career. The students struggled with the content, and I struggled with their struggles. The students seemed unprepared, and I immediately began looking for reasons for this, lapsing back into the deficit mindset that I had learned so well in my previous setting. The entire school population was wracked with poverty, and in my eyes, many of the parents seemed unwilling or unable to help their students succeed. I felt that the students did not give the necessary effort to be successful. I must admit that I began to long for my *good* students again.

It was at this point that one of the administrators at the school came to my room to see how I was doing. I am positive that she knew I was struggling and was

looking to provide encouragement. I poured out my frustrations about the level of preparation of my students, as well as their lack of effort. She gently began to challenge my deficit mindset, with its focus on achievement and effort. Through our discussions, which occurred frequently over the course of several days, my entire worldview began to change as I came to this important realization: inequity happens *to* disadvantaged students, not *because of* deficits within those students. I recognized that my focus on achievement gaps and deficits had profoundly impacted my views of equity in a decidedly negative way. As Gutiérrez (2008) notes, predominantly looking at achievement outcomes and gaps in achievement between groups promotes a deficit mindset, placing blame for lack of achievement at the feet of the students themselves. This further marginalizes the students, reducing them to demographic information (Carey, 2014).

I began to see that the educational system was to blame, not the students. This system, to which I had dedicated my life, was not treating my students equitably. There were, as the title of Jonathan Kozol's (1991) book suggests, *Savage Inequalities* in the funding of schools. These inequities, though, were deeper than simply funding issues. The inequities that Oakes (1990) cited so many years ago persist even today, as access to quality teachers, resources, and challenging curricula have been found to be inequitably distributed. In the district containing my school, the quality of educational opportunities offered varied widely, with the student's neighborhood having a profound impact on the quality of education offered in the elementary school grades. As the students advanced to middle and high schools, huge disparities began to

emerge in access to special programs and choice of more rigorous academic school settings.

My attention was now focused on the systemic and structural causes of inequity. I became aware of the political nature of teaching mathematics. As Gutiérrez (2013) advocates, I began to be interested in issues of identity and power and how they are reflected in the mathematics being taught to students of color. I was now looking to reform the mathematics to meet the needs of the students, not seeking to reform the students to meet the needs of Eurocentric mathematics. I became an impassioned advocate for social justice and reform in mathematics education. As Ladson-Billings (2006) challenges, I began to avoid deficit thinking and achievement gaps, in favor of looking at the educational debt, seeing inequity as a debt that has been accrued over time, the result of years of educational inequality. I was now struggling to close the *opportunity* gap, instead of the *achievement* gap (Flores, 2007).

I began to infuse the curriculum with social justice topics, as well as topics of interest. For instance, statistics about arrest rates examined by race for varying years was used as a springboard to examine linear regression. The exponential decrease of the rain forest was a great topic to allow students to engage in mathematics, but also become passionate about issues that were important in their lives. Topics of interest also included the relationship between height and arm span of NBA basketball players. Comparing data from NBA players with data from students within an algebra class allowed us to talk about the slope and y-intercepts of lines. Additionally, finance topics such as interest on a car loan and grocery shopping were used to connect mathematics to their interests.

It is important to note that this insight did not magically make all of the difficulties of teaching at the school vanish. I struggled with how to reform the mathematics I was teaching, while still addressing issues of standardized testing. I was constantly attempting to make the mathematics address the identity of students of color, making mathematics both a mirror and a window, allowing them to see themselves in the mathematics, as well as see how the mathematics granted them access to a broader world (Gutiérrez, 2012). In the end, though, my view of equity had been drastically altered in the crucible of experience.

Full Circle

Finally, after several years, my family moved once again to a large, metropolitan area in the south - the same area where my high school mathematics teaching career had begun almost twenty-five years earlier. As I selected a teaching setting and prepared for the new school year, the change in my conceptions of equity came sharply into focus. First, I purposely searched for a high school with a large population of students of color, seeking diversity instead of avoiding it. Second, as I interviewed for a teaching position, I made it clear that I wanted to teach Algebra 1, the *lowest* course in the mathematics curriculum at the school. Third, when I began decorating my classroom to prepare for the students, I began to think about how I could make my classroom communicate my desire to make mathematics welcoming to all, regardless of race, ethnicity, or gender. I knew that none of these ideas would have registered previously.

I also became keenly aware of messages that were being communicated that were contrary to my newfound convictions. For example, before the year began, I

attended a new teacher orientation designed to acclimate me to life as a teacher in the district, held in a large arena containing over a thousand new teachers to the district. Very early in the meeting, one of the district officials proclaimed one of the district's essential mantras: *Success for all students!* I was excited to join with like-minded educators in this mission. As I listened closer, though, I began to notice that any discussion of race or ethnicity was conspicuously missing. We were to strive to ensure that all students were able to succeed regardless of *socio-economic status* (SES). I immediately began to recognize this as an attempt at colorblindness. Throughout the year, I was a part of numerous meetings in which academic achievement data was examined. I was relieved that achievement gaps were no longer the focus of those meetings, but also puzzled by the complete absence of any discussion of race or ethnicity, while SES was repeatedly mentioned.

Because of the strongly centralized approach to curriculum in the district, these achievement data meetings always involved comparing the school data with the rest of the district. The fact that my school had the highest percentage of low SES students of any high school in the district was always mentioned and used as an explanation for the school's place in the district academic hierarchy. Often, we would be fourth or fifth in the district rankings and would rejoice in the fact that we had achieved so much with *our population*. As a school, we preached high expectations, but seemed amazed when the students reached those expectations.

In addition, the structure of the mathematics curriculum at the school was incredibly restrictive. The Algebra 1 team worked together as a group to plan, and we were all required to follow the same curriculum. While this provided consistency and

was very helpful for data analysis, it made it difficult to address many issues of inequity, since the attitude of the district and the school toward issues of inequity chose to completely avoid any mention of race. I felt a feeling of powerlessness creep in, as I was swept into the flow of a curriculum centered on access and achievement, with little regard for identity and power. As my colleague had expressed, we were teaching things that *our population*, almost sixty percent LatinX students and twenty percent black students, could understand. With laser focus, we were striving to guarantee passage on the state standardized exam at the end of the course.

My first year at this new school could be characterized as a mixture of failure and success. I was now fully cognizant of issues of race and the effects of those issues on equity in education, but I also felt shackled by the restrictions of a system in full denial of these racial issues. I struggled with how to express my desire to champion equity in a system that fought to deny the existence of inequity, or at least racial and ethnic inequity. I began to develop a posture of resistance as described by Gutiérrez (2017), recognizing that a system that is inequitable cannot be allowed to stand. I began to seek avenues to undermine the system, all the while fulfilling my duties and obligations as a teacher.

I began to question why certain topics were not included in the curriculum, not accepting the justification that *our students* could not learn those topics. I was especially conscious of topics that could set the stage for success in higher mathematics, not wanting my students to be shut out of opportunities due to beliefs about their abilities. I once again attempted to infuse the exponential decay of the rain forest into the curriculum around earth day but was met with resistance. In meetings

where we looked at data, I began to ask questions about students of color and how they were doing, wanting to make sure that we were being responsive to the needs of all students within the curriculum.

In short, I began to see my entire teaching career as a journey towards justice. As an advocate for social justice, I was and still am struggling to find ways to ensure success for all students, regardless of race and ethnicity.

Lessons learned

Looking back on this journey, three things stand out: 1) the evolution of my conception of equity, 2) the structural barriers to equity present in the current educational system, and 3) the impact of white fragility on equity issues. I will discuss each of these in light of my journey, viewing them through the lenses described previously.

Conception of Equity

As I look back on my teaching career, I now see a very clear progression of my conception of equity. I began with no concept of issues of equity. Possibly this was because education had been good to me. I had succeeded academically, especially in mathematics, so it was difficult to recognize the inadequacies of the educational system that had served me so well. I am fairly certain that I saw education as a meritocracy. My academic successes were the result of hard work and ability. I was completely unaware of the white privilege that I had benefited from throughout my education. I was oblivious to the idea that the mathematics curriculum itself could be an instrument of inequity, constructed by white people for the benefit of white students, often at the expense of students of color (Gutiérrez, 2017; Martin, 2015).

When I finally began to recognize that education was not equitable, or at least all students were not achieving on equal footing, I naturally began to search for reasons for this inequity. I began to fixate on *achievement gaps* and *subpopulations*. It was most comforting to find places to assign blame that were *as far as possible from me*. I began to echo common refrains, “*they* don’t have any support at home,” or “*they* are more interested in where the next meal is coming from”, or perhaps most damaging, “education is not important in *their* culture.” I also began to place blame on the students’ previous experiences in education with phrases like “*their* previous school did not have high academic standards,” or “*they* were promoted when *they* should have been *held back*.”

While there may seem to be a kernel of truth in those justifications, I now recognize all of them to be attempts to deny the very real impact of race on issues of equity. They represent classic white fragility responses (DiAngelo, 2018) to the stress induced by the realization that mathematics education in its current form was not working for everyone. These arguments are not unlike the ones offered in response to welfare or affirmative action, where the people receiving benefits are somehow seen as *deficient* or *lazy*, allowing white people to deflect attention away from the economic and societal structures that are the root causes of economic inequities (DiAngelo, 2018).

When I was finally confronted with the notion that inequity was not *the fault of those disadvantaged*, but rather the result of a rigged system of which I had often been a beneficiary, the orientation of my conception of equity was altered. My original understanding of equity only as access or achievement allowed me to place all

responsibility for success, and *especially failure*, on the backs of students. *They* do not care, or *they* are lazy, or *they* lack any help at home. This is the reason they are not *achieving*. I have given them *access* but they are not able to take advantage because of *their own* shortcomings or the shortcomings of *their* culture.

When I began to look at issues of power and identity, the reason for inequity shifted to the educational system, of which I was and am a part. I began to see students of color succeeding *in spite of* a society designed to hold them at bay, in spite of shortcomings in *my culture* as a white person. The question became how to help students of color overcome a flawed educational system. In a real sense, I began to see the need to help students negotiate deficiencies in curriculum, in resources, and maybe even deficiencies in myself as a teacher trained and immersed in a rigged system. I began to experience a heightened level of self-reflection, as I began to take the failure of students of color personally, not because I needed to be some sort of savior, but because I began to realize that it is the responsibility of those of us who call ourselves educators to fight against the causes of inequity.

As my conception of equity grew to encompass more than just access and achievement, but issues of power and identity as well, I began to see that I was doing more than preparing students to “play the game” of standardized testing and accountability ratings (Gutiérrez, 2017). I was also “changing the game” by honoring student identities and giving them power in the educational process (Gutiérrez, 2017). These two outcomes are often at odds with each other, and the tension between them must be recognized. It is important to note that although my concept of equity had

changed dramatically, it took time for this change to be manifested in curriculum and pedagogy.

In fact, because of the district centralization of the curriculum, it took a change in the courses that I teach to be able to begin to make significant changes within my own classroom. In my second year at the school, I was able to teach classes where I had more control over the curriculum in my classroom. I was also able to make use of blended learning, a district emphasis, to begin to work on infusing socially relevant curriculum in my classroom, increasing student engagement and ownership with the mathematics curriculum.

As I was now viewing equity issues through this widened lens, I began to grapple with root causes of inequity. Was inequity a racial issue or was it more about poverty? I experienced extremes of these two viewpoints in two consecutive teaching settings later in my career. First, the large, metropolitan district that I taught in on the east coast introduced me to racial dynamics in a way that I had never experienced before. I saw the seeming powerlessness of people of color as they attempted to navigate the educational system, a powerlessness that I and other white people did not experience. For the first time, I began to understand white privilege. The next place I taught was in a suburban district in the south. As described earlier, I was shocked by the absence of any mention of race, even though the school that I was teaching in had very similar demographics to the school in the metropolitan area on the east coast, at least as far as race and ethnicity were concerned. However, the district did place a large emphasis on the impact of poverty on educational outcomes. I was forced to

really ask myself if race and poverty was an either/or proposition or a both/and proposition.

While there are white people in poverty, an inordinately large proportion of those in poverty are people of color, and in fact the wealth gap between white people and people of color is carefully cultivated, making wealth an instrument of racism (Baradaran, 2017). It began to seem to me that often poverty followed race, as a symptom caused by a society working to preserve white supremacy. Treating symptoms, while helpful, cannot heal if the disease is left untreated. While the effects of poverty on educational outcomes are immense and must be treated, it is not enough to only deal with symptoms. The disease itself **MUST** be removed.

Choosing to see educational inequity only in terms of poverty illustrates the power of interest convergence, since dealing with poverty helps *both* black students and white students (Bell, 1980). Focusing on poverty is also a form of respectability politics, as policies are promoted that help all groups, but do not seek to address inequities between groups (Harris, 2014). This allows us to avoid the uneasy and uncomfortable discussions of race, once again a white fragility response (DiAngelo, 2018).

Finding myself in a district that chose to battle the effects of poverty while essentially denying race, I was forced to make a decision. Would I follow the flow or chart a different course? Believing the racial component of issues of equity to be too strong to ignore, I chose the path of resistance (Gutiérrez, 2017). I was determined to speak with colleagues on these racial issues, pointing out instances of racial injustice

when they occurred. I also began pushing to allow the curriculum to speak more to social justice issues, a move that was met with heavy resistance and little success.

In a nutshell, my conception of equity evolved from nonexistent, to a traditional view of equity as access and achievement, to a more nuanced conception addressing issues of power and identity in addition to access and achievement. This broader conception of equity was then reconciled with the culture of the educational system, and I was forced to determine what my response would be to inequity within the system. Finally, I began to see myself as a political activist, pushing for change within a system that I have found to be innately unfair. As my conception of equity developed, I was fighting against the headwinds of white fragility and colorblindness, appraisal systems, and the traditional career path of a teacher. A diagram of the path of the development of my conception of equity is shown in Figure 2.1 It is important to note that this model shows a general progression, but not necessarily a linear one with one stage following the other. Often, I moved back and forth through these stages, with the path marked by switchbacks and hairpin turns.

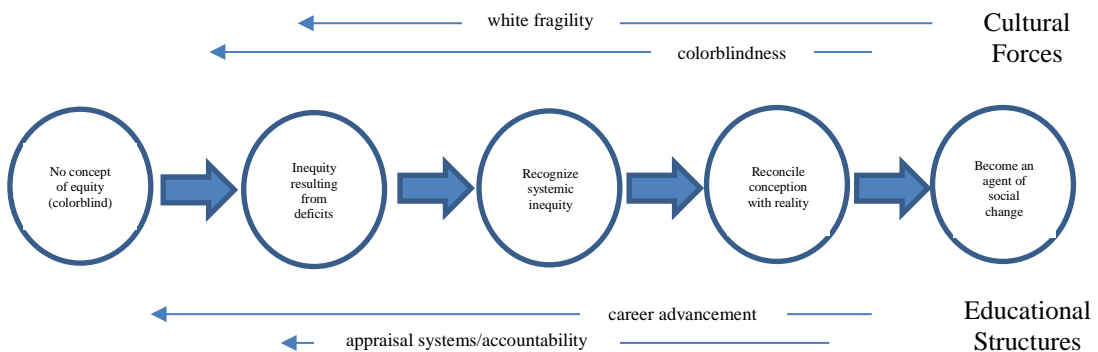


Figure 2.1.
Development of my conception of equity

Structural Barriers to Equity

Looking back on my journey, I recognize that there are many aspects of the educational system that obscured my view of issues of equity. First, it seems that the traditional arc of a teaching career impedes equity, as tracking and ability grouping encourage quality teachers to move away from the students who need them most. Second, appraisal systems seem to promote career choices that do not promote equity. Finally, accountability systems put in place to promote equity seem, ironically, to promote inequity.

As Oakes (1990) found, one of the causes of inequity in mathematics is an uneven distribution of quality teachers. Often this inequity is exacerbated by the *normal* arc of a teaching career. As I learned early on in my teaching career, *good* teachers eventually get to teach higher level classes. There is still a tendency in many schools to give the most inexperienced or least mathematically advanced teachers the lowest level mathematics classes to teach. Teachers who do a good job in those settings are often *promoted* to teach higher level mathematics with more capable students. While this is not always the case, the general path of a teaching career seems to be designed to move *good* teachers away from the students who need them most. Additionally, often motivated by the search for higher income potential, *good* teachers are often encouraged to become administrators, and while it is important to have capable educators in leadership positions, this further weakens the quality of teachers for students who need them most.

While this career path is not taken by all educators, as some feel legitimately called to address the needs of students who have often been forgotten by the system, it

is important to note that the typical teacher career path is a powerful force, pulling quality teachers away from where they are most needed. As a department chair, I was given a directive on more than one occasion to move certain teachers to more advanced courses to make sure that they did not leave the school to seek employment elsewhere. In other words, it is believed that teaching *disadvantaged* populations is taxing and to keep teachers, they need to be allowed to teach the *good* students.

The *most desirable* classes are created by tracking, which is at its core designed to sort or stratify students, contributing to inequities in education, especially along racial lines (Oakes, 2005). Often a disproportionate number of low SES and minority students are diverted from advanced mathematics classes as a result of tracking (Gamoran, 1987). Students from underrepresented populations, such as low SES students and students of color, are less likely to enroll in AP classes or take AP exams (Contreras, 2011; Solorzano & Ornelas, 2002). The result is a tendency for *good* teachers to flock towards classes, such as AP classes, that are often dominated by white students and to move away from classes with higher percentages of students of color.

To combat this, Gamoran (2010) proposes eliminating or at least limiting the pervasiveness of tracking. He recognizes, however, the inherent difficulties in eliminating tracking. When efforts are made to reduce tracking, often the parents of the *more advanced* students, which is often code for white students, fight to derail these efforts, a white fragility response designed to preserve white privilege. This leaves schools tasked with raising the academic rigor for lower-level students to eliminate inequity, ensuring that all students are given access to challenging

mathematics. Raising the level of rigor for lower-level students requires that quality teachers resist the allure of teaching *good* students and continue to teach those students who need them most. Additionally, and perhaps more fundamentally, it requires elimination of the need to classify students as either *good* or *bad*.

Other attempts to address teacher inequities include non-traditional teacher training pathways such as *Teach For America*, designed to enlist teachers *willing* to teach in difficult educational settings. These programs recruit teachers, provide a modest amount of training, and send them into the fray, providing economic incentives for their service. While these teachers are often motivated to serve, they often suffer from a lack of content and pedagogical knowledge (Darling-Hammond, 2000). There is also evidence that the attrition rate of these types of teachers is high (Heilig & Jez, 2010), as many of them are not seeking a career in education or move to a career in education away from the classroom.

In my experience, teacher appraisal systems also increase teacher inequities by promoting the desire to seek more ideal student populations. As a teacher in a suburban school on the west coast, teaching AP Calculus and AP Statistics, I received appraisals that were always in the *Highly Effective* category. When I moved to the east coast and taught at a metropolitan school with a more diverse population of students with more academic struggles, my appraisals began to fall into the *Effective* category. While this may not seem like a major change, it was very disheartening. I was working harder than I had ever worked before and was doing a better job than before. This performance, however, was not reflected in my appraisal ratings. The message was

received and understood: you are a *better* teacher, if you teach *better* students. Often *better* students seem to reside in less diverse settings.

Finally, many of the accountability measures that have been implemented to promote equity in mathematics education, appear to have the opposite effect. Advocates of reform measures such as *No Child Left Behind* (NCLB) and *Race to the Top* (RTTP) failed to see the impact on teacher retention. Pressures on educators as a result of NCLB, with its ambitious accountability standards caused many teachers to leave the profession (Hill & Barth, 2004). RTTP actually increased the impact of student performance on teacher appraisals through the *value added* metric, a measure of teacher impact on student achievement, demonizing teachers and further promoting the loss of quality teachers to the profession (Onosko, 2011).

Additionally, the authors of these accountability measures failed to see the negative impact they would have over the population they were created to serve. The loss of teachers mentioned previously is most severely felt in difficult-to-staff schools, often schools with large populations of students of color (Darling-Hammond, 2007; Onosko, 2011). Darling-Hammond (2007) referred to the effect of NCLB on schools with large populations of students of color as the *diversity penalty*. She noted, “This ‘diversity penalty’ sets up the prospect that the schools serving the neediest students will be the first to lose funds under the law” (p. 247). Some would argue that the *value added* metric, a key component of RTTP, has created an animosity between students and teachers, especially between teachers and students of color (Onosko, 2011).

In summary, it seems that the educational system itself as I have experienced it, while promoting the ideal of equity, is practically constructed in ways designed to

maintain inequity. From appraisal instruments, to tracking, to teacher placement, the system is designed to place the *best* teachers with the *best* students, and often, the system promotes the idea that the *best* students are white students. Even measures designed to address inequity, such as NCLB and RTTP, seem to preserve the very inequities they were designed to confront.

White Fragility

The most damaging impacts to equity, however, often go unnoticed or ignored as a result of the colorblindness of many white educators within the educational system. Since the teaching profession is still at least eighty percent white (Albert Shanker Institute, 2015), the power in the educational system is centered among white people who, in my experience, tend to profess a colorblind approach to issues of equity, serving to preserve the status quo. I have just recently begun to recognize this colorblindness as a symptom of white fragility. As DiAngelo (2018) describes, white fragility is an emotional reaction to racial issues that results in defensiveness, deflection, and denial, designed to promote white supremacy. Looking back on my journey through the years, interacting with educational systems in many different settings, I realize that I have witnessed and even enacted a variety of white fragility responses.

First and foremost, there is a resistance to acknowledge the white supremacy discussed by DiAngelo (2018) embedded within the educational system itself. By white supremacy, DiAngelo (2018) is not referring to Neo-nazi hate groups, but rather the belief embedded in the culture of white America that white is normal and everything else is other. The educational system as I have experienced it, views *white*

students as the prototype, and students of color as *subpopulations*. The terminology of subpopulations, ironically employed by reformers seeking to battle inequity, highlights and even increases the inequity. This deficit mentality promotes the idea that *good* students are *white* students. This is a powerful idea with far-reaching impacts in education.

In the later stages of my career, I have noticed a decrease in the use of deficit language and terms such as *subpopulation*, but this has seemed to be replaced with silence, at least when it comes to issues of race. White fragility often avoids talking about issues of race by a carefully constructed web of deflection and coded language (DiAngelo, 2018). I am certain that throughout my career, though it would never be spoken, I was aware of perceived demographic differences between *advanced* classes and *regular* classes. Hidden in the background, camouflaged by coded language, was the view of *white* as ideal or even advanced. Another code used to speak to issues of race is SES. In my current educational setting, words like *low income* and *socioeconomic status* are spoken frequently, while terms dealing with race are never spoken. Once again, beneath the surface is the knowledge that often SES is associated with race, and wealth is an instrument of racism (Baradaran, 2017).

Finally, I would acknowledge that throughout my career, I saw the educational system as a meritocracy, a view that I now see as a deflection from the truth - the educational system often exists as a sorting mechanism, creating, or more accurately, preserving an existing social hierarchy. Tracking and other forms of ability grouping serve as tools to rank students, with students of color often disproportionately represented in the lower academic levels (Gamoran, 1987). As educators, however, we

hide behind achievement scores or other measures to justify our leveling of students. While one may argue for or against tracking and leveling of students, this cannot be done without an acknowledgement of the role race plays in the process. We cannot buy into the myth of the meritocracy.

What's Next?

I did not begin my journey as an educator desiring to combat inequity. In fact, I probably began my career in complete denial of issues of equity. After all, I am a white, male educator whose entire life has been lived post *Brown v. Board of Education*, and, like many others, I made the mistake of assuming that racial inequality was eliminated by the Supreme Court's ruling. I had not been forced to deal with issues of inequity. Gradually, I became aware that inequity in education, particularly in mathematics education, was alive and well.

Until educators become aware of and willing to consider issues of equity, it is impossible for change to occur. In these pages, I have reflexively considered my own path, looking at the flow of events that brought me to consider issues of equity. I hope that through these reflections and observations, a clearer picture of teacher views of equity and the forces impacting those views has formed. Perhaps another fellow educator can be helped on his or her own journey. Together, may all of us who call ourselves educators continue to strive to achieve equity in education for all, regardless of race or ethnicity.

CHAPTER III

HIGH SCHOOL MATHEMATICS TEACHER CONCEPTIONS OF EQUITY

Living in a post-*Brown v Board of Education* world, it is tempting to assume that the strongholds of educational inequity in the United States were swept away with the stroke of a pen, as the Supreme Court ruled against segregation. Over sixty years after this landmark court case, though, the march for school desegregation and educational equity seems to have slowed. In fact, in many large suburban districts, segregation is on the rise, buoyed by several Supreme Court decisions (Orfield & Lee, 2007). As Brown Henderson and Brown (2017) note:

Not long after President George W. Bush’s nominees remade the Supreme Court, they struck down two race-conscious plans seeking to integrate public schools—with Chief Justice John Roberts simplistically claiming that ‘the way to stop discrimination on the basis of race is to stop discriminating on the basis of race’. (p. 3)

His comments echo a colorblindness that seems to permeate society today. Colorblindness in political, social, and even educational arenas is viewed as an instrument to eliminate racial bias, while often serving instead as an obstacle to addressing racial inequity (Apfelbaum, Norton, & Sommers, 2012).

White educators struggle to appreciate the inherent structural inequities in the educational system and their impact on students of color, often blind to the impact of white privilege, as defined by DiAngelo (2018), on issues of equity (Vaught & Castagno, 2008). DiAngelo (2018) describes white fragility as the emotional response

to the discomfort caused by encounters with issues of race. Since over eighty percent of the teaching population in the United States is white (Albert Shanker Institute, 2015), it is imperative that educators, particularly white educators, are aware of their own conceptions of equity, and how they may be influenced by issues of race.

Specifically, in mathematics education, white teachers often do not see the political nature of teaching mathematics, as often mathematics curricula is constructed by white people and for white people, serving as an instrument of racism (Gutiérrez, 2017; Martin, 2015). As Gutiérrez writes, “Who gets credit for doing and developing mathematics, who is capable in mathematics, and who is seen as part of the mathematical community is generally viewed as [w]hite” (Gutiérrez, 2017, p. 17). Martin (2015) adds in a critique of NCTM’s *Principles to Actions: Ensuring Mathematics Success for All* (2014), “school-based mathematics education for the collective Black is placed largely in the hands of Whites or in the hands of non-Whites who are often positioned to preserve White interests” (p. 21).

Often, the conception of mathematics is Eurocentric, focusing on the contribution of the Greeks to mathematical knowledge (Joseph, 1987). Joseph (1987) notes that this Eurocentrism demands that mathematical knowledge be developed axiomatically, denying the impact of political or cultural forces on mathematics knowledge. Thus, mathematics serves to promote existing hierarchies instead of promoting equity (Martin, 2015).

In considering issues of equity in mathematics education, then, it is imperative that teachers develop a conception of equity that takes into account more than issues

of achievement and access, but also considers power structures and cultural identities as well (Gutiérrez, 2012).

Purpose of the Study

Gorski (2017) explains that understanding and addressing issues of equity requires that teachers develop the ability to recognize, respond to, and redress bias and inequity, as well as the ability to cultivate environments free from racial bias and inequity. Developing these abilities requires teachers to understand their own conceptions of equity as well as be open to evaluate and if necessary, address incorrect conceptions. Vaught and Castagno (2008) describe interactions with teachers in two urban school districts involved in training on issues of equity, revealing that participant responses could often be characterized as defensive, exhibiting retrenchment into previously held beliefs about equity, with little or no understanding of the impact of white privilege. Helping teachers to positively confront and if necessary, change their own conceptions of equity requires that those conceptions are understood.

The purpose of this study is to understand the conceptions of equity of high school mathematics teachers in a large suburban district in the southern United States. Participants in the study completed a survey, describing their conceptions of equity in open-ended responses. These conceptions were examined through the lenses of critical race theory (Delgado & Stefancic, 2017), white fragility (DiAngelo, 2018), and a four-dimensional model of equity proposed by Rochelle Gutiérrez (2012). Investigating themes that emerged in participant responses formed a rich description of high school mathematics teacher conceptions of equity within the district.

By developing a greater understanding of high school mathematics teacher conceptions of equity, it is my hope that inservice and training programs can be developed to help high school mathematics teachers be able to recognize their own areas of racial bias. This study will also contribute to the body of knowledge regarding teacher conceptions of equity by providing insight into the conceptions of inservice teachers, particularly high school mathematics teachers in a large suburban district in the southern United States. Only when this bias and inequity are recognized and acknowledged will high school mathematics teachers be able to respond to and redress these biases, creating a culture free from racial bias and inequity (Gorski, 2017). Additionally, as high school mathematics teachers recognize their own racial biases, they can begin to understand their place as agents of social justice, seeking to challenge injustice within a system rife with inequity (Gutiérrez, 2017).

Theoretical Foundations and Literature Review

As mentioned previously, teacher conceptions of equity will be examined through the lens of critical race theory (CRT), with an emphasis on white privilege and white fragility responses to perceived attacks on white privilege. Second, the language of teacher conceptions of equity will be analyzed for deficit language as opposed to opportunity language (Flores, 2007). Additionally, conceptions of equity will be compared with the four dimensions of equity proposed by Gutiérrez (2012). In the paragraphs that follow, these ideas will be examined briefly, providing a backdrop for the study.

CRT

CRT is a branch of legal studies, examining the legal process with the intent of eradicating racial injustice (Delgado & Stefancic, 2017). The founders of CRT, such as Derrick Bell, believed that the advancement of civil rights had accelerated through the 1960's, reached its peak during the 1970's, and had in many cases, began retreating, leaving black people not much better off than they had been before the civil rights era (Bell, 2008). CRT scholars such as Crenshaw (2010) argue that in response to civil rights advances, society seems to have retreated into colorblindness, recognizing legal equality while ignoring glaring social inequities. Crenshaw further notes that this pattern has been repeated recently "in the wake of a monumental shattering of the political glass ceiling" (p. 1261), ushering in a so-called post-racial age dominated by colorblindness.

As a powerful counterargument against this colorblindness and a critique of the post-racial age, CRT claims that racism exists as a pervading force in society (Delgado & Stefancic, 2017). More than that, CRT argues that racism exists as a *permanent* force in society (Bell, 2018). As a result, CRT scholars (Bell, 1991) argue that it is impossible for racism to ever be fully eradicated. This realization leads to a *racial realism* as outlined by Bell (1991). This racial realism recognizes the role of racism within societal, governmental, judicial, and even educational structures (DeCuir & Dixson, 2004). Recognizing the permanence of racism, then, leads to a recognition that advances in civil rights are inevitably slowed by the deep-seated nature of racism, embedded within the court system and society as a whole (Bell, 1991).

A second tenet of CRT recognizes that this pervasive, permanent racism exists to protect whiteness (Harris, 1993). There is an ingrained belief within the fabric of American culture that *white* people are the norm and people of color are the *other*, with the *other* perceived to be a deviation and by nature inferior (DiAngelo, 2018). People of color are oppressed, creating a white supremacy that dominates society (Leonardo, 2004). The value of being white in society is powerful, an *invisible knapsack*, if you will, but is often unappreciated by white people (McIntosh, 1988). This whiteness is considered a property and carries with it a right to exclude others from the privileges and benefits of whiteness (Harris, 1993). This *white privilege* is carefully nurtured and protected through the systemic oppression of racism (DiAngelo, 2018).

As a result, advances in civil rights only occur when the interests of white people and people of color align (Bell, 1980). This is known as *interest convergence* and can be seen in Bell's (1980) analysis of *Brown v. Board of Education*. First, Bell (1980) details how the decision was framed as beneficial to white people in the arguments made before the court. Second, Bell (1980) argues that civil rights advances are curtailed when they begin to challenge white supremacy. This interest convergence preserves societal hierarchies, offering the illusion of advances in equality, while at the same time preserving white privilege (DiAngelo, 2018).

White Fragility

As CRT describes, racism exists to preserve white supremacy and white privilege (Harris, 1993). This can lead to uncomfortable moments when white people are confronted with racism and quite frankly, their role in that racism. These moments

often evoke an emotional response described by DiAngelo (2018) as *white fragility*. This response can take the form of denial, deflection, or even anger, and serves to short-circuit any attempt at dialogue, making the challenges of racism in society difficult to address (DiAngelo, 2018).

The colorblindness described previously is a typical white fragility response to racism. DiAngelo (2018) names colorblindness as a form of racism and describes it by relating the experience of a black man who was serving as a co-presenter at a workshop she was leading:

A white participant said to him, ‘I don’t see race; I don’t see you as black.’ My co-trainer’s response was, ‘Then how will you see racism?’ He then explained to her that he was black, he was confident that she could see this, and that his race meant that he had a very different experience in life than she did. If she were ever going to understand or challenge racism, she would need to acknowledge this difference. Pretending that she did not notice that he was black was not helpful to him in any way, as it denied his reality—indeed, it refused his reality—and kept hers insular and unchallenged. (p. 41-42)

These beliefs of personal colorblindness generalize to a belief that society as a whole is colorblind and race does not matter anymore in a seemingly post-racial culture (Forman, 2004).

Colorblindness is also promoted by a belief that American society as a whole is a meritocracy (Forman, 2004). This myth of the meritocracy holds that society rewards people based on performance, standards of performance are the same for everyone, and that evaluation systems are fair for everyone regardless of race, gender, or ethnicity (Ladson-Billings & Tate, 1995). Seeing society as a whole as fair, obscures the white privilege all around us and makes it impossible to address issues of inequity (McIntosh, 1988).

Another white fragility response can be seen in *aversive racism* (DiAngelo, 2018). This aversive racism can be seen in subtle biases or prejudices that contradict the consciously held convictions of equality, justice, and fairness held by a white person (Dovidio & Gaertner, 2004). Aversive racists believe in fair treatment for all people, but unconsciously are nervous around people who are different from them and avoid interracial involvement (Gaertner & Dovidio, 2005). DiAngelo (2018) describes several ways in which this aversive racism is expressed:

- Rationalizing racial segregation as unfortunate but necessary to access “good schools”
- Rationalizing that our workplaces are virtually all white because people of color just don’t apply
- Avoiding direct racial language and using racially coded terms such as *urban*, *underprivileged*, *diverse*, *sketchy*, and *good neighborhoods*
- Denying that we have few cross-racial relationships by proclaiming how diverse our community or workplace is
- Attributing inequality between whites and people of color to causes other than racism (p. 43-44)

Finally, white fragility allows white people to claim to be *innocent* of race, and the burden of racism is placed onto people of color, as they are assumed to be more prone to crime and violence (DiAngelo, 2018). Ironically, this belief has been used through the years as justification for unspeakable acts of violence perpetrated against black people by white people (DiAngelo, 2018). Additionally, it is this belief that results in an uneven distribution of justice, as black offenders are viewed to be prone

to violence, but white offenders are viewed to be the victims of external factors (DiAngelo, 2018). As DiAngelo (2018) states, white people “continually receive the benefit of the doubt not granted to people of color—our race alone helps establish our innocence” (p. 63).

Deficit Language and Educational Equity

The effects of racism and white fragility on education are often seen in the language we use. Often, we speak of inequity in education by talking about the achievement gap between groups, as in white students and students of color. This language is problematic for many reasons. First, deficit language casts issues of inequity as arising from deficiencies in the groups themselves (Gutiérrez, 2008). It echoes the language of cultural deficit theories of long ago (e.g, Hess & Shipman, 1965), questioning the commitment of parents, the preparation of students, or highlighting other cultural influences negatively impacting the ability of students to benefit from schooling (Ladson-Billings, 2007). Second, achievement gap language further polarizes our discourse and reduces individuals to nothing more than their race or their socio-economic status (Carey, 2014). Third, the achievement gap places groups in conflict with each other, without recognizing the barriers and obstacles that marginalized groups must overcome (Gutiérrez, 2014). Finally, achievement gap language fixes our gaze on groups, and we become consumed with differences in groups instead of the needs of individual students (Gutiérrez, 2014).

Much of the talk about equity has been phrased in gap language proceeding from a deficit mindset, but a number of scholars have emerged to challenge this lens (Gutiérrez, 2008, 2014; Flores, 2007; Ladson-Billings, 2006; Martin 2012, 2015). For

instance, Ladson-Billings (2006) challenges us to avoid deficit thinking and achievement gaps, in favor of looking at the educational debt, considering a debt that has been accrued over time, the result of years of educational inequity. Flores (2007) proposes that we focus on differences in opportunities - the opportunity gap.

Dimensions of Equity

Finally, it is necessary to discuss how the concept of equity is operationalized within this study. First, equity is different from equality. Equality implies sameness, while equity implies fairness or justice (Espinoza, 2007). Equity is often thought of in terms of three equalities: equal access, equal outcomes, and equal opportunities (Castelli, Ragazzi, & Crescentini, 2012). Conceptions of equity that only consider issues of achievement or equal outcomes are insufficient as they promote an emphasis on the achievement gap and fail to acknowledge the differences in opportunities available to students (Gutiérrez, 2008). In the same way, conceptions that focus only on issues of equal access or equal outcomes fail to consider the societal power structures that impact the educational attainment of students of color (Gutiérrez, 2012). Providing equal opportunity requires that these identity and power issues are considered (Roberts, 1968). Thus, Gutiérrez (2012) frames the understanding of equity through a model that focuses on four dimensions: *access*, *achievement*, *identity*, and *power*.

Access refers to the availability of quality teachers, challenging curriculum, and other in-school resources, which Oakes (1990) found to be inequitably distributed. Achievement refers to academic measures of success such as grades or standardized test scores (Gutiérrez, 2012). Gutiérrez (2012) describes identity as both a mirror and a

window, allowing students to better understand themselves and broaden their horizons through their connection to mathematics. The power dimension sees mathematics as an agent of social change, challenging existing power structures in society and mathematics itself (Gutstein, 2003).

In the four-dimensional model proposed by Gutiérrez (2002), access and achievement are placed along the dominant axis, as they represent the traditional views of equity as measured by most standard accountability measures. Identity and power fall on the critical axis, representing dimensions of mathematics education that address racism and power structures that impact student mathematical identities (Gutiérrez, 2002). The intersection of these two axes is referred to by Gutiérrez (2002) as *Nepantla*, a Spanish word meaning the space between, referring to the tension between these two perspectives on equity. This model is shown in Figure 1.1. In summary, this model proposed by Gutiérrez (2002) is a critique of traditional and reform mathematics, challenging the racism inherent in mathematics education in the United States. This model will be used in this study to categorize mathematics teacher conceptions of equity.

Methodology

For this study, a transformative research paradigm is applied, seeing diversity and inequity in the world and viewing research as a tool for social justice, seeking to eradicate inequities (Mertens, 2003). The transformative worldview sees reality as multiple and constructed through social interaction, influenced by political, cultural, and economic forces (Mertens, 2010). In this research, I am examining high school mathematics teacher conceptions of equity and must recognize that understanding

teacher beliefs about teaching and learning is paramount to improving teacher practice and effectiveness (Bryan & Atwater, 2002). the transformative paradigm recognizes that knowledge of realities is formed through interaction (Mertens, 2007). Although a primary tool of this research is a survey, the open-ended nature of the questions allows high school mathematics teachers to interact with the survey, gaining insight into conceptions of equity.

Methodologically, the transformative worldview requires the use of qualitative methods (Mertens, 2010). Creswell and Creswell (2017) describe qualitative methods as helpful to explore the meaning that groups of individuals give to a phenomenon. In this study, the conceptions that high school mathematics teachers in a large, suburban district in the southern United States were explored. Qualitative methods involve open-ended questions and iterative layers of analysis (Creswell and Creswell, 2017).

Research Questions

By examining the conceptions of equity of high school mathematics teachers, the following research questions will be addressed:

- 1) What are high school mathematics teacher conceptions of equity within the district and how do these conceptions align with the four dimensions of equity proposed by Gutiérrez (2012)?
- 2) In what ways are these conceptions of equity expressed using opportunity or deficit language?
- 3) How are colorblindness and white fragility expressed in these conceptions of equity?

By examining these questions, a picture of the conceptions of equity of high school mathematics teachers in the district will come into focus. Also, this study will give insight into mindsets of teachers as they address conceptions of equity.

Setting

As indicated earlier, this study was done in a large, suburban high school in the southern United States. The district studied is located in the suburbs of a large city and has a student population of well over one hundred thousand students. There are thirteen high schools in the district, most of which have over three thousand students each. According to most recent data (2018-2019), the district as a whole is around forty-five percent Hispanic, twenty-five percent white, and eighteen percent African American. The district also has around fifty percent of its students classified as economically disadvantaged. It is a district that prides itself on diversity and academic success. The district stresses success for all, concentrating heavily on providing assistance to economically disadvantaged students.

In receiving approval to work with the district, I was allowed to study a subset of seven of those high schools. Those seven high schools are representative of the rest of the district with the remaining high schools having similar demographics. Six of the high schools were comprehensive high schools with large student populations over three thousand, and one of the high schools was an alternative high school with a small population of less than three hundred. Of the seven high schools, five had Hispanic populations of over fifty percent, one had a Hispanic population just below fifty percent, and one had a Hispanic population of about twenty-five percent. Just one of the campuses had a student population made up of a majority of white students,

with three of the campuses having a white student population of less than ten percent. The African American student populations at the campuses ranged from a minimum of ten percent to a maximum of thirty percent. The demographics of the seven high schools can be seen in Appendix A.

Participants

The participants in the study were high school mathematics teachers at the seven campuses within the district. Together the seven high schools had approximately two hundred mathematics teachers. Email invitations to participate in a survey were sent by the district office to each member of the mathematics departments at the seven high schools. Teachers were not required to participate, and submission of the survey served as consent for the participants. Thirty teachers responded, but one response was incomplete and removed from the data, leaving twenty-nine participants, for a response rate of approximately fifteen percent. The number of participants from each of the seven high schools is also included in Appendix A.

Overall, the participants were mostly white teachers, with a large majority having over ten years of teaching experience (see Appendix B). In the district, almost seventy percent of the teachers are white, approximately fifteen percent of the teachers Hispanic, and around ten percent of the teachers are African American. Around half of the participants were veteran teachers with over fifteen years of experience. Only two of the participants had been teaching for less than five years. Over half of the participants had taught at their current school for more than ten years.

Data Collection

Data were collected by means of a qualitative survey. Although not often mentioned in methods textbooks, several authors describe the value of the qualitative survey and methods used in analysis (Fink, 2003; Jansen, 2010). Fink (2003) describes qualitative surveys as useful for exploring the diversity in a population. In this case the qualitative study is used to examine the diversity of mathematics teacher conceptions of equity. It consists of open-ended questions, designed to explore a given phenomenon (Jansen, 2010).

The survey was distributed as a Google Form, allowing respondents complete anonymity, as addresses were not collected. The survey began with questions regarding the participant's school setting, race, and years of teaching experience, both in their current setting and in total. These questions were asked in a multiple choice format and used to give some context to the study. Note that ethnicity and gender were omitted from the survey. Gender was omitted in order to focus the study. In addition, a short answer response item asked the participant to identify the names of courses taught, as well as the level of the classes (regular, advanced, AP, etc.).

The survey then included open-ended questions regarding their conceptions of equity in mathematics. First, the participants were asked what it meant for mathematics education to be equitable in the United States. Participants were then asked if they believed that mathematics education was equitable and instructed to explain their response. Next, participants were asked about obstacles to equity within the United States, their school, and their classroom. Finally, participants were asked to

identify structures in the school and in the classroom that promote equity. The Google Form survey is included in Appendix C.

Data Analysis

Initially, the participant responses were examined in light of the four dimensions of equity proposed by Gutiérrez (2012). Access, achievement, identity, and power were considered concepts suggesting concept coding (Miles, Huberman, & Saldaña, 2019). Each concept was defined as described by Gutierrez (2012). Access refers to availability of resources, such as teachers and courses. Achievement occurs not only to standardized test scores, but also to participation in advanced courses. Identity involves cultural issues and relevance of mathematics to students. Finally, power involves student voice and mathematics as a tool for promoting social justice. Thus, initial coding served to classify participant responses according to the four dimensions of equity.

During this coding, it became apparent that for each dimension, certain phrases or concepts for each dimension were used to describe equity, while other phrases or concepts were used to describe inequity. This became a second level of coding, noting that often the concepts describing inequity were expressed using deficit language. Appendix D identifies certain key phrases or ideas expressed in the data and how they were coded.

The responses for each participant were then analyzed holistically, examining the frequency with which each dimension appeared within the participant's answers. A graphical display was then constructed to give a visual representation of the data

(Miles, Huberman, & Saldaña, 2019). This graphical display assists in visualizing the focus of the conceptions of equity of the participants.

As previously mentioned, phrases and concepts describing inequity were often expressed using deficit language. This suggested a second coding pass of the participant responses focused specifically on the language of the responses. The language was analyzed specifically for language indicating opportunity, as well as deficit language. Again, the responses were coded conceptually for opportunity and deficit language.

Acknowledging the CRT belief in the preeminence of racism, the examples of deficit language were then coded a second time. This second coding served to cluster the responses around broader categories (Miles, Huberman, & Saldaña, 2019), specifically overt racial references and coded racial references, as well as references to socioeconomic status (SES). Appendix E illustrates the connection of racial and SES language with deficit language. Through this analysis, the dominance of SES references compared to racial (overt and coded) references was noted. Thus, the overall frequencies of racial and SES references were compared.

After analyzing the data using both dimensions of equity and language filters, a picture began to emerge of high school teacher conceptions of equity in this large, suburban school district in the southern United States. These findings will now be presented.

Findings

In discussing the findings of this study, I begin by comparing the participant responses with the four-dimensional model of equity proposed by Gutiérrez (2002).

Next, the language of the responses will be discussed, looking at deficit language, and language exhibiting colorblindness, and white fragility.

Dimensions of equity

To begin, the responses will be discussed in terms of references to access, achievement, identity, and power (Gutiérrez, 2002). First, a graphical display of individual participant conceptions of equity will be explained. Second, common themes emerging from participant responses will be discussed using excerpts from those responses.

A visual model of participant conceptions of equity. To better visualize the conceptions of equity of the participants in the study, the frequency with which each dimension occurred within the answers of each participant was calculated. The answers of three of the participants did not show a conception of equity addressing any of the four dimensions and were labeled as unresponsive.

As in the Gutiérrez (2002) model, access and achievement were placed on the dominant or horizontal axis, and identity and power were placed on the critical or vertical axis. The dominant axis was considered a continuum, with access on the positive horizontal axis and achievement on the negative horizontal axis. The horizontal coordinate for each participant was calculated as follows:

$$dominant = freq_{access} - freq_{achievement}$$

Similarly, the vertical axis was considered a continuum, with identity on the positive vertical axis and power on the negative vertical axis. The vertical coordinate for each participant was calculated as follows:

$$critical = freq_{identity} - freq_{power}$$

Thus, each participant can be represented by an ordered pair of the form:

$$(dominant, critical)$$

The frequency data of the participants were plotted on a coordinate plane. The data for the twenty-nine participants is shown in Appendix F.

Looking at this display gives insight into conceptions of equity. This graphical display is only intended to measure dominance of dimensions. In other words, looking at this display only indicates which dimensions are more prominent in conceptions of equity. Since this representation is based on frequency, locating points near the origin does not necessarily indicate a *balanced* view of equity. Locations near the origin could represent responses that made little reference to any of the four dimensions of equity. Such was the case with the three participants who were labeled as non-responsive.

Dimensions of Equity

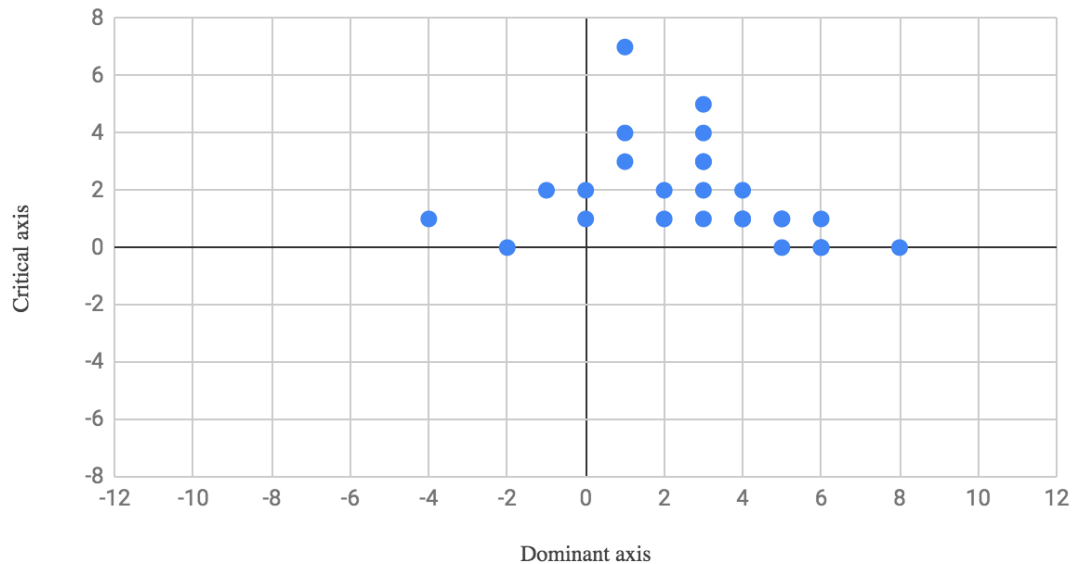


Figure 3.1

Upon examination of this graph (see Figure 3.1), we see that seventeen of the participants reside in the first quadrant, suggesting that their conceptions of equity were more concerned with access than achievement, and centered more on identity than on issues of power. Three of the participants fall in the second quadrant, meaning they appear more concerned with achievement than with access. None of the participants gave responses that focused more on power issues than identity issues, and overall, power issues were barely mentioned at all. Thus, none of the participants fell below the dominant axis.

Common themes in responses. The survey instrument asked participants several open-ended questions regarding conceptions of equity. First, participants were asked to explain what it means for mathematics education to be equitable and what would indicate that mathematics education in the United States was not equitable. Second, participants were asked if they believed that mathematics education in the United States was equitable. Third, participants were asked what obstacles exist to frustrate equity in mathematics education. Finally, participants were asked to identify structures or processes at their school or in their classroom that serve to promote equity. Analyzing participant responses in light of the four dimensions of equity highlighted several important themes.

Definition of equity. Participant definitions of equity tended to center around access. For example, Participant 9, a white educator whose responses focused solely on access and identity, indicated that equity ensures that mathematics is “accessible to students of all races, backgrounds, and socio-economic status.” Equality of opportunity was the most often expressed ideal (expressed in some form by fifteen of

the twenty-nine participants), as demonstrated by Participant 21, who explained, “Every student has the same opportunities to learn and succeed.” Several participants centered on equality of access to educational resources, illustrated by this quote from Participant 13: “Equity should involve equal opportunity with class offerings, class sizes, and teacher experience.” Additionally, some participants mentioned equity of standards or course objectives, as Participant 7 commented, “The standards need to be similar to each other in every state.”

A few participants’ conceptions of equity involved achievement, indicating that equity involves equality of outcomes. First, equity involves student levels of mastery, as Participant 12 explains, “All students [are] to be held to the same level of mastery.” Second, equity involves performance on standardized exams such as the ACT or SAT, as Participant 24 remarked, “Student[s] should take a standardized test in their junior year (such as SAT or ACT) to compare how schools are doing.” Additionally, some participants felt that one of the signs that education is not equitable can be found in achievement standards, as Participant 18 noted that “the difference in state standards as far as what is considered proficient in mathematics” was noticeable.

A few participants also saw identity as a component of equity. To these participants, equity must connect to the life of the student, as explained by Participant 26, a white educator whose responses centered on identity with no mention of access. This participant claimed, “[Mathematics] needs to be taught in a way that ALL students can use and apply in life.” Participant 17 claimed that equitable education is “applicable to students demographic and geographic culture,” while Participant 18 highlights the importance of education being “socially and culturally relevant.”

Finally, several participants noted the individual nature of education. As Participant 23 stated: “As a teacher it is our job to figure out who needs what and how to best equitably help them on an individual basis.”

Is education in the United State equitable? Next, participants were asked to comment on the equity of mathematics education in the United States with split results. The majority of participants (approximately sixty percent) indicated that they did not believe that mathematics education was equitable. Many attribute this to a lack of access to opportunity, emphasized by inequitable distribution of resources. Participant 21 explains, “I don't feel that all students are given the same opportunities. Some schools have more resources available to students. Some teachers are better than others. There are several things that can affect students' ability to learn.” Other participants focused on the difference in standards, as Participant 14 explains, “each state can create their own curriculum and each school district can interpret that curriculum differently, which each high school then implements/teaches a little differently.” Additionally, one participant cited differences in achievement levels as evidence of inequity. Interestingly, one of the few mentions of the power dimension of equity occurred as Participant 26 said, “The education system in the US is geared towards English speaking, already-educated Caucasians.” Lastly, some participants used identity issues to justify their view of mathematics education as inequitable, claiming that mathematics education is inequitable because, in the words of Participant 16, “language and cultural expectations that ‘families’ impart on their students vary widely.”

About twenty percent of the participants claimed that they believed mathematics education in the United States to be equitable. Most of these participants referenced access, illustrated by Participant 9 who said, “Students are not generally denied access to an education.” Similarly, Participant 3 wrote, “I feel everyone has the opportunity for a quality math education.” More specifically, Participant 1 explained, “Students are generally allowed to take the classes that allow them upward mobility in society.” However, this participant, like several others, qualified their judgment of equity in education with the following statement: “While some students and/or families choose not to take advantage of the opportunities offered, those opportunities are there for those that can and will attempt.” This statement seems to be an attempt to explain observed inequity, while still claiming education itself to be equitable.

The final twenty percent of the participants were noncommittal about equity in mathematics education in the United States. As Participant 20 observed, “I haven't compared the scope and sequences of other school districts, so I cannot comment.” Another participant claimed that they were not qualified to answer. It is worth noting that several of the participants who were unsure about equity of mathematics education in the United States appeared to have taught at their current setting for their entire teaching career.

Obstacles to equity. Participants were asked to identify obstacles to equity in mathematics education in the United States, in their school, and in their classroom. In general, the number of obstacles identified decreased as the focus changed from nationally, to the school level, and finally to the classroom level. Additionally, the focus of those obstacles seemed to change as well. Obstacles to equity in the

classroom tended to be focused much more on student abilities and efforts, while obstacles to equity in the United States tended to be more structural and cultural issues.

Many participants identified access to resources as a major obstacle to equity in mathematics education. Participant 21 indicated, “I feel like some schools/districts have more resources available to students than others. I think that can have a big impact on achievement and success.” In particular, participants focused on resources to hire quality teachers, as Participant 14 said, “higher paying districts will attract better and more qualified teachers that can teach more advanced mathematics classes.” Some participants even commented on the competency of other teachers, saying, “Some teachers are not motivated to the same level.”

Achievement issues were named as obstacles to equity. Participants expressed very negative feelings toward standardized tests, with several participants proposing elimination of those standardized tests or expressed pressures felt as teachers “teach to the test”. Additionally, frustrations and pressures were expressed with grading standards as seen in this quote from Participant 15: “Setting unrealistic standards puts pressure on teachers to make courses easier so more kids can succeed. There's an automatic assumption that teachers who pass 95% of their kids are more effective educators than teachers who only pass 70% of them.” Participant 21 elaborated, “Teachers don’t want to up the rigor for fear of failing too many low students.”

Many of the obstacles to equity identified by teachers were behavioral or cultural in nature. Behavior was listed as an obstacle by several participants, with comments similar to the following: “It's hard to do certain activities when they get out

of control.” Cultural attitudes towards education and parental involvement were listed as obstacles to equity. Many participant comments echoed this sentiment from Participant 28: “Some students lack the support at home and do not feel that they can be successful thereby choosing to not engage in higher level mathematics courses.” This participant elaborated further, “I also believe that within society there are those who do not encourage students with various backgrounds to pursue courses in higher levels of mathematics.” Participant 29 even admitted that there was a “Lack of understanding by teachers of cultural and behavioral issues students may exhibit that we view as limiting.”

Structures to promote equity. The last questions on the survey inquired about structures or procedures in place to promote equity both schoolwide and within the classroom. First, several participants indicated that access is a key to promoting equity, as Participant 2 explained, “every course is offered to all students.” Participant 9 added, “[Students] have access to education at the highest levels. Access for all.” Specifically, participants mentioned that students had the ability to move to the advanced track. Additionally, several participants mentioned access to technology, specifically graphing calculators.

Interestingly, even though mentions of identity in participant conceptions of equity were few, a large number of the structures or procedures designed to promote equity specifically addressed issues of identity. This suggests a knowledge that groups of students are not being successful, but a hesitancy to name those groups. Several participants referenced staff development opportunities that had been provided. Participant 4 mentioned, “We've done some studies in the past regarding cultural

responsiveness, but that definitely needs to be readdressed.” Participant 16 referred to “Staff development and conversations about ‘poverty’ mindsets and means to engage students.” Participants also promoted the importance of differentiation, as Participant 5 remarked, “[I] try extensively to tie concepts to the real-world, when possible.”

Finally, two areas of emphasis of the district were also mentioned as structures promoting equity. First, many participants mentioned team planning. In the district, curriculum is very centralized, and subject teams plan together in an effort to standardize instruction. In discussing team planning, Participant 14 said, “This ensures that no matter which teacher they have for precal, they are getting about the same precalculus education at our school.” Secondly, the district has been promoting blended learning as a way to increase student engagement. Participants seemed to believe that blended learning increased equity. Participant 16 remarked, “[The] current emphasis is on developing student ability to select and achieve objectives. They establish and track their own progress through blended learning.”

Response Language

The language that participants used to respond to questions gives a window into beliefs and biases. Several themes emerged when looking at the language of participant responses. First, although the overall tone of the responses was more opportunistic in nature, deficit language was observed in several specific areas. Second, there was a noticeable absence of references to race, hinting at attempts at colorblindness. In fact, within these responses we see evidence of white fragility.

Deficit language. Overall, participant responses contained language of opportunity as opposed to deficit language. As discussed previously, participant

responses tended to emphasize access, and this emphasis on access was generally expressed positively using opportunity language. This was particularly evident as participants articulated their ideas about equity. Many participants echoed the thoughts of Participant 5, who declared, “All students should be given the same opportunities to be successful in all math courses.” Participant 13 was even more specific, stating, “I think [education] should be equitable across gender lines, racial lines, and socio-economic lines. Equity should involve equal opportunity with class offerings, class sizes, and teacher experience.” This response is representative of the overall tone of the participant responses, as the participants expressed the belief that equity is achieved through opportunity and access to educational resources.

When responding to obstacles, however, the language naturally began to take on a more negative tone. Many of the responses tended to focus on the identities of students, often from a deficit perspective. First, many responses focused on the behavior of students. When asked about obstacles to equity, Participant 10 responded, “Behavior. It's hard to do certain activities when they get out of control...”. Many of the teachers fixated on the preparation level of students, as seen in this comment from Participant 11: “Some are more advanced, but others are behind.” In addition, several responses focused on the effort level or expectations of students, with Participant 26 commenting, “I am not sure that the students always use these opportunities to their fullest advantage.”

Participants also identified familial and cultural issues as obstacles to equity, and the language of these responses was more deficit oriented in nature. As Participant 28 explained, “Some students lack the support at home and do not feel that they can be

successful.” Participant 11 responded, “I believe that where I teach the expectations in the home are far less than those of the [school].” Teacher views of the effects of home could be summed up in the following response from Participant 24: “Family life for many of my students is not conducive to working outside of class.” The effects of language barriers were often represented as a deficit as illustrated by this comment, again from Participant 24: “When a school district or geographical area is having to deal with many students who are not English-speaking.....that makes that area ‘slow down’ it[s] education to help those kids catch up.” Overall, when comments mentioned student identities, these identities were often presented as a deficit.

When identifying relevance to students’ lives as an obstacle to equity, however, the language took on a more opportunistic tone, expressing a desire for change in mathematics education itself. Several participants commented that for mathematics education to be equitable, “[mathematics] needs to be taught in a way that ALL students can use and apply in life.” Many teachers, such as Participant 4, expressed this sentiment: “I believe that we don’t do enough to make the math relevant to the real world, or to students’ interests.” Participant 5 explained, “I use the calculator as much as possible and try extensively to tie concepts to the real-world, when possible.” Many teachers critiqued mathematics education as demonstrated by Participant 6 who commented that schools are often “not exposing socioeconomically disadvantaged students to ‘real world’ math and instead just doing packets or drill and kill practice.”

Race and ethnicity. In viewing the responses as a whole, there were surprisingly few overt references to race or ethnicity. Most of these overt references

were in response to questions about the definition of equity. Interestingly, there was very little mention of race in regard to obstacles to equity, and there was no mention of race when addressing obstacles to equity within the school or classroom. Many of the racial references were general in nature. As Participant 28 proclaimed, “I believe that in order to be equitable, that all levels of math should be accessible to each student regardless of race, ethnicity, religion, gender, economic status, or impairment.” Participant 13 responded, “I think it should be equitable across gender lines, racial lines, and socio-economic lines.” Specific responses tended to focus on ethnicity instead of race, as Participant 26 who explained, “A lot of my students are Hispanic and it seems like there is not a lot of support on education.” Participant 4 quoted stereotypes, saying that there was a belief among students in the classroom that “Asians are good at math.”

The responses included two coded references to race. First, several responses referred to culture. These references to culture most often occurred in discussions of obstacles to equity, as Participant 29 who claimed that one of the obstacles to equity in the classroom was a “lack of understanding by teachers of cultural and behavioral issues students may exhibit that we view as limiting”. Participant 4 identified the lack of staff diversity by saying, “Our math department's staff is not very culturally diverse, so our students don't necessarily feel represented by their teachers.” Several participants also focused on cultural expectations, as seen in this comment by Participant 1: “Cultural feelings that an education is not important and/or useful.”

The responses also commented on language barriers, which is a coded reference to ethnicity. As Participant 3 explained, “English as a second language is a

barrier.” Several participants commented on the disadvantage that English language learners (ELL) faced in the educational system in the United States. Additionally, several participants identified the ELL programs at their schools as structures designed to promote equity.

When analyzing the responses, socioeconomic status (SES) was mentioned roughly twice as often as issues of race. Participant 23 summed up beliefs about SES in the following comment: “Socio-economic diversity in our school creates obstacles for many students but perfect assent to others.” Participant 23 commented further, “Socio-economic status creates the most inequality in education.” This sentiment seemed to be shared by many of the participants. Participants also noted that SES affected access, with Participant 14 explaining, “Some lower socio-economic areas cannot compensate teachers as well, which may limit the type and amount of mathematics courses they can offer in the district.”

Discussion

The findings of this study seem to point to a colorblindness that is present in white educators in the district, observed in the limited number of references to race in the responses of the mostly white participants when prompted to discuss issues of equity. This colorblindness is expressed in a dominance of the access and achievement dimensions as delineated by Gutiérrez (2012) and stands in direct opposition to Bell’s (2018) assertion that race is both a prevalent and permanent force in society. Additionally, this colorblindness is an expression of white fragility, and serves to preserve the status quo, preventing meaningful advances pertaining to issues of equity

(DiAngelo, 2018). Instead, the participants seemed to fixate on SES, as opposed to race, a form of aversive racism (DiAngelo, 2018).

In this section, I discuss the findings of this study in light of CRT, emphasizing colorblindness. Additionally, white fragility within the responses of the study participants will be discussed. The conceptions of equity of the participants will be connected to CRT using the four-dimensional model of equity proposed by Gutiérrez (2012). Finally, recommendations for current practice and future research will be discussed.

Race and Equity

Many scholars advocate for the prominence of CRT in discussions of equity issues in education (DeCuir & Dixson, 2004; Ladson-Billings, 1998; Ladson-Billings & Tate, 1995). One of the chief tenets of CRT is the pervasiveness and permanence of racism (Bell, 1991). In describing the role of CRT in education, Decuir and Dixson (2004) comment:

In order to fully utilize CRT in education, researchers must remain critical of race, and how it is deployed. CRT implies that *race* should be the center of focus and charges researchers to *critique* school practices and policies that are both overtly and covertly racist. (p. 30)

The enemy of this focus on race is colorblindness, which promotes “conceptions of equality, expressed in rules that insist only on treatment that is the same across the board” (Delgado & Stefancic, 2017, p. 32). In this study, participant conceptions of equity centered on the dimension of access (Gutiérrez, 2012), indicating a desire for all students to be given the same or equal opportunities. Coupled with the infrequency of actual mentions of race, this suggests a

colorblindness of white high school mathematics teachers as described by Delgado and Stefancic (2017).

Interestingly, more than half of the teachers felt that education in the United States was inequitable, citing lack of access and inequitable distribution of resources as the reasons for this inequity. This inequity, however, was rarely attributed to issues of race. In fact, when asked about obstacles to equity, the responses tended to point to student abilities, effort, or low SES effects. This illustrates interest convergence, as ability, effort, or low SES effects impact white students as well as students of color. In addition, student identity issues, such as cultural or familial attitudes toward education, were viewed in a negative light and seen as obstacles to equity. This seems to indicate a desire to deflect attention away from discussion of race, a chief white fragility response (DiAngelo, 2018).

Consider the responses of Participant 5, a white educator teaching an upper level, dual-credit math class. The participant unequivocally stated that mathematics education in the United States was inequitable, with a conception of equity that focused on access. Race was never specifically mentioned by the participant, but SES was mentioned on at least two occasions, once in conjunction with the term *at risk*. In addition, several references were made to a lack of parental involvement and lack of previous preparation. Interestingly however, Participant 5 did reference an unwillingness in mathematics teachers to engage in progressive pedagogies.

Participant 6, a white educator, has a conception of equity that is centered on issues of identity. The issues of identity focused on, however, completely avoid issues of race, focusing instead on SES. The participant proclaims that math is inequitable

because we are “not exposing socioeconomically disadvantaged students to ‘real world’ math and instead just doing packets or drill and kill practice.” The participant talks about interventions such as a free meal program for students.

In addition, as previously mentioned, the number and focus of obstacles to equity changed as the participants were asked about obstacles to equity in the United States, in the school, and in the classroom. As the focus gets closer to home, the number of obstacles to equity seems to decrease and the focus of those obstacles to equity becomes more student-centric. This reflects a refusal to see racism within their own classroom and practice, another key white fragility response (DiAngelo, 2018).

As an example, consider the responses regarding obstacles of equity given by Participant 14. Participant 14 recognizes access to quality teachers and advanced curriculum as an obstacle to equity in mathematics education in the United States. When considering obstacles within the school, the participant cites the need for more teachers to teach advanced math classes, as well as a need to “push kids to challenge themselves and take the most rigorous math class that they can be successful in.” Finally, when considering obstacles to equity in the classroom, the participant refers to the varying ability levels and levels of preparation of the students.

Colorblindness is also demonstrated by the dimensions of equity. Access and achievement are located on the dominant axis because they reflect the status quo in this society, governed by standardized testing, and Eurocentric mathematics, and privileging the elite (Gutiérrez, 2002). Power and identity are located on the critical axis, signifying a connection to CRT, as they are dimensions that challenge power structures that oppress marginalized groups (Gutiérrez, 2012). As mentioned

previously, the responses of teachers focused on the dominant dimensions of access and achievement, with fewer mentions of the critical dimensions of identity and power. Moreover, many of the mentions of identity were expressed using deficit language. This seems to indicate a hesitancy to address issues of race (Gillborn, 2015), and the deficit nature of mentions of identity hint at a lack of comfort in discussing issues of race, another key component of white fragility (DiAngelo, 2018).

The intersection between race and SES, and the ways in which SES was used to obscure issues of racial inequity, is an essential finding and needs to be amplified within the theoretical framework of this study. Intersectionality, referring to the combination of multiple identities and sources of inequality, is an important concept dealing with racism that is considered in CRT literature (Gillborn, 2015). Crenshaw (1989) argued, discussing the treatment of Black women by the courts, that often identities combine to form a multi-layered system of identity and must be considered as such, avoiding a single axis interpretation of identity. A person's identity is more than a single, unitary identity (Delgado & Stefancic, 2017). It is important to recognize that race and SES can be part of the identities of students, and the relationship between the two must be studied.

As I examine the intersection of race and SES in participant responses, it is clear that the participants view race and SES as separate and do not see the intersectionality of the two. Thus, the focus of the participants, particularly the white participants, on SES as it relates to issues of equity, is another form of colorblindness and white fragility. It is important to recognize the connection between race and SES, as students of color, particularly black students, are much more likely to be from low

SES families than white students (Venkatesan, 2018). Additionally, Lubienski (2002) found that the differences in achievement between black and white students persisted even after considering SES, suggesting that race is a vital contributor to issues of equity. The focus on SES, then, can be viewed as a form of aversive racism, as the participants project colorblindness by projecting inequity on a cause other than racism, namely SES. Additionally, focus on SES can also be viewed as an enactment of respectability politics, as economic uplift for all is valued without acknowledgement of the differing needs of specific groups, especially marginalized groups (Harris, 2014).

Implications for practice

This colorblindness and white fragility that exists in a predominantly white teacher population must be addressed if any progress is to be made regarding issues of equity in mathematics education, and in particular, high school mathematics teacher conceptions of equity. Teacher conceptions of equity can be addressed in four main ways: 1) diversifying the teaching force, 2) reforms in teacher education programs, 3) curricular interventions, and 4) professional development experiences designed to help teachers understand racism and their complicity in it. In this section, I address each intervention, paying extra attention to curricular interventions and professional development, since the participants in this study were inservice teachers.

Diversifying the teaching force. There is a need to increase the diversity of the teaching force. In the United States, the teacher workforce does not reflect the diversity of the student population, as students of color make up over half of the student population (McFarland et al., 2017), but teachers of color make up less than

twenty percent of the teacher population (Loewus, 2017). The lack of teacher diversity, specifically in regards to race, must be addressed for several reasons outlined by Bireda and Chait (2011). First, fewer people of color are willing to assume careers in the classroom. Second, the lack of teachers of color may reflect a lack of applicants meeting qualifications, possibly the result of racism they have experienced in the education process. Third, retention of these teachers of color is especially difficult which may reflect workplace environments not welcoming to persons of color. Fourth, a lack of teachers of color makes it difficult for students to see themselves in mathematics (Gutiérrez, 2012). Diversifying the teaching force has been an emphasis for many years with some progress, but much more is needed.

Teacher education programs. Another way to combat the colorblindness and white fragility of white teachers is to affect preservice teachers before they reach the teaching force. Many researchers have suggested changes to teacher education programs to promote social justice (Boylan & Woolsey, 2015; Kaur, 2012; Nieto, 2000; Sleeter, 2008; Yosso & Solorzano, 2001). Boylan and Woolsey (2015) suggest helping teacher education students to understand their own identity, developing pedagogies focusing on empathy, discomfort, compassion, and respect. Nieto (2000) suggests that teacher education programs must engage preservice, inservice, and educational institutions to push for social justice. Finally, Yosso and Solorzano (2001) discuss pedagogies to confront stereotypes and racial biases of preservice teachers in an effort to increase awareness of racism both personally and in education as a whole.

Curricular interventions. There are several curricular interventions described in research to promote equity. Most of these interventions attempt to address the

critical dimensions of equity, namely identity and power. A few of these are discussed in the paragraphs that follow.

Elimination of tracking. One of the most deeply ingrained and insidious policies that creates inequity is tracking. Tracking is a barrier affecting the access dimension of education. Tracking at its core is designed to sort or stratify students, and therefore, must contribute to inequities in education (Oakes, 2005). Gamoran (2010) proposes eliminating or at least limiting the pervasiveness of tracking. He recognizes, however, the inherent difficulties in eliminating tracking, and acknowledges that raising the academic rigor for lower-level students, ensuring that all students are given access to challenging mathematics, will diminish inequity.

Culturally responsive pedagogy. Culturally responsive pedagogy (CRP) involves teaching pedagogies that build on student cultural resources, considering them to be resources rather than barriers (Aceves & Orosco, 2014). CRP addresses the identity dimension of equity. Teachers must be prepared through preservice education or professional development opportunities to implement CRP, as teachers must understand the cultures of students, be able to design culturally relevant curricula, and know how to build a classroom culture that is responsive to and appreciative of the cultures represented in it (Gay, 2002).

Ethnomathematics. In the simplest sense, ethnomathematics addresses the identity dimension of equity, acknowledging that the body of knowledge we know as mathematics has both a cultural and historical component and looks at mathematical practices within student cultures, both formal and informal, which contribute to the mathematical identities of students (d'Ambrosio, 1985). Ethnomathematics recognizes

that different people from different cultures produce different mathematics, so mathematics education cannot be thought of as a single body of knowledge taught through a single process, but rather a process beginning with the culture of the student, with the goal of developing their mathematical abilities within a cultural framework (Borba, 1990).

Professional development experiences. Professional development can be a way to engage colorblindness, as in this study by Blaisdell (2005). Through his interaction with high school teachers, Blaisdell (2005) encountered colorblindness, challenging white teachers by exposing them to CRT writings. He found this to be helpful, allowing them to begin to recognize the impacts of race and recognize curriculum as a property, or more accurately, a construct of whiteness (Martin, 2015). As a white educator, I recognize that it is imperative that teachers not only understand racism, but are willing to accept their complicity in it (Blaisdell, 2005; DiAngelo, 2018).

Countering colorblindness in white high school mathematics teachers, however, is made more difficult by white fragility. Often to reduce the stress caused by confronting issues of race and racial inequity, a white teacher will respond by denying racism or becoming angry (DiAngelo, 2018). Vaught and Castagno (2008) report on the attitudes of teachers involved in an equity training, noting that there was little change in teacher attitudes and beliefs about issues of equity, just a restructuring or adjustment of previous attitudes to make them more palatable. Further, Vaught and Castagno (2008) note that, absent institutional change, it is very difficult to change

attitudes of inservice teachers. It requires commitment and willingness to do the hard, slow work.

Further research and Limitations

Doing the hard, slow work of transforming teacher conceptions of equity requires commitment and dedication. This study has cast light on several areas for future research. First, teacher understanding of the intersection of race and SES on issues of equity needs to be studied. Second, the classification of teacher conceptions of equity according to the four dimensions of equity (Gutiérrez, 2012) deserves more investigation. Finally, the effect of white fragility on teacher conceptions of equity, and efforts to confront white fragility in inservice teachers needs to be examined.

The low response rate, approximately fifteen percent of the high school mathematics teachers at the high schools studied, is a limitation of this study. In addition, I was only granted access to teachers in seven of the high schools within the district, although the schools surveyed give a reasonable cross-section of the district as a whole. Second, the omission of a question regarding the ethnicity of the participants, specifically Hispanic versus non-Hispanic, is limiting. In general, the racial and ethnic breakdown of the high school mathematics teachers in the district is comparable to the breakdown of teachers in the district as a whole.

Conclusion

The analysis of participant responses sheds light on high school mathematics teacher conceptions of equity within this suburban district in the southern United States. I close this paper with a summary of these findings.

Equity as access. Viewed collectively, the participant responses paint a picture of a conception of equity focused mostly on access, with an emphasis on providing opportunities to all students. Issues of identity are also prominent, as participants see the individual identities of students as an obstacle to equal access. Achievement issues were also mentioned, with a few of the participants focusing more on achievement than access. Power issues were virtually unmentioned in the responses.

Identity as a deficit. Throughout the participant responses, students' racial, cultural, and socioeconomic identities, when mentioned, were viewed as a deficit, obstructing equity in mathematics education. There seems to be a recognition that many students are at a disadvantage, and this disadvantage is frustrating to teachers. It is impossible to read the responses without detecting a feeling of helplessness and defensiveness in dealing with differing levels of preparation of students, as well as student lack of motivation and effort. It is also important to note that teacher responses acknowledged that the mathematics curriculum is largely irrelevant to large numbers of students, particularly those from low SES backgrounds, assigning the blame for this irrelevance to district and state curriculum standards and standardized testing.

SES instead of race. When addressing student identities, participant responses focused on SES much more often than race. This could be the result of the overall atmosphere of the district, which focuses on nurturing the success of economically disadvantaged students and historically largely avoids language of race. Teachers saw SES as a major obstacle to equity in mathematics, viewing low SES students as having less access to resources, such as quality teachers. Additionally, teachers felt that

students from low SES backgrounds suffered from lower expectations, both individually and at home.

Colorblindness and white fragility. The infrequent mentions of race point to colorblindness present in the conceptions of white high school mathematics teachers. There were infrequent mentions of race when defining equity and discussing obstacles to equity in the United States, but a complete absence of any mention of race when addressing obstacles to equity within the school or classroom. Although the majority of the participants did not feel that education in the United States was equitable, very few actually acknowledged racial issues as obstacles to equity. Instead, they chose to focus on student attitudes, effort, and lack of prerequisite knowledge. If they did mention race as an issue, it was a coded reference, referring to language or culture.

Finally, the responses of the mostly white high school mathematics teachers show a degree of white fragility towards issues of inequity. The unwillingness to name racism is a critical symptom of white fragility (DiAngelo, 2018). Additionally, the focus on student deficiencies in knowledge, behavior, and effort, as well as the focus on SES, appear to be examples of aversive racism (DiAngelo, 2018). Overall, it appears that the participant responses indicate a hesitancy among white high school mathematics teachers to name racism as an obstacle to equity, especially within the classroom environment.

Concluding thoughts. Equity is a concept that is almost universally accepted as desirable. In order to achieve equity in mathematics education, however, equity itself must be clearly defined as there is confusion regarding the terms equity and equality (Espinoza, 2007). In particular, teachers cannot be expected to promote in

their practice a concept that they do not understand. In this research, the conceptions of equity of high school mathematics teachers in a large, suburban district in the south have been examined. These conceptions reveal a concept of equity centered on equal access, with little consideration of the impact of race on inequity.

Only as teachers fully understand their own conceptions will we be able to confront the monumental issues of equity in mathematics education facing us today. It is hoped that this study has contributed to the understanding of teacher conceptions of equity and the connection of these conceptions to CRT and white fragility. As we understand these issues, we can continue to fight to eradicate injustice and inequity in our classrooms.

CHAPTER IV

CONCLUSION

I found myself sitting in one of the hundreds of inservice meetings I have attended in my teaching career. It was a district-wide convocation opening the school year, similar to one I had attended the previous year. There were some opening remarks by various district administrators, including the district superintendent, followed by a keynote address. The previous year, the district meetings were characterized by a theme of *Success for All*, but within the convocation itself, there was little to no mention of race. SES, however, was mentioned throughout the session. Throughout the rest of the district meetings, there were a few elective sessions on equity that dealt with issues of race, but mostly, any discussion on equity was looked at through the lens of class or SES.

This year, however, the keynote speaker strode to the podium and began remarks by proclaiming that the way to move from being a good school district to a great school district was to address issues that were hard to hear. The speaker then began to talk about the impacts of race and the inequities that exist in education along racial lines. Ideas were referenced, such as white fragility (DiAngelo, 2018), that are found throughout this dissertation and highlighted by the two studies that have been presented. In addition, it was clear that the remarks were centered in CRT, with the goal being to impress on the teachers in the building the impact of race on equity in education. The response of the audience was enthusiastic. The address seemed to resonate with the large crowd of teachers present that day.

I was in the final phase of writing this dissertation as I sat in these meetings. Throughout the day, as session after session began to talk about the need to address racial issues in order to truly promote *Success for All*, several of my colleagues who were aware of my doctoral studies said to me, “Hey, aren’t they talking about your dissertation?” I would nod affirmatively, and a feeling of joy began growing as I soaked in what was being presented. Additionally, I was ecstatic at the positive response from educators to the call to address racial inequities within the district.

My joy was tempered, however, by this fact: since the crowd that day was filled with high school mathematics teachers, I could be reasonably sure that among the teachers listening to this address and reacting positively to it, were most, if not all, of the participants in the study outlined in the previous chapter. In the study, most of the participants had conceptions of equity that contained an element of colorblindness and white fragility. Would this address be an “Aha!” moment for them? Or were they listening and agreeing that something needed to be done, but not recognizing that the work needed to start with them? How would this affect their practice as teachers?

Through my personal experience as an educator, I have come to realize that no one wants education to be inequitable or unfair. In fact, as children, one of the first things we shout in the middle of a conflict is, “that’s not fair!”. I, like the majority of educators I have met, got into education because I wanted to make a difference in the lives of students. Admitting that education is not fair or equitable is difficult, because it means that the profession I have dedicated my life to is severely flawed. A majority of the participants in the study were able to recognize that education is inequitable but

were not willing to examine the impact of their own actions or inactions on these issues of equity, or even name sources of inequity.

Although equity is desirable, there is not an agreement as to what it means for education to be equitable, making it difficult or even impossible, to achieve equity. In the research included in this dissertation, the conceptions of equity of high school mathematics teachers were investigated. As I conclude this dissertation, I must focus again on the purpose of the research outlined in Chapter I. The research in this dissertation focused on the following ideas:

- High school mathematics teacher definitions of the concept of equity.
- Barriers to equity in mathematics education identified by high school mathematics
- Interventions high school mathematics teachers identify as addressing issues of equity in mathematics education
- The concepts of race, racism, and white fragility as expressed within the conceptions of equity of high school mathematics teachers

Research Findings

In this research, the conceptions of equity of high school mathematics teachers were studied through the lenses of CRT and a four-dimensional model of equity proposed by Gutiérrez (2002). The autoethnography outlined in Chapter II focused on my conception of equity as an example, paying attention to the development of that conception over time, as well as obstacles that hindered this development. In Chapter III, the conceptions of equity of a group of high school mathematics teachers was studied, comparing those conceptions to a four-dimensional model of equity, as well

as paying special attention to deficit language and evidence of colorblindness and white fragility. In the paragraphs that follow, I will briefly summarize the findings of these two studies and combine the two studies to make observations about high school mathematics teacher conceptions of equity.

Journey towards justice. In Chapter II, the development of my conception of equity was traced through the arc of my teaching career. Moving from complete unawareness of issues of equity, to awareness of issues of equity seen through a deficit lens, to an awareness of issues of equity within the educational system itself. I was then forced to reconcile this newfound conception of equity with the realities of teaching in an educational system rife with inequity. Finally, this led to an understanding of my role as an agent of social change.

Along the way to my current conception of equity I encountered cultural forces such as colorblindness and white fragility. In addition, the traditional teacher career path, with veteran teachers being *rewarded* with upper level classes that often contain smaller numbers of students of color, served as an obstacle to development of my conception of equity. Accountability and appraisal systems also served to hinder the development of my conception of equity.

Teacher conceptions of equity. In Chapter III, the conceptions of equity of high school mathematics teachers in a large, suburban district in the southern United States were studied, comparing those conceptions to the four-dimensional model of equity proposed by Gutiérrez (2002). In this study, the conceptions of equity of the participant teachers were found to be focused on issues of access. In addition, issues of

identity, when raised, seemed to be framed in deficit language, often presented as an obstacle to equity.

Additionally, the conceptions of equity were studied for evidence of colorblindness and white fragility. The infrequent mentions of race and the seeming fixation on SES provide evidence of colorblindness and white fragility in the conceptions of equity of the participants, particularly the white participants. In the white educators studied in this research (myself included), there is often an unwillingness to name racism and the part that white educators play in that racism (Gillborn, 2005). In general, teacher conceptions tended to view obstacles to inequity as occurring in the nation as a whole, but not at their school or within their classrooms. This can be seen as a white fragility response that looks to move issues of race as far from the individual teacher as possible, placing responsibility for inequity elsewhere.

Summary of findings

In examining these two studies together, it is important to note the contribution of each study individually to form the findings of this research. First, the autoethnography that is the subject of Chapter II provides a longitudinal look at the conceptions of equity of an individual teacher over the arc of a career of over twenty-five years. The key contribution of this chapter is the view of conceptions of equity as malleable. In addition, an examination of my career suggests several forces, both educational structures and societal factors, attempting to shape conceptions of equity. It is important to note that this is the example of one white teacher, and as such, may not be applicable to other teachers. For instance, many teachers teach their entire careers in a single district and do not have the opportunity to experience different

types of educational settings. These different settings were obviously very impactful on the development of my conception of equity.

The study of high school mathematics teacher conceptions of equity that is the subject of Chapter III, provides a snapshot of the conceptions of equity of a sample of high school mathematics teachers in a large, suburban district in the southern United States. In this snapshot, teacher conceptions of equity come into focus, with an emphasis on dimensions of equity, as well as colorblindness and white fragility. This study brings to light the variations in those conceptions of equity and the commonalities in those conceptions.

Taken together, the studies in the previous chapters suggest the following findings:

- Conceptions of equity of high school mathematics teachers in the district seem to focus on dominant dimensions of equity (access and achievement) over critical dimensions of equity (power and identity). Dominant dimensions are labeled by Gutiérrez (2002) as such because they reflect the understanding of equity in mathematics valued by society. Thus, in many ways the conceptions of equity of the high school mathematics teachers studied mirrors the perspective of society.
- Identity issues, when addressed within conceptions of equity, are often discussed by high school mathematics teachers within the district in deficit terms, often seeing identity as an obstacle to equity.
- These conceptions of equity do not have to be stagnant. In fact, they may develop over time as illustrated by my own experience. This development of

my conceptions of equity suggests a continuum of conceptions of equity that may be informative when looking at the high school mathematics teacher population as a whole.

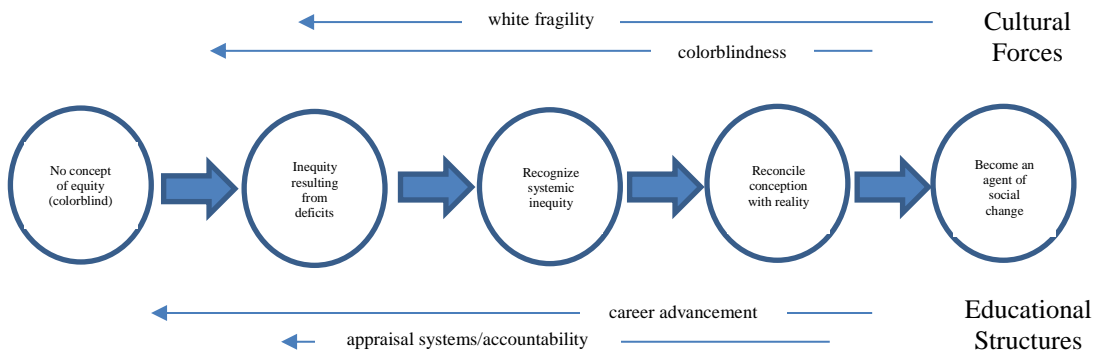
- Development of these conceptions of equity faces several challenges from the structure of educational systems, such as the traditional career path of teachers, as well as accountability and appraisal systems.
- White high school mathematics teachers in the school district are impacted by colorblindness and exhibit responses that can be classified as white fragility when confronted with issues of equity in mathematics.

Implications of Findings

Combining the findings from these two studies leads to the following observations about high school mathematics teacher conceptions of equity that have implications in practice. First, the conceptions of equity of teachers are not stagnant, but can be developed. Although it appears that current events in society have increased awareness of racial issues in the United States, many white high school mathematics teachers still cling to colorblind ideals when encountering issues of equity within educational settings. Teachers must be made aware of their own conceptions before they can address those issues. Second, many mathematics teachers view SES as a critical factor in issues of equity, while failing to recognize the intersectionality of race and SES. In the paragraphs that follow, both of these observations will be discussed with applications for practice.

Developing conceptions of equity

First, reflecting on this research, I would suggest that it would be informative to consider conceptions of equity, not as stagnant but as developing, as demonstrated by my career in education. Although it would seem that the development of teacher conceptions of equity is unique, varying from teacher to teacher, it is my suggestion that the path illustrated in my personal experience as outlined in the autoethnography may be instructive in considering the development of high school mathematics teacher conceptions of equity. This path, first offered in Chapter II, is shown again below:



Development of my conception of equity

To apply this path to the development of conceptions of equity of other teachers, the path should be viewed, not as stages that must be experienced sequentially, but rather as a continuum, describing broad states of conceptions of equity that range from no conception of equity (colorblind) to teacher as social justice advocate. Reworking the diagram to express it as a continuum yields the diagram seen in Figure 4.1.

In addition to these states of conceptions of equity, I would suggest that the forces that impeded the development of my conception of equity are not unique,

neither are they exhaustive. These forces may vary by district, school, community, or state. Thus, it is instructive to identify where on the continuum the conception of equity of a given teacher falls. In addition, identifying the forces impeding the development of this conception, may allow these issues to be addressed, and the conception of equity of teachers moved towards a more nuanced understanding.

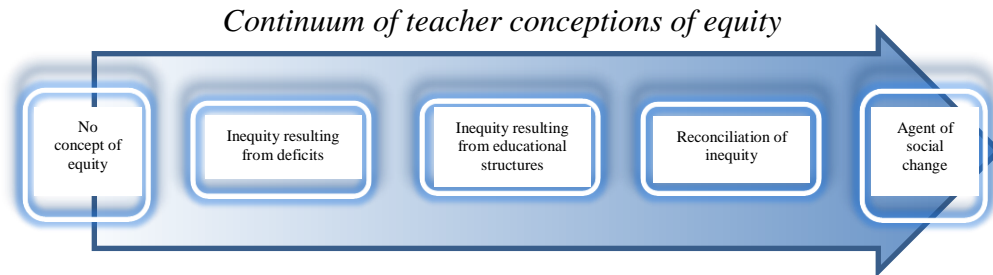


Figure 4.1

Looking at this continuum, it appears that many of the participants in Chapter III have conceptions of equity that indicate a knowledge of inequity that is attributed to deficits. Additionally, many of the participants seem to express conceptions of equity that exhibit colorblindness, attributing inequity instead to SES, a response that could be described as aversive racism (DiAngelo, 2018). Looking back on my teaching career, I can say that the responses from a large number of my colleagues throughout my career could be described as similar to the responses of the participants in the study. This suggests that the states of conception outlined by my own experience may form a starting point for examining the development of high school mathematics teacher conceptions of equity.

Again, the example of my career suggests a conception of equity that changes over time. In reality, my conceptions of issues of equity have gone through a dramatic shift throughout the twenty-five years of my teaching career. The experience of

moving to a high school in a large, metropolitan area highly affected by inequity, especially in mathematics education, provided a catalyst for the changes in my conceptions of equity. It is not practical, to replicate that experience for all mathematics teachers. How then, can we change the conceptions of equity of high school mathematics teachers? Maybe more importantly, given Bell's (2018) assertion of the permanence of racism, is it even plausible to change the conceptions of equity of high school mathematics teachers, particularly white high school mathematics teachers?

First, as mentioned in Chapter III, teacher education programs must continue to work to address conceptions of equity within preservice teachers *before* they enter the profession. Much research has been done to investigate the changes needed in preservice education programs to address conceptions of equity of preservice teachers (Boylan & Woolsey, 2015; Kaur, 2012; Nieto, 2000; Sleeter, 2008; Yosso & Solorzano, 2001). These studies outline the need for preservice teachers to understand their own conceptions of equity, as well as to understand issues of race and their effect on mathematics education.

Second, the conceptions of equity of inservice high school mathematics teachers must be addressed, remembering the connection of teacher beliefs and teacher practice. To assist in the development of inservice high school mathematics teacher conceptions of equity, it seems to be imperative that districts work to confront high school mathematics teachers with the impact of race on issues of inequity, seeking to eradicate colorblindness by developing the conceptions of equity of the teachers. As stated in Chapter III, teachers must be able to recognize, respond to, and redress bias

and inequity, as well as the ability to cultivate environments free from racial bias and inequity, to begin to address issues of inequity (Gorski, 2017). Staff development must be developed that provides a forum for teachers to discuss their conceptions of equity. Administrators and school officials must be unified in their efforts to keep issues of race in the forefront of the battle to eliminate inequity, encouraging the development of teacher practices that confront issues of inequity.

Teachers must be informed of the tenets of CRT, in order to confront teacher issues of colorblindness. Blaisdell (2005) describes teachers involved in professional development in which they were exposed to CRT writings, and its effects on teacher colorblindness. Teachers must be aware of the inherent racism within educational structures, recognizing their own complicity.

A note of caution, however. Two very powerful counterarguments emerge when addressing issues of inequity. First, there is the inherent difficulty of engaging people in discussions about race, especially in a white-dominated field such as education. Second, there is a sense that addressing issues of race takes time that overworked teachers simply do not have.

DiAngelo (2018) emphasizes the difficulty of engaging people, especially white people in conversations regarding issues of race. She contends that discussing racial issues elicits an emotional response characterized by deflection, denial or anger. A study by Vaught and Castagno (2008) illustrates the difficulties in these discussions, as teachers involved in professional development centering on issues of equity were studied. The study found that individual teachers do not see themselves as racist and are unable to recognize the structural and systemic factors privileging white students

at the expense of students of color. Additionally, the study found that when confronted by issues of equity, teacher views were often not changed, but teachers instead attempted to justify their previous views. Although these conversations about issues of equity are difficult, it is important that administrators are persistent, so that teacher conceptions of equity can be understood and shaped, and so that these beliefs can result in transformation of teacher practices.

Additionally, although these conversations take time, often time that teachers do not feel they have to give, I would argue that it is time well spent. In order to build a classroom culture and climate conducive to learning, teachers must be able to create a learning community based on mutual respect and caring (Gay, 2002). This kind of environment cannot be built by a teacher who does not understand their own conceptions of equity (Gorski, 2017). Thus, teachers *must* make the time to grapple with their own conceptions of equity, examining their own teaching practices in the light of these conceptions.

Intersectionality and SES

Often the impact of SES on issues of equity is made a focal point in addressing issues of equity because it is more palatable than discussing issues of race. This is problematic, since as mentioned previously, persons of color, especially black persons, are more likely to be classified as low SES than white persons (Reeves, Rodrigue, & Kneebone, 2016). Teacher participant conceptions of equity in Chapter III seemed to focus more on issues of SES than on issues of race.

Most of the references to SES in this study did not contain any reference to issues of race. When mentions of SES occur in isolation, without any reference to

race, SES appears to be used by study participants to deflect attention away from race. These mentions of SES seem to be an example of aversive racism, one of the ways white fragility expresses itself (DiAngelo, 2018). According to DiAngelo (2018), “aversive racists enact racism in ways that allow them to maintain a positive self-image” (p.43). Specifically, seeking to place blame for inequity on issues other than race, namely SES, to avoid discussions of racism, is an example of aversive racism and white fragility. Additionally, focusing on SES is an example of respectability politics, as the more palatable ideal, namely economic uplift of all persons, is pursued at the expense of addressing inequities experienced as a result of race (Harris, 2014).

Instead, an understanding of the interplay between race and SES is needed. This requires an understanding of the CRT conception of intersectionality. Intersectionality refers to the combination of multiple identities and sources of inequality and is an important concept dealing with racism that is considered in CRT literature (Gillborn, 2015). Crenshaw (1989) writes about intersectionality in discussing the treatment of black women by the courts. She argued that often identities combine to form a multi-layered system of identity and must be considered as such, avoiding a single axis interpretation of identity. A person’s identity is more than a single, unitary identity (Delgado & Stefancic, 2017).

Teachers must be brought to the realization that there is a difference in being poor and white and being poor and a person of color. Thus, dealing only with issues of poverty is not enough to eliminate issues of inequity. The racism that undergirds the inequitable distribution of wealth and power in the United States must also be recognized and addressed. Administrators, as well as teachers, must strive to keep race

in the forefront, acknowledging the discomfort that accompanies this. Opportunities must be given for educators to discuss issues of race and their impact on issues of equity, in order to transform teaching practices and eliminate sources of inequity within the high school mathematics classroom.

Next Steps

The research outlined in this dissertation suggests that mathematics teacher conceptions of equity can be, and I would suggest, must be changed. As Chapter III outlines, these conceptions are often focused on providing access while seeing issues of identity as deficits to be overcome. High school mathematics teachers must be brought, through persistent exposure to views of equity impacted by CRT and the four dimensions of equity outlined by Gutiérrez (2012), to an understanding of the impacts of race on issues of equity, as well as their role in promoting equity in mathematics education.

I would suggest that future research is needed in three specific areas. First, this study suggests the development of conceptions of equity, particularly in mathematics, over time, as seen in my own personal journey. Research is needed to determine if teacher conceptions of equity truly change over time, and if so, what are some key factors contributing to this development. Teacher education programs and professional development offerings can be developed to promote the development of conceptions of equity. In addition, systemic factors either positively or negatively affecting the development of these conceptions can be addressed.

Secondly, more research can be done examining teacher conceptions of equity in light of the four dimensions of equity defined by Gutierrez (2017). The issues of

power and identity in particular require more study. It seems apparent from the study in Chapter III, that there is very little understanding of the power issues impacting inequity in education. Identity, while more widely understood, seems to be viewed mostly as a deficit. The effectiveness of interventions designed to promote understanding of the effect of the dimensions of power and identity on issues of equity deserves greater study.

Lastly, the understanding of the intersection of race and SES and its impact on issues of identity needs further examination. Specifically, the place SES occupies in teacher conceptions of equity is an important topic of study. In Chapter III, it appears that participant teachers placed primary importance on SES, allowing white teachers to deflect from discussions regarding the impact of race on issues of equity. Do white teachers see SES as the prime contributor to issues of inequity, or do they see SES and race as intersecting components of identity?

Concluding Thoughts

A few years before beginning my doctoral studies, I considered entering a doctoral program at another institution. Ironically, the program was not a fit because the focus of the program was equity in education, and at the time, I was not that interested in equity in education. Now, just a few years later, I would consider equity in mathematics education to be my passion. This illustrates the changing nature of conceptions of equity.

As educators, issues of race and its effect on issues of equity, must be at the forefront of our minds. It is essential that we fight the influences in society that would seek to encourage colorblind policies, recognizing racism as a permanent force in

society. For if we do not see issues of race and how they affect equity in mathematics education, how will we be able to combat inequity?

It is my hope that this dissertation has provided a greater understanding of the conceptions of equity of high school mathematics teachers, as well as hope that these issues can change. We must be persistent, addressing issues of race whenever they occur. Teachers must be confronted with their own conceptions of equity, and those conceptions must be challenged when necessary. Only when teachers are truly aware of their own biases, can they be expected to promote an educational environment, providing equitable mathematics education to all students.

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APPENDIX A

School Site Demographics 2018-2019									
School Site	African American	Hispanic	White	Native American	Asian	Pacific Islander	Low SES	Students	Responses
School A	19.9	49.4	17.1	1.4	9.9	0	60.1	3726	1
School B	23.7	57	9.2	0.9	7	0.2	69.9	3704	5
School C	19.7	59	9.2	0.9	9.6	0.1	72.3	3014	9
School D	29.7	51.2	9.9	0.8	6.2	0.1	66.1	3148	2
School E	10	25.6	50.7	0.3	10.7	0	23.3	3347	2
School F	10.7	60.8	14.4	0.3	12	0	63.1	3560	9
School G	25.4	53.5	18.7	0	0.4	0	---	233	1

APPENDIX B

District Teacher Demographics		
Race	Percent	
White	68	
Black or African American	13	
Hispanic	15	
Asian	2	
Pacific Islander	0	
Native American	0	
Participant Teaching Experience		
Years of experience	At current site	Total teaching
0 - 4	7	2
5 - 9	4	5
10 - 14	13	7
15+	5	15

APPENDIX C

Teacher Conceptions About Equity

Thank you so much for participating in this study. Answer each of the following questions in a few sentences. Your answers will be completely anonymous and will be used to gain a better understanding of teacher conceptions of equity.

Basic Information

1. At what school do you currently teach?

Mark only one oval.

- School A
- School B
- School C
- School D
- School E
- School F
- School G

2. How many years have you taught at your current school?

3. How many years have you taught in all?

4. List the subjects you currently teach (Please distinguish between L, K, AP and dual credit).

5. How would you describe your race?

Mark only one oval.

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White

APPENDIX C (continued)

Conceptions of Equity

The following questions deal with the concept of equity. They are purposefully broad and vague in nature. Please answer the questions with your own opinions and beliefs.

6. What do you think it means for math education in the United States to be equitable?

7. What factors do you think would indicate that math education in the United States is not equitable?

8. Do you feel that math education in the United States is equitable? Explain your answer.

9. What do you feel are some obstacles within society to achieving equity in math education in the United States?

10. What do you feel are some obstacles at your school to achieving equity in math education?

APPENDIX C (continued)

11. What do you feel are some obstacles in your classroom to achieving equity in math education?

12. Describe any structures or procedures that are in place at your school in order to promote equity.

13. Describe any structures or procedures that you use within your classroom in order to promote equity.

Thanks so much for your time!

APPENDIX D

Dimensions of equity - Rochelle Gutiérrez (2012)	
Affirmative Responses (equitable)	Negative Responses (inequitable)
Access	
equal access	limited access
equal opportunity	less opportunity
access to quality teachers	unqualified teachers
equal course offerings	unequal course offerings
equal quality of instruction	differing qualities of instruction
equal resources	unequal resources
equal level of rigor	unequal rigor (note: NOT differentiation)
access to quality curriculum	limited access to quality curriculum
team planning standardizing instruction	
differentiated instruction	
Achievement	
achievement	lack of achievement
standardized test results equal	standardized test results unequal
passing requirements	need to get rid of standardized testing
high standards	subjective nature of grading
	fear of high failure rates
Power	
student autonomy in selecting objectives	
student voice in classroom	
student / parent autonomy in course selection	
Identity	
cultural feelings of school as important	cultural feelings of school as not important
communication with parents	lack of parental involvement
differentiation to address student interests	certain groups bad at math
math relevant to student's lives	math irrelevant to students' lives
different meanings for success	lack of staff diversity
respect for diversity	

APPENDIX E

Language		
	Category	Deficit
Racial reference	Race	Hispanic - value of education
		race - differing levels of achievement
Coded racial reference	Language	language as a barrier
		ELL difficulties with standardized tests
	Culture	education not valued in culture
		parents not engaged
		parents not able to help (specific to race)
		familial patterns (specific to race)
at-risk (racial reference)		
Unrelated to race	Socioeconomic status (SES)	lack of resources
		at-risk (SES reference)
	Behavior	lack of effort
		Inattentiveness
		disruptive behavior
	Student ability	lack of prerequisite skills

APPENDIX F

Participant	Frequency of Access	Frequency of Achievement	Frequency of Identity	Frequency of Power	Coordinates
1	5	0	1	0	(5, 1)
2	5	1	2	0	(4, 2)
3	2	0	2	0	(2, 2)
4	2	1	7	0	(1, 7)
5	4	1	2	0	(3, 2)
6	3	0	6	1	(3, 5)
7	6	0	0	0	(6, 0)
8	5	1	1	0	(4, 1)
9	8	0	0	0	(8, 0)
10	4	1	3	0	(3, 3)
11	3	0	1	0	(3, 1)
12	6	4	1	0	(2, 1)
13	7	2	1	0	(5, 1)
14	7	1	1	0	(6, 1)
15	2	6	1	0	(-4, 1)
16	1	0	6	2	(1, 4)
17	1	0	3	0	(1, 3)
18	4	1	3	0	(3, 3)
19	5	0	0	0	(5, 0)
20	NR	NR	NR	NR	-----
21	7	1	1	1	(6, 0)
22	NR	NR	NR	NR	-----
23	4	0	1	0	(4, 1)
24	3	3	1	0	(0, 1)
25	1	3	0	0	(-2, 0)
26	0	1	3	1	(-1, 2)
27	NR	NR	NR	NR	-----
28	3	0	4	0	(3, 4)
29	1	1	2	0	(0, 2)