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I am submitting herewith a dissertation written by Renee Lenise Colquitt entitled "Social Justice in Mathematics Education." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Teacher Education.

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Social Justice in Mathematics Education

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Renee Lenise Colquitt
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Abstract

Today's mathematics classrooms are filled with students with different races, ethnicities, abilities, and socioeconomic status environments, and other issues that impact their learning. Students of color, in particular, often score lower than their White counterparts on standardized mathematics tests and are underrepresented in advanced placement mathematics classes. The historically marginalized students will soon be the majority. If careful attention is not paid to this shift in demographics, the United States runs the risk of falling farther behind other countries economically and academically. Since mathematics often serves as a gatekeeper for admittance to postsecondary institutions and many well-paying jobs, the discrepancy between the mathematics success of Whites and students of color cannot be ignored. Students will also compete globally for the opportunities that will enhance their quality of life. Thus, a shift in teaching mathematics must be a priority if access to higher education and employment is to be equitable.

The purpose of this study is to examine the perspectives of teachers in grades 6-12 mathematics classrooms. The research questions are: (1) How does social justice influence the teaching practices and mathematics curriculum for grades 6-12? and (2) How do mathematics teachers define and use social justice?

A survey grounded in five successful tenets of multicultural education (Ladson-Billings, 1994) gathers the perspectives of twelve teachers of grades 6-12 mathematics. Survey responses, in conjunction with the small-group interview conversation of two teachers, illuminate the issues pertaining to establishing a socially just classroom. Results indicate a strong desire for teachers to reach *all* students but not many teachers are familiar with pedagogies that support this vision. Implications include a need for the purposeful preparation of teacher education programs to equip teachers for the diverse students they are expected to teach as well as professional development opportunities to support teachers of diverse learners.

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Chapter 1

Introduction

Ongoing changes in our local, national, and global societies are shaping the teaching and learning of mathematics. Classroom environments and teachers' practices are propelling mathematics education towards a more sophisticated discipline. New standards, state and national high-stakes tests, advances in technology, and more diverse student populations contribute to this shift. Today's public school teachers of mathematics are preparing students for jobs that have yet to be created. The competition for these jobs is no longer local, but global. Students, therefore, must be able to think mathematically, analyze information, and make data-driven decisions in the mathematics classroom as preparation for the demands of a challenging work world. This, by no means, is an easy task for students or teachers; yet, the task presents itself as a necessary challenge to which mathematics students, teachers, and teacher educators must respond.

The effective teaching of mathematics is essential for all students, especially those who are in the underrepresented populations; namely, African-Americans, Latinos, Native American Indians, and students from low socioeconomic backgrounds. (Gay and Howard, 2000). According to the U.S. Department of Education (2009), these underrepresented populations are growing, suggesting that special care and attention is needed to ensure their academic survival. As the minority becomes the majority, the impact of the failures of underrepresented populations stands to create an enormous challenge for school districts across the nation. This phenomenon is sure to come and it cannot be ignored.

The issues that underrepresented student populations face are real. Studies show a “gap” in the mathematics achievement between White students and students of color (Ladson-Billings, 1996). The change in United States public schools’ demographics due suggests that teaching pedagogies are in need of reform if all of the students in the public school system are to be prepared for futures in postsecondary institutions and ultimately employment. According to Gay and Howard (2000), about 86% of the teaching force in K-12 classrooms is White and their minority groups’ counterpart percentage is decreasing. At the same time, the student population is changing with about 36% of the United States’ students from minority groups. This number is expected to increase each year (U.S. Department of Education, 2009). While the number of teachers of color is slowly declining, the number of students of color is steadily rising. Tate (1995) notes that while this demographic shift is taking place, students of color are scoring significantly lower on mathematics tests than White students. This shift in teacher and student demographics is in need of a response. Teachers and teacher education programs are largely responsible if public education has any hopes of teaching *all* students to learn mathematics.

One manner in which to address the issues of teaching diverse, twenty-first century learners is to embrace a pedagogy that acknowledges and places value upon the genuine understanding of mathematics for all students. Regardless of color, socioeconomic status, or gender, students should be afforded the same opportunities for access and success in higher-level mathematics courses. NCTM (2000) states: “The mathematics classroom, then, is a place where all students should be encouraged to

actively participate, contribute to discussions, share new ideas, and develop solutions to problems that are real to their respective cultural backgrounds and communities.” Such a classroom may require teachers to view mathematics education through a social justice perspective. Gutstein and Peterson (2006) note that “teachers should view students’ home cultures and languages as strengths upon which to build, rather than deficits for which to compensate.” (p. 3) This statement suggests the purposeful efforts of teachers to identify, embrace, and incorporate the lived experiences of the students into the mathematics curriculum to provide students with meaningful learning opportunities that may help propel students towards success. The following pages will provide a definition of a social just curriculum and its implications for the teaching and learning of mathematics.

Social Justice in Educational Practice

While there is no explicit definition for social justice as it pertains to mathematics education, it is helpful to explore the discipline of social work for a thorough explanation. The following description of a social justice education program for social workers will serve as one framework for creating a socially just mathematics classroom. Adapted from the Council of Social Work Education (CSWE, 2001), programs in social justice should "provide content related to implementing strategies to combat discrimination, oppression, and economic deprivation and to promote social and economic justice... [and] prepare students to advocate for nondiscriminatory social and economic systems." With this description, it is important to “establish a community of learners that is aware of issues that hinder the progress of social justice in our communities” (CSWE, 2001). Such an educational program should also “equip students with contextual experiences to

demonstrate the social injustices that plague our communities.” With these perspectives in mind, social justice in the mathematics classroom will be discussed as the desired backdrop for effective mathematics teaching and learning.

As the previous definition of social justice education programs illuminates the remainder of this manuscript, it is important to note that the field of social work shares in mathematics education’s struggle to yield advocates for those who are oppressed and underrepresented. A quantitative study by Hancock, Kledaras, and Waites (2012) on the beliefs of social work students reveals that within an undergraduate or graduate program specializing in social justice, advocates to change the conditions of the oppressed.

Awareness is made, but change does not automatically follow. These results support the notion that social justice is a subjective and complex idea; even those who are specially trained in the discipline struggle with the realities associated with advocating change.

With this in mind, it is of no surprise that many teacher preparation programs are producing teachers who are uncomfortable with the responsibilities that accompany changing the existing curriculum to one that is embedded in social justice. With optional coursework related to social justice issues, many teachers leave their teacher preparation programs ill-prepared to identify the various inequities that exist in the classroom, much less address them. Injustices in mathematics education are abundant and can be analyzed and communicated using data from disaggregated standardized test scores and postsecondary graduation rates. The social justice context, then, can also supply potentially rich mathematics that requires students to think about and do mathematics in a way that is applicable to their everyday lived experiences.

Research in social justice as it applies to education leads to a variety of subtopics upon which to build. Teaching from a socially just perspective is often interwoven with other related topics, such as multicultural education, culturally responsive teaching, and ethnomathematics. This pedagogy has multiple layers and requires a sincere passion for what is right on the part of those who implement such a pedagogy. Social justice is not just about creating awareness; it involves working to make equitable changes to help those who are recipients of injustices. Some of the social injustices prevalent in the United States' public education systems include discrimination based on color, nationality, sexual orientation, religious affiliation, socioeconomic status, gender, and disability, just to name a few. Each of these "choices" carries consequences that reach far beyond the walls of the classroom and ultimately affect a student's quality of life. In mathematics education, inequities may not be as visible since all students enroll in mathematics courses in middle and high schools. However, White students out-score students of color on standardized tests and take more higher-level mathematics courses, despite the same schools, teachers, and curriculum. (Tate, 2003). In the following pages, the concept of social justice in mathematics education will help further support the problem for this study. Viewpoints from the area of education research will be highlighted to further illustrate the tenets of social justice as it pertains to mathematics education.

Definitions

Through the exploration of social justice in education, the terms "equity", "diversity", and "culturally relevant teaching" are important keywords that should be

defined. Equity is defined by Rousseau and Tate (2003) as the equal opportunities that result from the decisions, policies, and practices that govern our classrooms. Equal and equity should not be interchanged as synonyms. Equal implies the quantifiable distribution of resources, regardless of what is needed. Equity implies the appropriate distribution of resources based on what is needed to achieve the intended results. For example, allowing two students the weekend to complete an online research project gives them an equal amount of time, but is not necessarily an equitable situation if one student has no access to a computer. While many classrooms operate on the “one size fits all” equality principle, the results are not always equitable, denying the disadvantaged populations the access that this “one size fits all” model, grants to the privileged. To be equitable, then, means to recognize what is necessary for all to attain success and then to make provisions for such differentiation. Traditional classrooms are simply not designed to allow for such a drastic viewpoint, supporting the need to change the way classrooms are managed.

Hodge (2006) offers a definition of diversity that depicts the classroom as a non-neutral environment that encompasses more than just the teaching of mathematics. Diversity in the classroom can be expanded to “...one that is based on participation in particular cultural practices rather than solely on physical appearances.” (Hodge, 2006, p. 375) Such participation may promote or deny the learning of mathematics and is worthy of consideration when entering the classroom. Students bring with them values, traditions, beliefs, and personal identities, each of which plays an important role in how they learn mathematics. Hodge (2006) also brings to the forefront the many groups and

communities in which students live and participate. Not all students within a particular ethnic group share the same values or beliefs; thus diversity goes beyond skin color and includes all of the influences that attribute to a person's culture.

Although diversity is not a race-only concept, it is disturbing to see that students of color, particularly African-Americans and Latinos, are still the most underrepresented populations in advanced placement courses in mathematics (Tate, 1995). A plausible explanation for this phenomenon is the lack of culturally relevant teaching within our curricula. If students are treated equally in the "one size fits all" approach and the outcomes consistently yield significantly higher failure rates for particular subgroups, then the teaching practices should be called into question.

Culturally relevant teaching is defined by Ladson-Billings (1994) as a multicultural approach that creates an environment that purposefully takes into consideration the following tenets: (a) teacher beliefs about students; (b) content and materials; (c) instructional approaches (d) teaching environment; and (e) teacher education. These tenets should be carefully explored as they often have a direct correlation with the success of students of color in mathematics. As the population changes, so will the needs of the students and so must the teaching practices and environment change to reflect the cultures and values of the students. Such a pedagogy is necessary to actively engage the students who are typically disengaged in traditional classroom settings and address the social injustices that occur in many mathematics classrooms.

The issues of socially just teaching are ones that are important for several reasons. First, with the influx of underrepresented populations in the United States, the current educational system stands to suffer unless changes in the status quo are implemented. With marginalized student performing significantly lower on standardized tests than their White counterparts and significantly lower than students in other countries, we need to address this as a national and global issue. We cannot control the demographics, but we need to be cognizant of the issues that accompany the demographics. To sit by and not address the inequities in education would be detrimental to our goals to compete globally with others who prepare their students to think and communicate mathematically. Second, to teach in a socially just manner will help address national economic issues. The industries in the United States need workers who are thinkers, problem solvers and innovators. Such a workforce does not automatically come into existence; it must be cultivated. If our soon-to-be majority population will be made up of those who have historically been marginalized in education, similar results are to be expected in industry. To remain competitive means we must address the issues of equity, quality education for all, and the support needed to develop the minds of our students.

Third, if we are to compete globally, as a nation we must prepare students to function in a society that is fueled by economic success. Our public education is a feeder for postsecondary institutions, the military, and the work force of our nation. We, now more than ever, compete with other countries to make and sell goods, to stimulate our economy, and lead to financial growth. Not having prepared thinkers in the work force may compromise our success and contribute to a decrease in the quality of our workers

and products., causing us to rely more heavily upon other countries for our basic needs and wants. Each of these issues stands to have an impact on individuals and families across the United States. It is for these reasons we need to carefully consider ways to prepare students for this kind of competition.

Finally, using a socially just pedagogy in the public school systems will help improve our students' chances of competing in the world of technology. Many advances in technology produce better, more efficient ways in which to operate. These changes drive the decisions of many schools, postsecondary institutions, and businesses. Such advances make traditional teaching and the use of a traditional curriculum somewhat outdated. Parts of a traditional curriculum are useful, but additional resources are needed to facilitate the learning and thinking that are critical for meeting the demands of technology and innovation.

Problem Statement

With these ideas in mind, the need to address the issues of the teaching and learning of mathematics is at hand and can no longer be deemed insignificant. Changes must be made. Teacher preparation programs must prepare teachers to work in diverse classrooms. Teachers must not only be open to teaching in diverse settings, but they must use appropriate resources to accomplish this goal. Students must be groomed, preferably starting in the early grades, to adapt to the changes in the way mathematics is taught and assessed. Parents need access to the appropriate resources to help their students. Everyone is affected, in one way or another, by the quality of the education system that guides children as they grow to become adults who will need to support themselves

financially and contribute to society. The question is, how can we do this? How can all of these changes be made and accepted as valuable? How can we prepare all students to reach beyond stereotypes and their environments to be successful? How can we prepare teachers to address the needs of all students and thereby increasing the probability of their success in mathematics courses?

Research Question

The purpose of this study is to address the following research questions:

- (1) How does social justice influence the teaching practices and mathematics curriculum for grades 6-12?
- (2) How do teachers define and use social justice?

In answering these questions, it is helpful to study the body of literature surrounding the issues of critical race theory, social justice, and teaching diverse students. These related topics are useful in piecing together the ideas that link together to forge the social justice movement in education. Much of the literature on social justice in mathematics education is grounded in the elementary schools and teacher preparation programs. Filling the gap is a goal of this study as teachers in middle grades and high school share their thoughts about socially just mathematics classrooms. The intent of this study is also to add to the body of literature and to provide supporting documentation for schools willing to consider a social justice approach to mathematics education. Before looking at the literature in mathematics education as it relates to social justice, it is worthwhile to visit

some of the literature on critical race theory and how this framework provides a lens through which some researchers use to explore injustices in teacher preparation.

Social Justice in Teacher Preparation Programs: A Critical Race Theory Perspective

The aforementioned definition from the field of social work education can be directly related to teaching strategies and student outcomes. While there is some research on these topics, much of the research for socially just learning environments places emphasis upon the teacher preparation programs. Teachers cannot be expected to enter their teaching assignments equipped to address social justice issues and implement culturally relevant teaching strategies without training. The exploration of teacher preparation in mathematics education often enlists the methodologies rooted in critical race theory (CRT). According to Delgado and Stefancic (2001), critical race theory refers to “radical legal movement that seeks to change the relationship that exists amongst race, racism, and power within society” (p. 144). Yosso (2006) defines CRT in education as “a theoretical and analytical framework that challenges the ways race and racism affect educational structures, practices, and discourses” (p.172)

When using CRT as a methodology for research, race is at the center of the research and perspectives of race and power are used for data analysis and drawing conclusions. Such an approach is used by Hayes and Juárez (2012) to study teacher education programs and to illustrate the distribution of White power and prevalence of Whiteness that exists in many teacher preparation programs. The use of a counter-narrative situates the study in a CRT framework and helps unveil the social injustices that exist within these programs. The study paints a portrait of an African-American educator

who is “put in his place” for teaching his students how to think about teaching in culturally diverse classrooms. The professor is sanctioned for his attempt to broaden his students’ views of education for all and is forced to comply in silence or risk losing his position at the university. Furthermore, he is assigned a committee of White colleagues to “help” him regain his focus and shy away from addressing the sensitive topic of race in his methods courses. The notions of race and power are used to show how policies and procedures are in place to silence those who may potentially jeopardize the status quo of White power in teacher education programs.

Hayes and Juárez (2012) suggest, through a CRT lens, that the upholding of White power is no coincidence. Many teacher education programs have one course, usually optional, to lump together and scratch the surface of a variety of issues in education that have negative consequences for students of color. This course may include such topics as social justice, equity, and diversity as it addresses these issues in a non-confrontational manner. Meanwhile, the mainstream required courses rarely touch on these issues, fostering the belief that education is a neutral field in which race is not a factor. Further, as Hayes and Juárez posit, this encourages teacher education programs to maintain White power while simultaneously failing to prepare future teachers for the diverse populations they will be responsible for educating.

To continue with CRT as a methodology, Juárez, Smith, and Hayes (2008) offer a view of social justice “through the lens of White privilege-the historical privilege of characteristics associated with being White, a primary English speaker, male, heterosexual, Christian Protestant, and middle class” (p. 21) This lens allows a view of

social justice that disperses privilege to the people described above and perpetuates the injustices of those not fitting the description. The authors claim that teacher education is a White world full of predominately White teachers who, because they often do not have experiences outside of their culture, believe that all students should be treated equal. This is the very issue that Tate (1995), Rousseau and Tate (2003), and Ladson-Billings (1995) document as a troublesome belief that helps create and sustain socially unjust mathematics classrooms. Juárez, Smith, and Hayes (2008) note that teachers who treat all students the same bring to the table their White experiences from a White teacher preparation institution with the challenge of teaching all students. Race is generally not a factor to these teachers, adding to the continued marginalization of students of color and those in low socioeconomic households. The authors also state that diversity and multiculturalism are often taught as afterthoughts within the teacher preparation curriculum and future teachers are not adequately prepared to interact with students who are not like them. Finally, Juárez, Smith, and Hayes (2008) insist that the standardized test scores that are public information for schools across the nation indicate that what is occurring now in classrooms is not working for a significant number of students of color. Yet, the discussions for change are not taking place in teacher education programs. This fuels the cycle of White power and keeps the Whiteness of teacher education in tact (Hayes and Juárez, 2012).

Tutak, Bondy, and Thomasenia (2011) discuss critical mathematics as a necessary tool for supporting the National Council of Teachers of Mathematics, NCTM, (2000), Equity Principle. This principle states “excellence in mathematics education requires

equity--high expectations and strong support for all students” (p. 12). Such high expectations include each student’s ability to “read” their world using mathematics and to think critically about how mathematics can be used to promote change within today’s society. Written in 2000, the NCTM Equity Principle has yet to manifest itself in many of the mathematics classrooms of the twenty-first century. The Principle is of extreme importance, but Tutak, Bondy, and Thomasenia (2011) argue that until all classrooms have the technology, curriculum resources, and culturally relevant teachers, equity will not become a reality. With no specific guidelines for implementation and no socially just policies to guarantee the equitable distribution of resources, it is difficult to determine when or if the Equity Principle will come to pass. If classrooms are not equitable, then it will be difficult for teachers to create situations in which students can think critically about mathematics, especially from a social justice viewpoint. Again, the equitable allocation of resources relates to the issues Tate (1995), Ladson-Billings (1992, 1994, 1995), and Hodge (2006) mention in their research and must be a priority for teacher preparation programs and schools across the nation.

In order for students to “read” their world through mathematics, Frankenstein (1997) introduces critical mathematics literacy and defines it as a student’s ability to use mathematics as an agent to study, analyze, and question existing injustices and to fuel potential changes. Frankenstein also adds that students are critically literate in mathematics are able to make informed decisions about societal issues and policies. This requires not only NCTM’s (2000) Equity Principle, but an overhaul in the teacher preparation programs that equip teachers with the insights and confidence to teach from

such a perspective. Frankenstein (1997) notes that there is no manual for such a teaching pedagogy. The lessons and problems exist within the lives and communities of the students, making this pedagogy mathematically rich, culturally responsive, and authentic. Hence, teaching students critical mathematics literacy brings challenges for teachers who assume complete control of the classroom atmosphere. This kind of control must be shared with the students if the mathematics is going to be relevant. Teachers must be prepared to function in this particular setting and such preparation does not occur automatically.

In reviewing a brief portion of the literature of Ladson-Billings (1995), Rousseau and Tate (1999), and Frankenstein (1997), the ultimate responsibility of teaching in an equitable, socially just classroom rests heavily upon teacher preparation programs. Gay and Howard (2000) offer a rationale for deliberately preparing future teachers to teach ethnically diverse student populations. Future teachers are often uncomfortable discussing race or teaching from a multicultural perspective. “Both preservice and inservice teachers are puzzled about how they can teach simultaneously for meeting standards of academic excellence and multicultural education. Many think this is impossible, even as they claim to accept the need to do both.” (Gay and Howard, 2000, p. 3) Each teacher brings a set of values, substantiated or not, to the classroom and such values influence how they teach their students. Gay and Howard also expound on the need for multicultural education by disaggregated data. African-American, Latino, and Native American students continually perform poorly in mathematics, which corroborates findings by Tate (1999) and Ladson-Billings (1995). The disparity between desirable

teaching practices and teacher preparation programs is a byproduct of racism, especially as it pertains to mathematics education, since mathematics is often considered a “gatekeeper” that allows or denies access to college and many careers. Gay and Howard (2000) suggest that more than one or two introductory courses in multicultural education and diversity be required of all who plan to become licensed to educate our children and aspiring teachers. Finally, Gay and Howard (2000) declare teaching a cultural education pedagogy must be shared effort. All teacher educators, not just those of color, have the responsibility of preparing future teachers to teach with cultural sensitivity and social justice in mind. Since the majority of educators are not people of color, the task must be distributed amongst all teacher educators and must begin with undergraduate students to have a potentially significant role in teaching mathematics in socially just classrooms.

The notion of teacher preparation is not solely coursework, but also includes a self-reflection component once the teacher is in the classroom. Gay and Howard (2000) deem this essential for the preparation of 21st century teachers. Reflections, according to Gay and Howard include:

(a) critical honesty about the culturally conditioned assumptions of White dominance and perceptions of truth; (b) genuine empathy for the experiences, issues, and perspectives of other ethnic groups; (c) advocating for the redistribution of power and privilege amongst ethnic groups; and (d) investing resources and energies in the actual process of change. (Gay and Howard, 2000, p. 8)

Like Gay and Howard, Rousseau and Tate (2003) also stress the importance of teacher reflection as a way to improve the equity amongst students in mathematics classrooms.

To illustrate this point, the notion of colorblind teaching is frequently used to justify equal treatment for all students. But, from a CRT perspective, colorblind teaching is a tool to keep the current educational structures in tact. Not acknowledging color implies a teacher's conscious choice to recognize and ignore the undeniable differences amongst students and to deny that those differences result in inequitable teaching practices (Hodge, 2006) and should be considered when planning lessons (Ladson-Billings, 1994; Ensign, 2003).

Finally, Rousseau and Tate (2003) note that teacher self-reflection is instrumental in helping eliminate inequities in the classroom. Teachers who view equity as being equal in the distribution of resources see equity as a process and not an outcome. In addition, when teachers reflect on equity as a socioeconomic issue, they may fail to notice the implications of racism and place the blame of student apathy and academic failure on their parents' lack of education. This leaves the current distribution of power as is and obscures the need to change the policies and practices that contribute to the failure of students of color in mathematics.

Conclusion

Part of the hindrance of social justice in general, and in education, specifically, is a direct result of racism. Derrick Bell's (1992) stance that racism is a permanent fixture in our societal structure resonates with much of the literature on social justice. It is appropriate to accept the notion that social injustice will not be completely eradicated from our society. As long as power, privilege, and entitlement are alive, racism will continue to impact our classrooms as well as our communities. Recognizing that racism is

here to stay, it is, however, important to move forward in the struggles that will ease the pain and suffering of those on the losing side of racism and the recipients of social injustices.

This partial review of literature related to social justice in education from a critical race theory perspective leaves teachers and teacher educators with implications for improving the current state of mathematics education. Teacher education programs should adopt the philosophy of preparing *all* teachers to teach *all* students. This requires being aware of equity issues, diversity within the classroom, and the support needed to appropriately implement these ideas. Relevant teaching needs to be the rule, not the exception. Equity in mathematics education will help in the challenges associated with preparing students and teachers for the communities in which they are expected to thrive. Rousseau and Tate (2003) insist that “equal treatment is not equitable if it leads to different outcomes.” (p. 212) It is imperative that teachers and teacher educators rise to the occasion and do what is right to provide equitable, socially just environments for all mathematics students.

With this in mind, the problem statement is developed in more detail and leads to the discussion of how teacher preparation programs impact the teaching practices in the classrooms and, ultimately, the success or failure of students in mathematics. Chapter 2 contains a review of the literature on social justice in mathematics education and culturally relevant teaching, followed by the study’s methods in Chapter 3. Chapter 4 summarizes the collected from the study and an analysis. The final chapter of this

manuscript, Chapter 5, concludes with a discussion of the findings, implications for teachers and teacher educators, and suggestions for further research.

Chapter 2

Literature Review

Review of Literature

A close look at the research related to social justice in education supports the notion that students of color often require a different approach to achieve success in mathematics classrooms. Gutiérrez's (1999) qualitative study focuses on the success of Latina/o high school students in calculus. Situated in an urban setting, Gutiérrez finds that Latina/o students from low socioeconomic backgrounds are capable of achieving the same success as their White counterparts in suburban settings. The key, according to Gutiérrez, is the sensitivity and dedication of professional teachers who believe in their students' abilities. The mathematics department in this study is aware of the students' needs and takes these needs into account to provide the necessary support for student success. Diversity is embraced by the members of the mathematics department and is useful for developing positive relationships with students in and outside of the classroom. The teachers value meaningful relationships with their students which they build and maintain throughout the academic year. The teachers not only take the time to learn about their students, but they also collaborate during the school day and coordinate additional time outside of the work day to discuss lessons, student progress, and evaluate each other's lessons. The teachers provide tutoring at various points throughout the school day to minimize the chances of students leaving school without the assistance they need to complete assignments. This scaffolding allows students to enter the classroom at various levels and receive equitable accommodations to meet their academic and personal needs. Gutiérrez uses interviews and observations to thoroughly examine the success of the

calculus program and connects its success to a culturally relevant pedagogy (Ladson-Billings, 1994) that is embraced by the mathematics department. The teachers also share the belief that students who have access to calculus in high school also have access to college and fields of study that have historically excluded people of color. This access, as Gutiérrez concludes, provides a culturally just environment for the Latino/a students who, in a different setting, may not be given the equitable resources necessary for success.

Teaching for social justice is as important as teaching with social justice. Mitescu et al. (2011) measure the practices of implementing a social justice curriculum in elementary school classes. This mixed methods study is unique within this body of literature in that it links the teaching practices of teachers directly to the student outcomes on the end-of-unit state-mandated tests. Findings suggest that students who receive more instructions from the social justice context demonstrate higher levels of reasoning and, ultimately, score higher on state tests than those with less social justice context. While this study involves only 22 novice elementary school teachers and their students from the same school district, the results are promising as they validate the use of social justice in the curriculum. These results hold true for all subgroups, not just the White students. For these elementary students, the early exposure to concepts of social justice helps provide a socially just classroom and allows the students to question the policies that are in place and work towards equitable situations for all.

One study in particular notes a lack of culturally relevant pedagogy within the classroom and its results for African-American males. Rousseau and Tate (1995) observed and interviewed teachers and document a seriously inequitable classroom

environment. One teacher in this study claims to be fair to all students by redirecting the responsibility of helping students from her agenda to that of the students. The goal is to encourage students to initiate the conversations that allow for assistance with the day's tasks, but instead results in White students asking for help and African-American students, particularly males, being left out of the learning process. The students who suffer the most in this situation are further marginalized and ultimately experience failure in the course. The teacher recognizes this trend and allows it to continue. The African-American students' reluctance to ask for the help they (and the teacher) know they desperately need, results in an inequitable situation that brings injustice directly to the students' doorsteps. The teacher perceives herself to be equitable because the same opportunities given to the African-American male are given to the entire class; the African-American males "choose" not to take advantage of the opportunities. The students' failures, then, are not a result of unfair treatment, but, according to the teacher, are the logical consequences of their choices. The blame transfers to the students and leaves the teacher with no reason to consider adjusting her teaching strategies to ensure that all of her students have an equitable opportunity to learn mathematics.

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Each of these studies provides a glimpse of classrooms that are engaging and full of mathematics that is rich and relevant. These factors are key to the success of students, especially students of color. When the context is meaningful, students will work. Tate (1995) posits that classrooms that provide authentic learning for students is no longer an option, but is a requirement, if students are to be successful in mathematics. According to Tate, students of color are often forced to understand the experiences of Whites to be successful in a mathematics classroom. The teachers (usually White) select problems from textbooks written by mostly White authors from a White perspective. Ensign (2003) also notes this and claims that the problems are not relevant to many students of color, thus forcing many of them to not only learn the mathematics, but to identify with a context in which they may have no prior experience. (Note: Changing the Eurocentric names or faces to traditionally Hispanic names, or faces, for example, does not make mathematics culturally relevant. This “short cut” demonstrates the lack of cultural sensitivity on the part of textbook writers and contributes to the difficulties of students to do mathematics.) The textbook approach to teaching mathematics creates and sustains inequitable learning environments and holds hostage the progress of social justice in mathematics classrooms across the United States.

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The notion of teacher preparation is not solely coursework, but also includes a self-reflection component once the teacher is in the classroom. Gay and Howard (2000) deem this essential for the preparation of 21st century teachers. Reflections, according to Gay and Howard include:

(a) critical honesty about the culturally conditioned assumptions of White dominance and perceptions of truth; (b) genuine empathy for the experiences, issues, and perspectives of other ethnic groups; (c) advocating for the redistribution of power and privilege amongst ethnic groups; and (d) investing resources and energies in the actual process of change. (Gay and Howard, 2000, p. 8)

Like Gay and Howard, Rousseau and Tate (2003) also stress the importance of teacher reflection as a way to improve the equity amongst students in mathematics classrooms. To illustrate this point, the notion of colorblind teaching is frequently used to justify equal treatment for all students. But, from a CRT perspective, colorblind teaching is a tool to keep the current educational structures intact. Not acknowledging color implies a teacher's conscious choice to recognize and ignore the undeniable differences amongst students and to deny that those differences result in inequitable teaching practices (Hodge, 2006) and should be considered when planning lessons (Ladson-Billings, 1994; Ensign, 2003).

Finally, Rousseau and Tate (2003) note that teacher self-reflection is instrumental in helping eliminate inequities in the classroom. Teachers who view equity as being equal in the distribution of resources see equity as a process and not an outcome. In addition, when teachers reflect on equity as a socioeconomic issue, they may fail to notice the implications of racism and place the blame of student apathy and academic failure on their parents' lack of education. This leaves the current distribution of power as is and obscures the need to change the policies and practices that contribute to the failure of students of color in mathematics.

Conclusion

The partial review of literature related to social justice in education leaves teachers and teacher educators with implications for improving the current state of mathematics education. Teacher education programs should adopt the philosophy of preparing all teachers to teach all students. This requires being aware of equity issues,

diversity within the classroom, and the support needed to appropriately implement these ideas. Relevant teaching needs to be the rule, not the exception. Equity in mathematics education will help in the challenges associated with preparing students and teachers for the communities in which they are expected to thrive. Rousseau and Tate (2003) insist that “equal treatment is not equitable if it leads to different outcomes.” (p. 212) It is imperative that teachers and teacher educators rise to the occasion and do what is right to provide equitable, socially just environments for all mathematics students.

Chapter 3

Methodology

Review of Literature

A close look at the research related to social justice in education supports the notion that students of color often require a different approach to achieve success in mathematics classrooms. Gutiérrez's (1999) qualitative study focuses on the success of Latina/o high school students in calculus. Situated in an urban setting, Gutiérrez finds that Latina/o students from low socioeconomic backgrounds are capable of achieving the same success as their White counterparts in suburban settings. The key, according to Gutiérrez, is the sensitivity and dedication of professional teachers who believe in their students' abilities. The mathematics department in this study is aware of the students' needs and takes these needs into account to provide the necessary support for student success. Diversity is embraced by the members of the mathematics department and is useful for developing positive relationships with students in and outside of the classroom. The teachers value meaningful relationships with their students which they build and maintain throughout the academic year. The teachers not only take the time to learn about their students, but they also collaborate during the school day and coordinate additional time outside of the work day to discuss lessons, student progress, and evaluate each other's lessons. The teachers provide tutoring at various points throughout the school day to minimize the chances of students leaving school without the assistance they need to complete assignments. This scaffolding allows students to enter the classroom at various levels and receive equitable accommodations to meet their academic and personal needs.

Gutiérrez uses interviews and observations to thoroughly examine the success of the calculus program and connects its success to a culturally relevant pedagogy (Ladson-Billings, 1994) that is embraced by the mathematics department. The teachers also share the belief that students who have access to calculus in high school also have access to college and fields of study that have historically excluded people of color. This access, as Gutiérrez concludes, provides a culturally just environment for the Latino/a students who, in a different setting, may not be given the equitable resources necessary for success.

Teaching for social justice is as important as teaching with social justice. Mitescu et al. (2011) measure the practices of implementing a social justice curriculum in elementary school classes. This mixed methods study is unique within this body of literature in that it links the teaching practices of teachers directly to the student outcomes on the end-of-unit state-mandated tests. Findings suggest that students who receive more instructions from the social justice context demonstrate higher levels of reasoning and, ultimately, score higher on state tests than those with less social justice context. While this study involves only 22 novice elementary school teachers and their students from the same school district, the results are promising as they validate the use of social justice in the curriculum. These results hold true for all subgroups, not just the White students. For these elementary students, the early exposure to concepts of social justice helps provide a socially just classroom and allows the students to question the policies that are in place and work towards equitable situations for all.

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Chapter 4

Data and Analysis

The purpose of this study was to explore the perceptions of grades 6-12 teachers as related to social justice in mathematics education. Data was collected via an online survey using Google Drive and a small group interview.

Data collection procedures

Upon IRB approval, the first stages of data collection were launched. A formal letter of invitation was sent out to several public school districts within the southeastern part of the United States soliciting the consent of the superintendents and/or school directors. Included with this letter was a copy of the Informed Consent Statement and the project information sheet. [Appendix X] A follow-up email was sent approximately two weeks later to confirm receipt of the original request. Two school districts responded favorably to the request. These documents were then secured and submitted to the IRB board and added to the IRB application for this study.

Once consent was granted, the principals of each middle and high school in the two school districts were contacted. A copy of the consent form was included in the correspondence as well as a request for the permission to contact the appropriate school personnel via email. Once permission was granted, the email addresses of all mathematics teachers in grades 6-12 were contacted by email. Attached to the email were the project information sheet, the informed consent form, and a copy of the district's permission for me to contact the teachers. {Appendix X} Approximately one week later, an email was sent to each of the teachers indicating a separate email with the link to the online survey would be sent later that day. Two weeks were allowed as responses were

collected. Two follow -up emails were sent to all teachers, two weeks after the initial email and three weeks after the initial email, to ensure receipt of the survey. Twelve teachers (approximately 28%) responded to the survey and two teachers responded to the request to participate in the small group interview. The interview participants were contacted via email and a place and time was agreed upon for the interview.

Once the interview was scheduled, the two participants were given consent forms and reminded that the interview was voluntary. Once the signatures on the consent forms were obtained, the interview took place and lasted approximately fifty minutes. The interview was tape-recorded and transcribed for data analysis.

The survey participants

Upon approval from the school district leaders to collect information from their respective teachers, 43 math teachers in grades 6-12 were contacted. Twelve teachers completed the online survey.

Demographics

Your gender

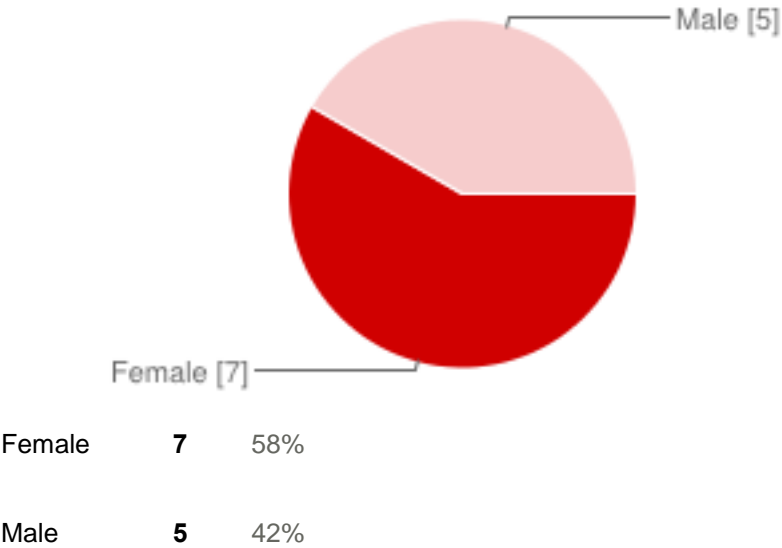


Figure 1 Survey Participants' Genders

Your ethnic background

Caucasian, White, I don't have one, and African American.

Your highest level of education

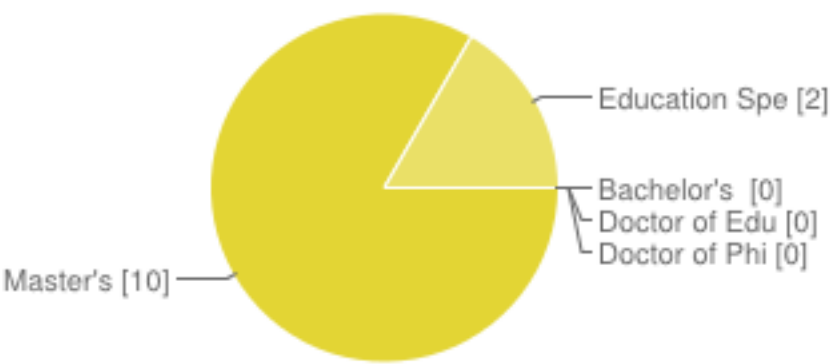


Figure 2 Survey Participants' highest level of education

Bachelor's	0	0%
Master's	10	83%
Education Specialist	2	17%
Doctor of Education	0	0%
Doctor of Philosophy	0	0%

Total years of teaching experience

35 30 7 5 19 15 12 20 10

Grade levels you have taught

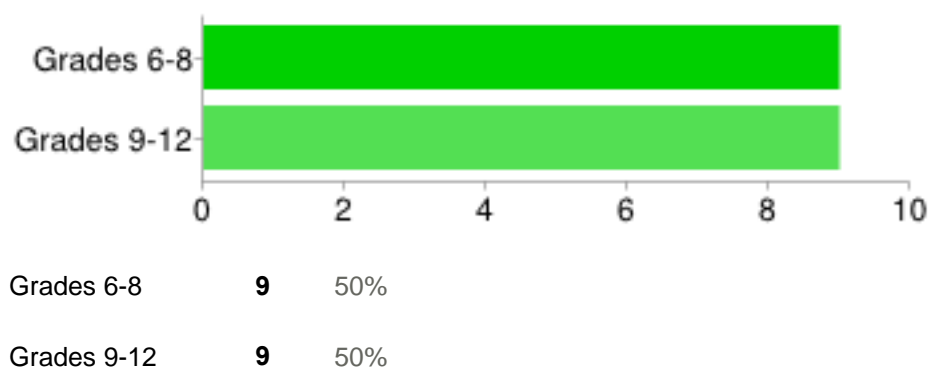


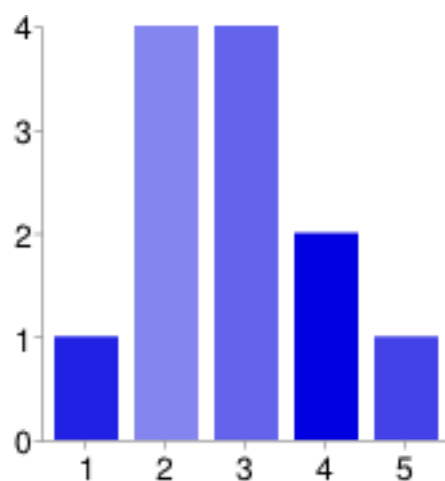
Figure 3 Survey Participants' Grades Taught

Twelve teachers (approximately 28%) responded to the survey items. Of the twelve, seven were females and 5 were males. The participants identified themselves as either Caucasian/White, African-American, or none. The highest level attained by the survey participants was an Educational Specialist. Two (17%) indicated earning this degree; the other ten (83%) had earned a master's degree.

Survey Results

The online survey was open to the participants for approximately one month. Email reminders were sent out to ensure each person had the opportunity to respond to the survey items. In the following pages, the twelve survey responses were recorded. Each teacher was asked to respond with a numerical response of 1 through 5 with 1 being "rarely" and 5 being "almost always."

When asked, “Are you knowledgeable about social justice issues in mathematics education?”, the responses were as follows:

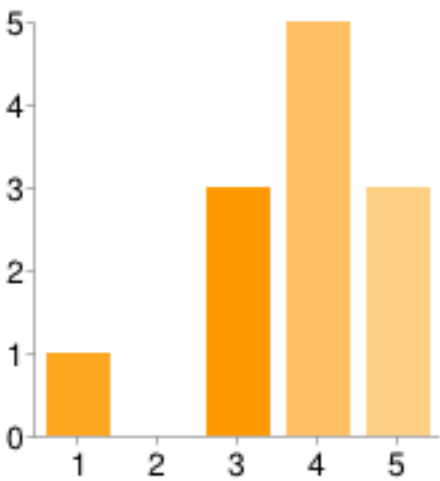


1	1	8%
2	4	33%
3	4	33%
4	2	17%
5	1	8%

Figure 4 Survey Participants’ Knowledge of Social Justice in Mathematics Education

The survey then allowed for a scaled response and a short-answer response to each of the following thirteen questions. The short-answer responses are listed in italics below their respective graphs and percentages.

When asked, “How concerned are you about the cultural climate of your classroom?”, the teachers responded as follows:



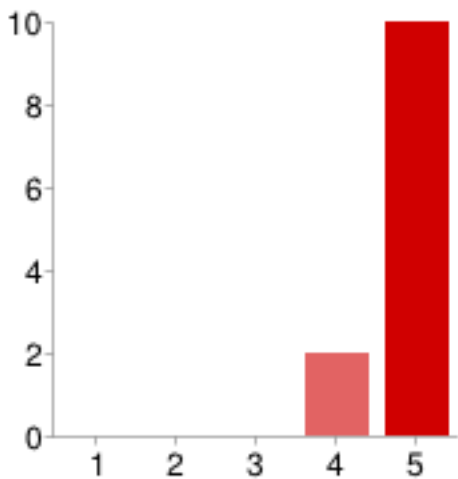
1	1	8%
2	0	0%
3	3	25%
4	5	42%
5	3	25%

Figure 5 Survey Participants’ Level of Concern for Cultural Climate

Comments:

I take into account the multi-cultural world that we live in. However, once in a while new students arrive from cultures that I am not familiar with, but I still include them and help to understand the tasks at hand to help maximize their learning potential.

When asked, “How concerned are you about reaching all of your students?”, the responses were as follows:



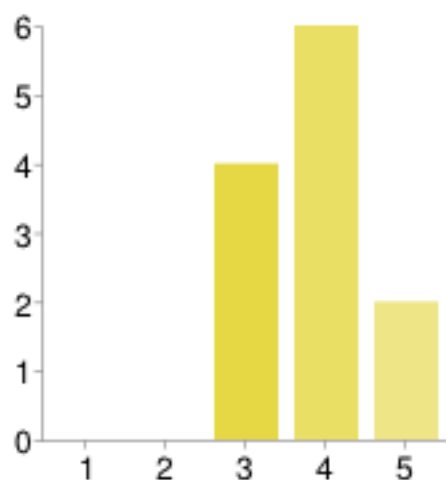
1	0	0%
2	0	0%
3	0	0%
4	2	17%
5	10	83%

Figure 6 Survey Participants’ Concerns for Reaching All Students

Comments:

Every class is structured around everyone being successful. Students are arranged in groups to help with peer tutoring and problem solving. When students have difficulty, time is taken to help find where there issues lie and help make corrections to problem solving methods.

When asked, “Do you have the curriculum resources necessary to successfully teach all of your students?”, the teachers responded accordingly:



1 **0** 0%

2 **0** 0%

3 **4** 33%

4 **6** 50%

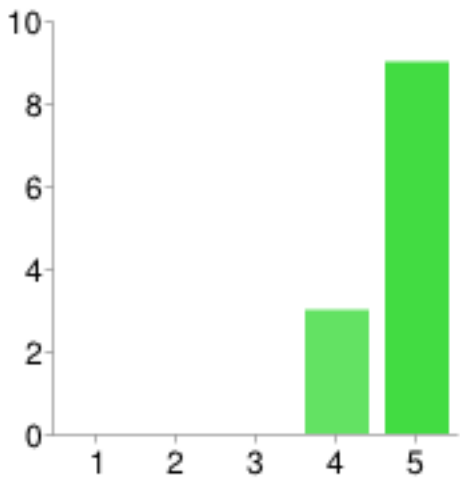
5 **2** 17%

Figure 7 Survey Participants’ Access to Curriculum Resources

Comments:

We definitely have great resources to work with. From time to time, I have EL students who speak a different language and we do our best with Google Translator or a limited supply of Spanish textbooks that follow the curriculum.

When asked, “Do you feel confident enough with your mathematics background to reach all of your students?”, the teachers responded:

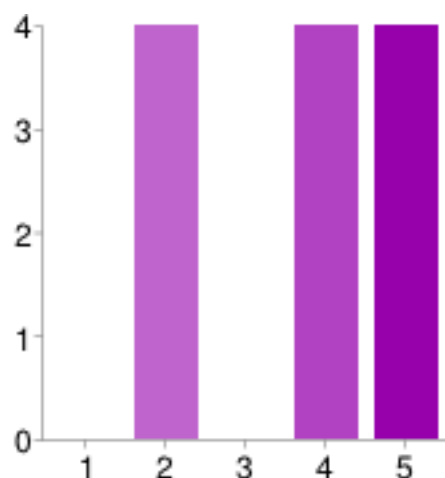


1	0	0%
2	0	0%
3	0	0%
4	3	25%
5	9	75%

Figure 8 Survey Participants’ Mathematics Background

Comments: *I have taught multiple levels of mathematics. This allows me to know where the students are going and also know what knowledge they are coming to me with. I also have materials and a working knowledge to help build skills to help fill in gaps and allow students to work to their maximum potential.*

When asked, “Do you use data to inform your teaching practices, particularly for marginalized students?”, the results were as follows:



1 **0** 0%

2 **4** 33%

3 **0** 0%

4 **4** 33%

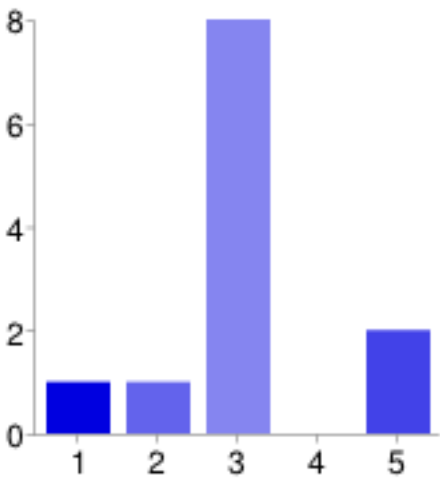
5 **4** 33%

Figure 9 Survey Participants’ Use of Student Data

Comments:

The use of TCAP scores, test scores, common formative assessments, etc. is use on a weekly basis to determine the lessons that need to be taught. This in turn is also used with the curriculum guidelines that are set forth in the Common Core to guide students to proficiency and beyond on state tests and prepare for the CRA written exams throughout the year. I wish I had more time to do this. The type of analysis necessary is just not practical with everything else we have on our plates.

Teachers were then asked, “Do you align your teaching strategies with those of a culturally relevant paradigm?”



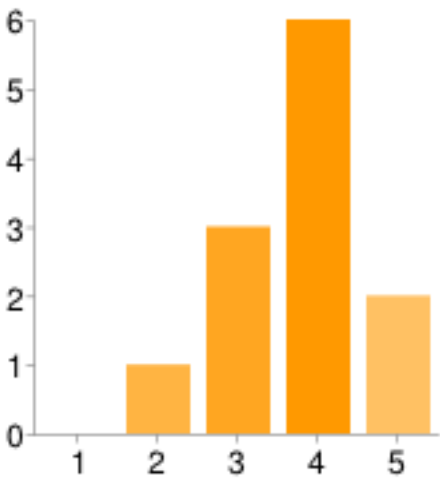
1	1	8%
2	1	8%
3	8	67%
4	0	0%
5	2	17%

Figure 10 Survey Participants’ Alignment of Teaching with Culturally Relevant Pedagogy

Comments:

I work to make sure that all students are included and understand the examples being used to teach the lessons. When they do not, a new example that is understood is found and used to help practice and understand the topic being discussed.

Next, the teachers were asked, “Do you believe you have cultural experiences that your students are able to identify with?”



1	0	0%
2	1	8%
3	3	25%
4	6	50%
5	2	17%

Figure 11 Study Participants’ Cultural Experiences

Comments:

I have had the opportunity to travel and learn about different social groups. I also work and associate with many different cultures in the community.

The next survey question asked, “Are your students' beliefs about themselves and their abilities taken into consideration as you develop lesson plans, assessments, and/or interventions?”

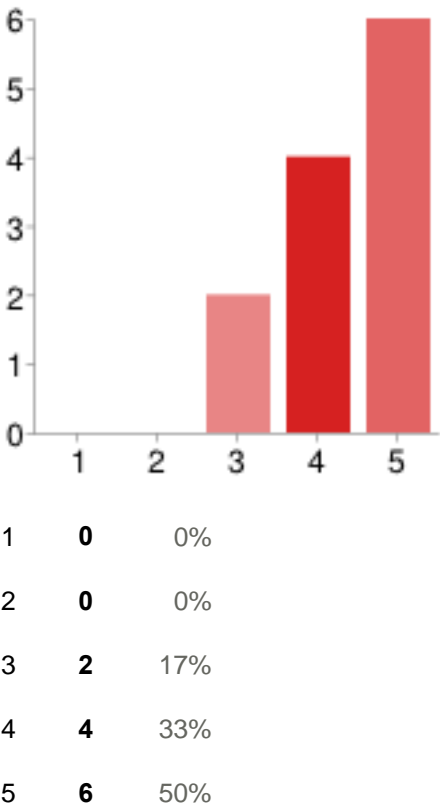
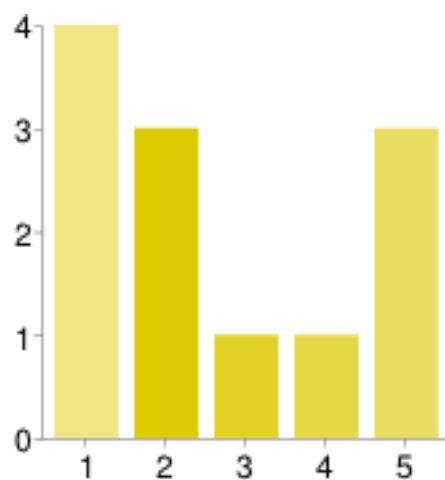


Figure 12 Survey Participants’ Views on Students’ Beliefs

Comments:
I strive to encourage all students to do their very best. We have open communication that is ok to be "wrong" when solving problems. If this happens, we work to find where they are deficient and find ways for them to build the skills they need to be more confident about successful completion of their work.

When asked, “Do you feel that your teacher education program adequately prepared you to teach in diverse classrooms?”, the responses were as follows:



1 **4** 33%

2 **3** 25%

3 **1** 8%

4 **1** 8%

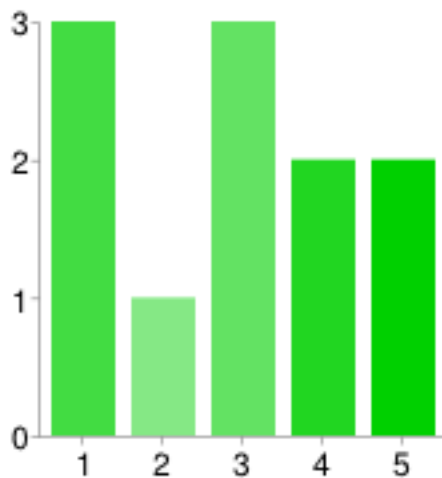
5 **3** 25%

Figure 13 Survey Participants’ Views on Teacher Preparation Programs

Comments:

No, I do not. This is definitely something that has to be practiced and cannot just be discussed. Seeing this type of work in action is a must. There is no one right way to go about doing this. You can't read a book and become adept in a diverse classroom. These skills are built over time.

The survey then asked, “Is your classroom decorated/arranged to reflect the diversity of your students?”



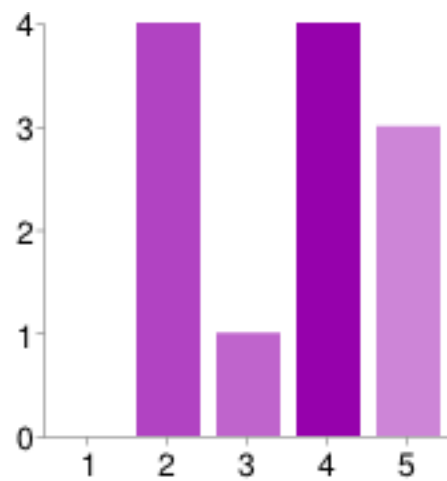
1	3	27%
2	1	9%
3	3	27%
4	2	18%
5	2	18%

Figure 14 Survey Participants’ Classroom Decorations/Arrangements

Comments:

Yes and no. There room is built around math concepts. Posters are designed in a way to help encourage learning for all, but are written in a way that is easy to understand without any extra information that might cause confusion.

Next, teachers were asked, “Do you feel that you have the technology resources and training available to provide instruction for all of your students?” Their responses:



1 **0** 0%

2 **4** 33%

3 **1** 8%

4 **4** 33%

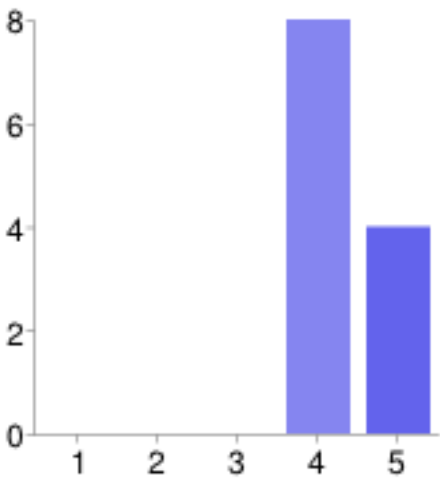
5 **3** 25%

Figure 15 Survey Participants’ Access to Technology Resources to Reach All Students

Comments:

Absolutely. I am able to use Google Translator quickly and efficiently to help language barriers. We also use it to find diverse problems that students can work through to learn about the world around them.

The next survey question was, “Do you vary your teaching strategies and/or use supplemental resources to help reach all of your students?”



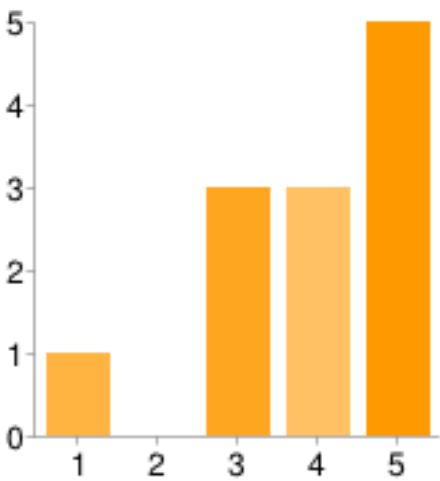
1	0	0%
2	0	0%
3	0	0%
4	8	67%
5	4	33%

Figure 16 Survey Participants’ on Varying Teaching Methods

Comments:

Yes, there is no one right way to teach. Daily lessons are adapted to work with all students. Outside materials are used to help students better understand problems or give examples that can best help students accomplish the task at hand.

The teachers were then asked, “Do you use cooperative learning groups to engage your students?” Their responses are documented below:



1	1	8%
2	0	0%
3	3	25%
4	3	25%
5	5	42%

Figure 17 Survey Participants’ Use of Cooperative Learning Groups

Comments:

Students are arranged in groups on a daily basis. Most lessons allow for students to work together to accomplish tasks. It is hard within my class to organize groups due to student behavior issues.

The final two items on the survey were short-answer items. The first of these two asked, ‘What behaviors do you consider important in your classroom?’

Comments: *Teacher: 1. Prepared for lesson 2. Interesting 3. Differentiated levels 4.*

Flexibility Student: 1. willing to try / actually do work 2. prepared with materials 3.

willingness to study for long term retention The student should feel comfortable with the teacher to be able to ask questions without being intimidated. Students should allow for all thoughts on a topic. They should feel free to express themselves on the methods chosen, even if different from the others. Students should be quiet when the teacher is teaching. They should be on time to class and arrive with all of their materials with them, including homework. Show respect to classmates and staff. Be responsible for your grades and actions. I expect effort from myself and my students that reflects attention to the language and relational nature of mathematics, regardless of the student's background. In order for true learning to occur, an atmosphere that allows students to be supported in their mistakes as well as in their successes must be of paramount importance. Students need to feel that they can discuss their mathematical errors without fear of judgment. Finally, I expect that students will not harm my space or their fellow classmates space in either word or deed. I expect students to be ready, respectful, and responsible. I am a patient teacher. When I ask a question, I allow time for all students to think and have an opportunity to answer questions. When students struggle, I take the time to help them build the skills they need to be successful. I have one rule for my classroom. Do not speak, while someone else is speaking. This teaches us all to be mindful to listen and learn from the explanations being given. We might find a new or

maybe even easier way to be able to problem solve. meaningful discussions, evidence-based discussions, appropriate use of vocabulary Respect for others and the safe, quiet, learning environment Consistent Work ethic, without excuse or modification I expect all of my students to put forth the greatest effort they can. My job is to supplement the efforts of those students who need help. Ability to work cooperatively in a group, participation, attentiveness, respectfulness Engaged in learning and respectful of all

The last survey item inquired about issues related to a socially just classroom

“Please describe any obstacles you face when you teach a diverse group of learners.”

Comments:

A general lack of the previous behaviors. My students have not been taught, by any culture, to respect that which is respectable. The obstacles become less the more diverse the backgrounds. If the classroom represents the school as a whole, then there is more acceptance and less defiance. I may not have total control over the diversity of my classes, but I do know that there is less disruption when the classes are diverse. Grading scales, individual lessons, pacing, high students challenged and low level not over challenged The major obstacles that I face when dealing with diverse learning groups include student ability & behavior. I teach children that routinely do not want to do anything, let alone try to learn something new. I also have extremely diverse student abilities within the same class room which makes it frustrating at times for both the high

and the low level students. Often students of lower abilities tend to come from lower socio economic background. It is often hard to garner the home support needed for these students to catch up and become successful on grade level. Also, students from this background tend to not see the value that a good education can hold in moving them out of a poverty situation. It is cyclic from generation to generation. The differences in student abilities make day-to-day planning very challenging. It is important to enrich students who have mastered the curriculum without leaving anyone behind. Some groups can be louder than others. Some groups call others racist, which may not be the case. Ability levels influence how I teach and how I help individual students. Adjustments are made as necessary to reach all students. Time is usually the biggest obstacle. There are only so many minutes in which the class period lasts. That does mean I think the school day should last longer.

The Small Group Interview Participants

After the survey results were collected, the two volunteers for the small group interview were contacted and an interview time and location was established.

The Interview

To gather a deeper understanding of teachers' perspectives towards social justice in mathematics education, interview questions were developed using the tenets of multicultural education (Ladson-Billings, (1994) that are critical in the success of diverse

students. These questions were reviewed by my doctoral committee, revised, and submitted to the University for approval.

The interview began with the introduction of the research project, how the data would be used, and the voluntary nature of this interview. Both participants were reminded that at any time they could withdraw from the study and have his/her information discarded as data for the study. Informed consent forms were read, signed, and turned in to interviewer. The interview began with a list of contrasting pairs of words. The participants were to choose the “better” word of the pair and were asked to provide support, if desired, for their responses. The one pair of words that created the most intense response from both participants was “equal and equitable.”

Teacher 2 chose equitable because, “...working with students at different levels, equal means, to me they get the same assignments, whereas equitable means they are challenged to the same level.” Teacher 1 nods in agreement, but chooses not to add any further comments to Teacher 2’s response.

Defining Social Justice

The first question was, “How do you define or describe social justice as it relates to your classroom?” Teacher 2 immediately said, “I define social justice as, I’m providing equal access to everybody with the content and I’m not allowing their backgrounds or their prior knowledge to hinder the presentation of the new material. If they, uh, don’t have the background, we’ll go into the background for them. I’ll take the

time out so that whatever they've done that causes them not to have an appropriate background for the topic, that they can all understand the topic by the end of class."

Teacher 1 responded as well: "I kind of think about where my students are from. We have students from diverse backgrounds, but a lot of the kids in Algebra 1...let's face it. If we went home, if we looked at the neighborhood where they're from, or where mom and dad are from, we would see a variety of social challenges that have nothing to do with academics and everything to do with academics. Their society, where they're from, has a huge impact on what I do here. So, I kind of consider social justice to realize my kids come from different places and I have to find a way to reach all to there to bring them to here. Those reaches are not all the same. I try to be equitable; equal doesn't mean the same thing. I have to go to where they're from, no matter how distant that is..."

Teacher 1 goes on to add, "... I also believe that as I show kids they can succeed, they start to act like different kids. Different kids. Successful kids."

Classroom Environment

The next question, falling in line with Ladson-Billings (1994) tenets of multicultural education inquires about the classroom environment.

Teacher 1 comments: "I can't say that I talk about gender or culture as much. What I attempt to do is I attempt to tell students that what gender we are, how much money our dad makes, how little our dad makes, how little money we have, whatever...that it is very inconsequential and that hard work dominates all of that." Teacher 2 adds: "I hold the same expectations of everybody, whether they are IEP students, hyperactive students,

African-American students, or low socioeconomic...this is what I expect you to do every day. I have the same expectations...across the board. And, am I a little more forgiving of the ADHD student who needs to get up and walk around because he can't sit still for fifteen minutes? Yes...I allow that without an issue. There are variances build in based upon the students' needs, but expectations that they are going to be on task, focused, trying...". Teacher 2 continues: "...what each person can do on that level can vary slightly based on their...whether they have an IEP or they're ADHD or their background. I see change over time in the classroom, that if I am consistent with that [expectations], they learn that if they do what's expected, everything goes better and is more enjoyable to them."

Teacher 1 expresses a need do better when it comes to the design and decoration of the classroom: ..." I'd love to have almost a poster of every student so the student can see themselves in some setting. So, if I was some great graphic artist, I'd take a picture of every student and put them in some uniform, like a nurse, a doctor, an engineer, whatever, so they could see them. And, again, I don't do that, probably because I'm lazy or don't have time or something." Teacher 2 agrees that more attention needs to be paid to the design of the classroom and indicated the difficulty in finding materials appropriate for high school students. However, both Teacher 1 and Teacher 2 agree that having more of a culturally relevant decorum may help students see themselves in successful roles they may not have otherwise envisioned.

Curriculum and Materials

When asked, “What does a socially just curriculum look like? How do your lesson plans, assessments, etc. reflect social justice in your classes?”, Teacher 1 shared some personal adjustments that have been made to help students who are not able to work at the same pace and level as the others in the class: “I have two Hispanic speaking students who don’t speak English. I thought, about nine, ten weeks ago, that this would be a very difficult challenge that I could not overcome.” Teacher 1 then shares that the language barrier and anticipated problems are addressed by special grouping assignments, “...because it seems a little unfair that I’m not giving the test in Spanish, and I certainly can’t teach in Spanish. I’m not bilingual. So, I want to say, to modify an injustice.” Teacher 1 goes further to explain this instructional decision: “...I mean if you think about it, the student could be German-Speaking or French or whatever. We still have the same problem. I have a student who cannot comprehend, moment by moment, what I am saying or what I’m asking or what I’m explaining. I try to modify that social injustice...I assist.” This kind of adjustment is not just for English Language Learners (ELLs). Teacher 1 also shares an approach to removing injustices for those who are physically impaired: “I have a student who is physically handicapped. [He] can barely write...he has trouble walking, he has trouble writing. Often times, I’ll assist him in the writing portion of something that is more complex. So, I’ll be writing an equation down and he’ll tell me what to do. I’ll sit next to him, even during testing, to try to get him through more complex challenges.”

Teacher 1 also describes a view of equity by sharing information about a student who recently transferred to an Algebra 1 class from another school district. Teacher 1 describes the student as a very weak student with gaps in her mathematics background: “... I’m giving her a little more help, but I think I’d do that for anybody. I don’t think it matters who she is or what she is. Only that she’s at the bottom of this pile and can’t get up.”

Teacher 1 then used the following analogy to make sense of this subjective decision. “... it’s like the smallest baby, or like the smallest child. I’m taking five kids camping, but the littlest kid might need to be carried some of the time...I’m helping a child who needs more help.”

Teacher 2 added to the discussion issues that were different from Teacher 1’s due to the nature of the students. Teacher 2 said, “...a lot of times, I struggle with that [modifications] because...it needs to be absolute in my [classroom]. It’s a “yes” or it’s a “no.” There is no “maybe.” They don’t understand the boundaries of helping this student a little bit because they have an IEP, they need it, or they’re a little weak, or they need a little background.” Teacher 2 added that during tests, “Nobody talks, nobody helps. But I do come back to my social justice and to my equitableness in the fact that, depending on where they’re at, although I’ll mark whether right or wrong, I will not necessarily take off points even though I mark it wrong. If somebody was absent for a section and hasn’t had time to get that make up work done, rather than marking it wrong and lowering their test

grade, I may mark it wrong and give them...a chance to come back and look at it again later.”

In response to the social justice aspect of the curriculum choices made by teaches, Teacher 1 noted that very few projects are assigned. While projects are valued, Teacher 1 has had experiences that suggest that many students have needs beyond the scope of a project. When a project is assigned, the “haves and the have nots” are easily identified. Then, to reduce the socioeconomic differences within the classroom, “...I kind of watch for kids who don’t have...and I wouldn’t say it, once again, I’m not sure I’d call it an overt social attempt...the student’s background doesn’t matter to me, where they’re from doesn’t matter to me. Only that they have a need.”

Teacher 2 posited that while projects are sparingly assigned throughout the year to help students connect the content with their daily lives, a proactive stance is taken when it comes to supplies and materials for the completion of projects. It is noted that, “When I do my projects, I provide everything.... if they don’t have it [the completed project], it’s their fault. Not their parents’ fault, not society’s fault, not the school’s responsibility...they’ve given the opportunity to work, they’ve been given the opportunity to get the materials they need, they’ve been given the opportunity to use free materials.” Teacher 1 nodded in agreement of this strategy.

Classroom Environment/Discussions

When asked, “What kinds of discussions would take place when using social justice concepts to teach mathematics?”, Teacher 2 mentioned a situation in which there were three students, all in the same class, who all had missing fingers. Class discussions were often centered around a base 10 system for mathematics and science. The reason for this base 10 dominance was explained as a quick way to count since we have ten fingers. The three students who did not have all ten fingers added to the discussion and asked if they could use a different base since they did not have ten fingers with which to count. The class, then was able to discuss base 5 and base 7 models and compare them to the base 10 model. “This got us into a great tangent. And, those students, because of the classroom that we evolved together, were very comfortable with their disabilities and were very comfortable discussing, “Well, how would this base work? What’s different? What’s better about it? What’s worse?” And, you know, unfortunately we decided that base 7, because it didn’t have many divisors, wasn’t the best one in the end...he was willing to accept that. The student said he would take away his claw and...just use his one real hand and go base 5. And he just handled that real well. It led to a much more in-depth and robust discussion than I could have ever generated without that student bringing that question to the floor.” Teacher 1 continued with some conversations with students of color who experience social injustices within the educational setting...”We’d be mental midgets if we didn’t know, absolute without any doubt, that African-American boys have trouble everywhere in America in school, generally. The reason for that is debatable, but it’s the truth. The moment one of my boys does well, I definitely pinpoint

that a lot. Just so, and again, it's so like, I want everybody to think that, no matter who they are...and sometimes they think of themselves as a "what." I don't. I think of them as a "who." I comprehend, at the deepest level, that our skin color is absolutely, positively meaningless unless it means something to us. Even if it's a wrong meaning, I know my students. If I had a blue poor kid, he could learn to do math. Unless he was taught, poor blue kids can't do math, and so what I attempt to do is, find a blue kid who's doing math, and then I'll go.....so I attempt to encourage the feeling and the thought path that you are like me...but I try to tell my kids daily that I'm not a math genius. That I am not mathematically gifted and I try to tell my students, daily... that they are exactly like me. I tell them I'm not better than them, I'm not smarter than them, I'm not faster than them. There isn't a...difference between us. Inside of us, it's the same. It's universal. It's universally the same. And, every now and then, it starts to catch my kids. They start to get it. I tell them that on the inside, we are quite similar. And, the outside may not matter as much as they think it does. If they work hard they can get it."

Student and Teacher Beliefs

Teacher 1 continued to express frustration towards the misconceptions students bring to the classroom discussions: "...one [African-American] young lady, she's not very good at math and she once told me that it's a cultural thing..." Once he began to give this student examples of African-American women who were strong in math, the student no longer used this as an excuse when she did poorly in class. This scenario inspired Teacher 1 to return to a previous comment made about the classroom decorum..."I don't feel like I

overtly pay enough attention, and it may be that after we have this discussion, I'll start thinking about, "How should I? How do I? How do I make the environment in the room visually accommodating? How do I do overtly what I'm not doing now?"

Teacher 2 interjected that while misconceptions are seen almost daily in the mathematics classroom, the misconceptions are not allowed to unravel the educational process that has already been established. "There are a whole lot of social issues that I can't help with. Um, I'm not from their background. I will be honest, I don't understand a lot of the background, the culture, right now. I'm not young and I'm not from that background. So, I can't put myself in it. Um, I can put myself in having to fit into cultures and places where I don't mix. Um, but...I had a student one day ask in the middle of math class, "What does a pimp need to know about graphing?" Teacher 2 provided this example of a student who did not find the value in graphing equations. The student identified a topic that was not school-appropriate, but was relevant to his life. Teacher 2 adjusted the classroom dialogue and helped the student see the value of math in all areas of life. Teacher 2 said, "...my goal is to teach them how to graph, and that's what my goal is, I've got to go to where they're at and he was clearly in...whatever area he was in to have that question from, but he wanted to know. And, hooking into the culture that he lived in, on a daily basis."

Teacher Preparation

The interview continued forward with more scenarios of students who used mnemonics that were inappropriate for school, but were effective in helping student remember math formulas and trigonometric ratios. Both Teacher 1 and Teacher 2 agreed

that as long as the students' learning strategies worked, the students were encouraged to use them to complete assignments and assessments.

The next question was, "When asked, "What kinds of resources and/or experiences would be useful for teachers who plan to use social justice as a mathematics curriculum tool or as a classroom management tool?", Teacher 1 responded: "...I have to admit that I don't spend enough time on this [social justice] and it's definitely not something that we discussed at my university. We didn't spend a lot of time, you know, working on, focusing on it..." Teacher 1 immediately replied to this question with, "I'm not very...um...sure that anything in terms of education has helped out or made a big difference" and listed some personal and professional experiences from a previous career, but firmly states that while no coursework had been taken that focused on social justice issues in mathematics education, experiences revealed that "...different people from different cultures and different diverse whatever, still have the opportunities, the possibilities, of success here (pointing to his brain).".

Teacher 1 continued, "...every one of my kids can be adopted by me, live in my house, have every opportunity that a son or daughter born to me would have, if I treated them all the same. I don't mean the same as in the same exact requirements. I mean, treat them all with the same expectations, that I can teach you and that you can learn, that you have opportunities and possibilities."

Teacher 2 suggested that teachers having "diverse situations early on is important. Teachers who do not have such exposure may not be adequately prepared to teach students who are different from them." Teacher 2 shared that there was no coursework in

the undergraduate program (which was not in education) related to social justice and teaching diverse students, but in the master's level education courses, there was one required course on the social history of education in America. Teacher 2 recalled having discussion in that class that introduced the issues that would be inevitable as a teacher of diverse students. Teacher 2 reflected upon classroom experiences and decided that teaching is "...one of the things that I can do to make the world a better place. I can't invent the next iPhone, I can't invent the next Windows; ,that's not my cup of tea. But, I can make sure that I give everybody the opportunity. It doesn't matter where they come from."

Teacher 2 gleaned this statement from an English education program at the university in which the students were required to teach in diverse environments and spend time within the communities where their students lived. "...These [student]teachers got in the classrooms that weren't identical to what they had growing up, and they couldn't function and they didn't know what to do. I know it was real interesting that it wasn't just that they were doing placements in culturally diverse classrooms, but they were...given a variety of experiences. If students don't have that background, a culturally diverse background, they need to be given it somehow...trips to somewhere else where you're living their life for a while, whether it's within, as a teacher, or as a community member doing something in their community."

As far as other experiences prior to being in the classroom, Teacher 1 agreed with Teacher 2's statement by adding "... I think if you have to, you'd have to make sure that

their education, at least offer the experience...no, no...mandate the experience that they [teachers] teach in some diverse backgrounds..”

Teacher 1 continued, “...if you have cultural diversity in the training, if you have men and women coming from culturally diverse places, it’s an advantage. It’s definitely an advantage. If you put that into the education, once again, it’s an advantage. It’s more. It adds to their winning. So, yes, if you want teachers who are talented in diverse situations, then give them diverse situations early on.”

Teacher 1 also shared a personal philosophy of teaching as a craft that goes beyond the mathematics curriculum. He states, “Well, I’m a math teacher and I love math, but I actually kind of focus on something that’s not really math. I want...you to get better at being a student.” This challenge is approached an increased effort to reduce the “fear factor” for students who are afraid of making mistakes in class. Teacher 1 noted that once the fear factor is reduced, , “...I look for engagement which gets them back in the franchise of possibilities...it’s about the possibilities, the realm of possibilities, that I think is much better than the grades.”

Teacher 2 echoed Teacher 1’s philosophy that teaching is not just about subject matter. “I want them to rise to whatever challenge is placed in front of them, whether it’s in my math class or in some other class, but I haven’t really thought about trying to make my kids a better student. For some of my kids, the goal is, if they’re a better student, that might be the only thing they learn that’s going to apply to their life. And, that’s great.”

Content

In terms of the content, Teacher 2 expressed thoughts on the impact the state and national standards have on how teachers measure student success. “Unfortunately, I think with today’s standards and No Child Left Behind, there’s also a huge issue of how far does it (progress) have to be? The state says they have to do well on the EOC or on the PARCC or whatever like that, so you can’t just say [a student has] made progress.”

Teacher 1 agreed with Teacher 2 in that progress is measured in a variety of ways: “...The things that I’m looking for the most...are reductions of fears, the ability to do work and try stuff and take risks. If we see improved math scores later down the road, then ok...what I’m saying is, I tend not to look at that up front.” This comment presented yet another social challenge in mathematics education as Teacher 1 added, “I have kids, and I swear, some teacher years ago told them that they couldn’t do math. In fact, some teacher might have told them, “Well, I’m not good at math and some kids just aren’t good at math.” There are kids who actually believe that they are genetically programmed to not be good at math. And, so I kind of battle that...it isn’t culture, I don’t think....I think it’s a misconception. And, do we see it in some cultures more than others? Yeah, maybe. But again, I kind of minimize that perspective. I don’t think it’s...something I need to focus on. And, again, maybe I’m missing something. I tell my kids they can do it.”

Obstacles in Maintaining a Socially Just Environment

As Teacher 2 concluded, a story is shared on the thoughts on the educational process as a whole: “...This is just not our school’s issue. It’s a society issue.” Teacher 2 illustrated this by describing the situation of a White male ninth grader with ADHD who was bright,

but had not experienced success in an upper level mathematics class. The issues, Teacher 2 suggested, were non-academic but stemmed from social issues. “If I look at his socioeconomics [status], he would probably be on the lower end. And, so he doesn’t have the social skills or the parenting...not the parenting...the parenting support to get him where he could be successful...” Consequently, this student was removed from the advanced course and was placed in a basic course. Teacher 2 was able to work one-on-one with this student, which helped support his assessment of the student’s abilities to do rigorous mathematics. “...he can take what I’ve talked about and go to the hard problems and ask me a relevant question...” Teacher 2, according to the student’s mother, “...made him feel smart.” The close interaction in a small setting was key for Teacher 2 to see these qualities in the student that were not evident in the much larger, structured, fast-paced setting in which the student was not able to function.

Teacher 1 shared that experiences, such as this experiences, were far too frequent. The reason for this frequencies was attributed to “...miscommunication. If a boy who’s ADHD and he’s an African-American male and he’s poor, well, then he’s probably stupid. It’s a terribly unfair issue, which has pretty much nothing to do with his intellect.”

The interview concludes with Teacher 1 and Teacher 2 both asking for feedback on how to better reach all of their students.

Data Analysis

Upon the completion of the survey and the small group interview transcription, the survey data and interview responses were reviewed for themes and specific responses to help answer the research questions. The survey and interview responses provided some

useful comments to inform the stakeholders of mathematics education in grades 6-12.

Most of the survey questions were given a scaled response of 1 to 5 (1 being “rarely” and 5 being “almost always”). With the exception of one question, the survey items offered space for participants to provide additional comments to support their scaled responses.

The results are analyzed in the following pages.

Cultural Climate

In response to the question about the participants’ knowledge of social justice as it relates to mathematics education, only one participant responded with a 5. Seventy-five percent (9 participants) answered with a 1, 2, or 3. This result was consistent with research that highlighted the lack of awareness that teachers bring to the classroom about the issues of social justice and how these issues impacted teaching and learning (Rousseau and Tate, 2003). When asked how concerned the participants were about the cultural climate of their classrooms, approximately 92% (11 participants) responded with a 3 or higher. One teacher reported that he/she “...takes into account the multi-cultural world in which we live” and “...students arrive from cultures that I am not familiar with.” This comment was consistent with research by Gutiérrez (1999) that suggested teachers need exposure to the diverse classrooms in which they will be expected to teach. This was a theme in the interview as well.

Ten teachers (approximately 83%) responded with a 5 which indicated that they were almost always concerned about all students’ success while 2 participants (approximately 17%) responded with a 4. Classroom resources, according to the survey responses, were not a hindrance for teaching diverse populations, as indicated by all 12

teachers responding with a 3 or higher. With the increase of English Language Learners, it was noted that resources, such as “Google Translator and Spanish workbooks that follow our curriculum...” have helped teachers address individual student needs. This was one approach to “leveling the playing field” for those who are not strong in the English language. This level of support was also evident in the interview as one teacher “.helps the student who needs the most help.”

Content and Teaching Practices

Content knowledge was one of the five tenets Ladson-Billings (1994) discussed to describe the pieces of a solid culturally relevant curriculum. The survey showed that three teachers (25%) responded with a 4 while the other 9 teachers(75%) responded with a 5 to indicate their comfort levels with their respective mathematics backgrounds to teach their students. Interestingly, 10 teachers (approximately 83%) answered with a 3 or lower to the alignment of their teaching practices to those of a culturally relevant paradigm.

Ladson-Billings (1994) suggested that content knowledge and teaching through a culturally relevant lens go hand in hand and combine with the other tenets described as essential for creating and sustaining a culturally relevant environment in which students of color can successfully learn mathematics.

Teacher Preparation

The disparity between these sets or survey responses may be a by-product of the lack of required coursework in their teacher preparation programs, as also indicated in the interview responses. Lack of knowledge about social justice issues, then, has continued to be the norm (Hayes and Juárez, 2012) and has kept many teachers from the information

that stood to help, rather than hurt, teaching practices and student learning. Eight teachers (approximately 67%) responded with a 3 or lower when asked if their teacher preparation programs were adequate in preparing them for teaching in diverse classrooms. One teacher commented: “This is definitely something that has to be practiced and cannot just be discussed. Seeing this type of work in action is a must. There is no one right way to go about doing this. You can't read a book and become adept in a diverse classroom. These skills are built over time.” These sentiments were echoed by the interview participants who noted that such experiences prior to actual teaching assignments should be a “mandate.”

Student Identities

Ladson-Billings (1994) also stressed the importance of student beliefs in a culturally diverse classroom. What students think about themselves matters and plays a significant role in the success or failure of the students. All twelve teachers in this study responded with a 3 or higher in regards to the importance of students' beliefs about themselves and how these beliefs were considered when planning lessons, activities, and assessments. This was also a strong theme for Gutiérrez (1999) and in the interview as both participants shared their philosophies of teaching. While teaching mathematics was the original intention for both interviewees, they both also strongly believed in helping students become better people in general, not necessarily great math students. The students however, as described in the interview responses, were encouraged to believe in their abilities and their willingness to try to succeed at mathematics. Social issues, such as stereotypes, misconceptions, economic issues, and prior failure in mathematics seemed to

influence students to believe they could not be successful in mathematics. Both interviewees insisted, throughout the interview, that the reduction of the “fear factor” and having students “see others who look like them succeed in math” was key to the educational process. With every other resource in place, the need for students to think they were capable and then to attempt to do mathematics was the ultimate deciding factor in the students’ success.

Classroom Environment

This study also revealed that teachers, in general, feel they had the resources they needed (technology, curricular, etc.) to reach all of their students. It was also worth noting that when teachers had a free-response item asking about the behaviors they would expect to see in a culturally diverse classroom, no one commented on the cultural/racial backgrounds of the students and how these factors could play a role in how students participate and respond in class. The overwhelming responses were centered around respect for others, consistent effort to learn, an environment that promotes learning, and teachers being prepared for class. These practices are consistent with traditional classrooms that were considered to run smoothly if students conformed to societal norms (sit quietly, follow rules and expectations, etc.) often seen in the White, middle-class culture (Juárez, Smith, and Hayes, 2008) and may not have been environments where students who did not conform could be successful. As Teacher 2 said in the interview, “there are some African-American boys, in particular, who are kinesthetic and need to move around to show you what their answer is.” While this may have been the way some students demonstrated their understanding, it may have been considered inappropriate

behavior for traditional teachers in traditional classroom settings. If the student did not “respect” the teacher, their peers, and the classroom space, then students were deemed off-task or non-compliant.

Low Socioeconomic Status Students

When asked what obstacles made it difficult for teaching and learning in a socially just environment, several teacher responses were offered. Common responses were that lower level students were more of a challenge to engage because they often brought to the classroom a variety of issues that “have nothing to do with math but have everything to do with meth.” One teacher commented that low socioeconomic status students tend to bring less to the classroom in terms of skill sets and the social skills necessary for success in school, particularly in mathematics. This concern was also mentioned in Teacher 2’s interview response and suggested that more attention need to be provided for teachers and low socioeconomic status students to help bridge the gap between what these already marginalized students can do and what they need to be able to do. Not to say that all low socioeconomic status students display these characteristics, but some of the teachers in this study felt that this played an important role in who was successful and who was not.

Summary

How does social justice influence the teaching practices and mathematics curriculum for grades 6-12 and how do teachers define and use social justice? While only a sampling of the perceptions of twelve teachers of grades 6-12 mathematics in two public school districts, the answers are both encouraging and perplexing. All participants

want the best possible outcomes for all their students but indicated a limited knowledge of the scope of the issue and of the resources available. The survey responses, along with the small group interview discussion, were reviewed and several themes emerged. The themes, such as cultural climate, teacher preparation, student identities, and low socioeconomic status emerged and were used to help in the discussion of the results and implications for mathematics education, which follow in the last chapter of this manuscript.

Chapter 5

Conclusions and Recommendations

The aim of this study is to determine whether and how mathematics teachers in grades 6-12 defined and responded to social justice issues within their classrooms. Today's classrooms have diverse groups of students that bring to the classroom multiple value systems and skill sets. The public education system in the United States currently offers the free opportunity for the schooling of all students through grade 12, regardless of their backgrounds or limitations. Traditional structures are still used in many classrooms, despite this change in population. As more students from various backgrounds partake of this educational opportunity, teaching practices must accommodate the changes within this population. State and national requirements increase while current trends in standardized test scores suggest that select groups of students still score significantly lower than their counterparts (Tate, 1995). The number of students in these lower scoring subgroups are increasing, so a shift in mathematics education is due. A free public education is simply not enough to sustain the changing demographics of the classroom. Resources must accompany this opportunity if success for all is the intended outcome.

While the classroom demographics are changing, so are the requirements for postsecondary education. This, in turn, poses new challenges and more accountability for employees. The demands set forth by employers and postsecondary institutions are high. Postsecondary education and job opportunities are not just within the United States. Advances in travel and communication tools make the world more accessible. Our students will compete on a global level for training and employment, making this an

economic issue. Therefore, mathematics teachers and teacher preparation programs must accept the challenge to prepare all students for success in a competitive, global society. Changes in teaching and learning mathematics must follow.

Traditional teaching methods in mathematics have often left behind specific groups of students; namely, poor students and minority students. Essentially, classrooms are changing. Expectations are changing. Teaching and learning mathematics, therefore, must change as well. Approaching teaching mathematics through the lens of social justice, then, is one way in which to address the needs of diverse learners. A socially just classroom provides a solid academic curriculum while identifying, understanding, and embracing the uniqueness of each student. This requires not only a different way of teaching students in the classroom, but a different approach to preparing teachers. The research and findings of Ladson-Billings (1994) provides the theoretical framework for this study, which suggest that there are five major tenets under which the successful teaching and learning found in multicultural education research applies to the teaching of mathematics to diverse learners. One tenet involves the adequate preparation of teachers through undergraduate and graduate experiences. Teachers should expect diversity within their classrooms and prepare to teach in such situations before their first teaching assignment. Understanding the dynamics of a diverse classroom does not occur instantly nor does it occur by accident. It is a purposeful process that occurs through experiences that can and should be provided through coursework, practice, and reflection of future teachers. A second tenet of multicultural education that yields success in diverse classrooms is the quality of the teacher's content knowledge and use of materials used to

deliver the content knowledge. Teachers must be strong enough in the subject matter to teach from a variety of perspectives and to value different thinking and learning approaches offered by students.

The third tenet insists that teachers' beliefs about students are critical to the classroom setting. According to Ladson-Billings (1994), encouragement from teachers who sincerely believe in the abilities of their students plays a large role in what students believe about themselves and what they are able to accomplish. Teachers must then value their students' backgrounds and the experience that they bring to the classroom as the teachers also provide the support necessary to make student success a reality. With authentic, positive reinforcement from teachers, students of color and their marginalized populations are more likely, according to Gutiérrez's (1999) and Mitescu et al. (2011), to put forth effort to succeed in mathematics and pursue higher mathematics courses beyond basic graduation requirements.

Along these same lines, the curriculum is the fourth tenet of multicultural education that plays a major role in the success of diverse learners of mathematics. A rigorous curriculum promotes higher-order thinking, reasoning, and problem-solving opportunities for all students. In addition, resources such as textbooks, supplies, technology, and manipulatives, are important to helping students learn and communicate their understanding using multiple representations. The curriculum should also reflect the diversity of the students and should include culturally relevant problems to engage students and to add substance to routine mathematics problems. Gay and Howard's (2000) research posits that meeting high academic standards teaching diverse learners

must be inseparable, but teachers often feel they must choose between the two. A quality curriculum in combination with multicultural education, then, are the keys to helping diverse learners meet high academic standards.

The final tenet that Ladson-Billings (1994) suggests is the classroom environment. Students must have a space in which they can express themselves, ask questions, work cooperatively, and learn from others. The space is student-centered and is safe for students when they make mistakes. Everyone in this classroom environment contributes to discussions and solutions to problems. Everyone's thoughts matter. Such an environment depends heavily on details such as the arrangement of furniture, decorum, and, ultimately, the spoken and unspoken expectations set by the teacher. The classroom environment, in conjunction with the other four tenets found in multicultural education research, also help lay a solid foundation for teaching mathematics to diverse learners. Ultimately, this leads to a socially just educational setting that addresses the needs of students who are historically left behind in mathematics.

These tenets frame the study and were forefront in the creation of a survey and interview questions to explore the issues of socially just classrooms in mathematics education. Seven school districts in the southeastern part of the United States received an invitation to participate in this study. The Study Information Sheet and Informed Consent forms were sent to each district's superintendent and two districts consented. Of the 43 teachers of grades 6-12 mathematics in these districts, twelve (approximately 28%) completed the online survey by providing scaled responses from 1 to 5 (1 being "rarely" and 5 being "almost always") to fourteen items. Survey participants also responded to

two open response items. Two teachers agree to participate in the small group interview that consists of eight questions. The survey data was organized with descriptive statistics and the transcription of the small group interview underwent analysis.

Discussion

The results this study offer support for the existing research in mathematics education as it pertains to social justice. *“How does social justice influence the teaching practices and mathematics curriculum for grades 6-12?”* All twelve survey participants use a 3 or higher (1 being “rarely” and 5 being “almost always”) to indicate their thoughts on the importance of teachers’ beliefs and their accompanying implications. Teacher comments explain that these beliefs often stem from the teachers’ beliefs about what their students can do. Gutiérrez’s (1999) research highlights teachers who help Hispanic high school students successfully complete calculus by believing in their students and pushing them to meet high standards while providing appropriate support. Teachers in this study attribute their students’ success not only to their beliefs about their students’ abilities, but also to the time spent outside of the classroom collaborating with each other, developing personal relationships with students, and making sure students felt good about themselves. Knowing the students’ cultural backgrounds and living situations helps the teachers as they set up tutoring programs, study sessions, and other interventions to keep the students on track. In addition to the survey responses, the interview dialogue reiterates Teacher 1’s approach with ELL students who need additional help to reduce the social injustice of having to learn mathematics in a language with which they have limited experience. Both teachers in the small group interview share stories that further

explain their strong beliefs in helping those who need the help and that, when reaching students where they are, some of the “reaches are farther”. This modification goes along with the research of Rousseau and Tate (2003); equal does not mean fair. Some students need more than others and teachers need to be aware of this and respond accordingly.

It is worth noting that the teachers in this study define diversity in ways that are not addressed in the literature chosen for this study. One of Teacher 2’s interview responses discusses the diversity within the classroom with students who did not have ten fingers with which to count. He describes a lesson that led to a rich discussion of counting systems, allowing students to go beyond the curriculum and the lesson’s objectives to explore the relationships between a base ten model and their real-life situations. Diversity, in this case, is not based on race, gender, language, or academic ability. The physical challenges that these students face are what make them diverse. Their needs must be met as well as those of other students who fall into the traditional definition of diverse populations. As Hodge (2006) notes, diversity goes beyond skin color and economic situations. A classroom with all Hispanic males, for example, would appear homogeneous but is actually very diverse. Each student would bring with him experiences, values, and perspectives that make him different from the other Hispanic males in the classroom. Diversity, then, goes beyond the scope of outward appearances and is to be taken beyond the scope of external factors alone.

Ensign (2003) as well as Ladson-Billings (1994, 1995) and Gutstein and Petersen (2006), notes that students respond positively when math is relevant. Like Teacher 2’s students, being engaged in mathematics means connecting the mathematics to a useful

situation that is important to the student, as Ensign (2003) notes. Such a perspective, however, requires that teachers know about and appreciate the cultural influences that their students bring to the classroom. The interview responses provide evidence of the importance of relevance as Teacher 1 shares specific examples of how students are willing to work harder when the topic is something they can relate to and use immediately in their lives. Both interview participants indicate that students need to feel smart and able to learn what is being taught. Teachers, however, are not always able to organize, facilitate, and/or and maintain a culturally relevant mathematics classroom.

The survey responses also show that eight (approximately 67%) teachers use a 3 or lower (1 being “rarely” and 5 being “almost always”) in regards to their teacher preparation programs getting them ready to teach in diverse classrooms. Both interview participants agree with this statement and comment on their desire to have required coursework and teaching experiences with diverse learners. Their lack of exposure is a hindrance to the educational process as they work with diverse learners without prior training. Hayes and Juárez (2012) find that teacher education programs are not designed to purposefully inform teachers about diversity issues and how to teach in multicultural settings. Gay and Howard (2000) urge teacher preparation programs to be intentional about exposing, educating, and equipping teachers with the necessary tools to address the needs of their students. One of the survey participants stresses that teaching in diverse situations is “learned over time” and teachers simply do not have enough access to practical teaching experiences to prepare for the task at hand.

“How do teachers define and use social justice?”

It is also worth noting that the survey participants define a socially just classroom using norms from traditional classrooms. Comments such as, “Students should be quiet when the teacher is teaching” and students should be “quiet” so others can work, suggests that the teacher is the center of the classroom and discourse may not be the norm for mathematics classrooms. This standard operating procedure is in conflict with comments on how teachers treat their students fairly and work to ensure that students learn. Some students may need discussion, not “quiet”, each day to learn. Ideas from classmates may be more helpful than the direct instruction of the teacher. To ensure an equitable situation, the classroom should be a space where the students’ needs are met. Teacher definitions of social justice may need to be adjusted to reflect the reality within their classrooms. Treating all students the same and expecting all students to conform to traditional classroom structures suggests that student identities, beliefs, and values are not the driving force behind the lessons and activities. All students, according to some survey responses, should participate in the class, but participation is subjective and often carries with it a traditional context. The way in which students participate and the frequency of a student’s participation may still have an impact on her or his grade in the course, as described by Teacher 2’s comments about African-American males who are sometimes very kinesthetic and more active than other students. If the student is penalized for her or his expression of class patrician, the classroom is not socially just. The students would be expected to respond in a particular way, upholding the social injustices in mathematics education that some teachers claim to dismiss.

Another teacher comments, “I expect effort from myself and my students that reflects attention to the language and relational nature of mathematics, regardless of the student's background.” This suggests that the diversity of the students (personal experiences, race, economic status, etc.) was not a factor in the expectations set by the teacher. While this may appear to be a classroom conducive to including all students in the educational process, it can create an inequitable situation in which using a neutral, or color-blind, approach. The notion of color-blindness is often used to demonstrate one's lack of judgment towards a person who is different. However, in the classroom setting, neutrality and color-kindness may in fact diminish the uniqueness of students and devalue what each student brings to the classroom. Such a teaching strategy stands to keep mathematics education in its current state of being; namely, an area in which all students are treated equally. Rousseau and Tate (2003) insist that “equal treatment is not equitable if it leads to different outcomes.” (p. 212) Interview responses are in agreement with this definition of equity and both interview participants concur that helping students varies from classroom to classroom with the ultimate goal of success for all students. The current needs of the students are considered. Cultural values of students influence how and when teachers provide scaffolding for students. Also found in the survey responses were comments that suggest differentiation and equitable are synonymous. Teachers comment on using Google Translator to help students for which English is not their primary language. This form of differentiation allows students to access the material in their own language, but does not necessarily provide an equitable situation for the English Language Learners. The ELL students may need further explanations and

discourse to make sense of the mathematics. Google Translator does not provide such depth. Teachers in this study also indicate their efforts to ensure that all students are learning; yet, no specific strategies are given. It seems, therefore, reasonable to conclude that differentiation is considered by some teachers as a way to address social justice issues within the classroom. Again, such a strategy is not helpful if all students are still not able to achieve the same success in the course. Inequity, in the midst of differentiation, then, is still prominent.

A final finding in this study is the importance of relevance as it accompanies rigor. Relevant issues need to be brought to class by students Tate (1999), and Frankenstein (1997), document this same suggestion and note that when the classroom is student-centered, more authentic learning takes place. Interview responses provide examples of how this student-centered classroom makes a positive difference in the way students think about and approach mathematics.

Limitations

As with any research study, there are limitations that impact the data collection, analysis, and results. First, the study begins at the start of an academic school year for the school districts involved. The school districts are all immersed in various mandatory projects at the local, state level, and national levels. New teacher evaluation rubrics are in their second year of implementation at the time of this study. The Common Core State Standards (CCSS) are in their trial year in hopes of implementation in the upcoming school year. Mathematics teachers of Algebra 1, Geometry, and Algebra 2 are in a preview year for Constructed Response Assessments (CRAs). The CRAs will count

towards student course grades and teacher evaluation criteria, so the professional development focus for many schools is on preparing students and teachers for these assessments. These mandates require mathematics teachers, principals, and school district leaders to complete additional training and lesson planning. These new additions to the responsibilities of the teachers and principals may be the cause for only two responses from the seven school districts. More participation from school districts could provide a richer source of information and more perspectives to help inform this study. With so few responses, it is therefore not reasonable to generalize from the survey and interviews.

Second, the interview is conducted with two teachers with very similar backgrounds in education. Both are pursuing teaching as a second career, thus approaching education from a perspective that may differ from teachers who pursue education as their first career. This limits the study in that their perspectives are not completely conclusive since they stem from a second career lens versus traditionally licensed teachers who receive training at the undergraduate levels of teacher education programs.

Third, the open-response items on the survey yield some interesting comments, but warrant further explanation and/or specific examples to confirm the thoughts of the participants. These details, such as specific examples to support their written comments, will remain unknown for this study, but may be investigated in a follow-up study.

Finally, the study's participants are teachers who are past or present colleagues and/or classmates. Their views and responses may not be as transparent as desired. This may, in turn, affect the quality as well as the quantity of the data.

Biases

Working as a mathematics teacher leads me to believe that all students are capable of learning to do complex mathematics. The level and pace at which students can learn such math, however, varies. Circumstances beyond the mathematics classroom often impact what and how students learn. I strongly believe that these factors are not going to disappear nor will they offer a fair and equitable opportunity for all students to be successful. As the researcher, I strongly believe in the reality of social injustices in mathematics education and am looking for ways to help reduce these injustices. As a current classroom teacher, I have certain beliefs about what occurs in mathematics classrooms. I often study disaggregated data and while it seems that teachers try to be equitable in their practices, the students who typically do poorly year after year are those students of color and students from low socioeconomic status homes. I am, therefore, close to the matter at hand and may bring some of my personal values and experiences to this study that may affect the lens I use to complete the analysis. I am from a constructivist paradigm, so I believe that all learning is created within an individual's experiences and is unique to each person. What a person learns can also evolve over time and is influenced by that person's experiences and perspectives. The comments in this study, then, are also unique to those who provided them and cannot be fully understood in the context of all mathematics teachers in all mathematics classrooms.

Implications for Further Research

Social justice in mathematics education is a topic in which much research has not been reported, particularly for grades 6-12. It is a relatively young branch of research as it

applies to teaching mathematics to diverse groups of learners. This study provides insights for future research in that the survey and interview responses indicate a request from teachers *for* teachers to have deliberate coursework and teaching experiences that offer teachers rich and meaningful information on diverse classrooms. Teacher preparation programs should require coursework on social justice and how this relates to teaching mathematics. Within the courses, articles and books that address tough issues that are not typically brought up in teacher education classes should be mandated for student teachers. Discourse should revolve around the issue and potential solutions to the issues should be the end result of such courses. Future teachers should also have experiences in the preparation, teaching, and evaluation of lesson plans that address social justice issues. Observations of socially just classrooms need to be scheduled to help future and new teachers see how the elements of a culturally relevant classroom intertwine. These mentioned suggestions should be required of all future teachers and perhaps even a follow-up evaluation should occur once a student has secured a teaching position. If teachers are to reach all students and prepare them for success in mathematics, much is to be addressed in terms of the issues that widen or maintain the learning gaps between White students and historically underrepresented students in mathematics. More studies like those of Mitescu et al. (2011) and Rousseau and Tate (1995) are necessary to strengthen the case for undergraduate work to introduce the social justice issues in education. Teachers need resources (curricular, technological, professional development, etc.) to teach diverse learners.

Additional research in mathematics education, specifically on the relationships between teaching practices and student outcomes, may be helpful in making the case for more experiences at the teacher preparation institutions as well as professional development for current teachers. It is with such documentation that mathematics education can move forward, in quality as well as in quantity, using the best teaching practices to effectively deliver rigorous and relevant material to students.

Much is to be learned, but some insights gleaned from this study suggest that while mathematics education is not where it should be in terms of the multicultural tenets, it has made significant improvements from a historical perspective. Courses, workshops, and research materials are available now for teachers to study the aspects of social justice and how they impact their teaching pedagogies. Access to these materials is limited, but can be more available through meaningful discussions around social justice issues.

As suggested by Rousseau and Tate (1995) teachers' perspectives need to be explored before meaningful conversations and changes can begin. Teachers and school districts that achieve success with historically marginalized students, especially need to be studied and shared with teachers who have difficulty in doing so. With the insights provided by current literature in conjunction with the possibilities that may emerge from future research, mathematics education is well on its way to creating and sustaining successful multicultural classrooms.

List of References

Bell, D.A. (1992). *Faces at the bottom of the well: The permanence of racism*. Basic Books: New York.

Council on Social Work Education. (2001). *Educational Policy and Accreditation Standards*

(Draft No. 2). Author: Alexandria, VA.

Ensign, J. (2003). Including culturally relevant math in an urban school. *Educational Studies*, 34(4), 414-423.

Frankenstein, M.F. (1997). In addition to the mathematics: Including equity issues in the curriculum. Yearbook (National Council of Teachers of Mathematics), pp. 10-22.

Gay, G. and Howard, T.C. (2000). Multicultural teacher education for the 21st century. *Teacher Educator*, 36(1), 1-16.

Gutiérrez, R. (1999). Advancing urban Latina/o youth in mathematics: Lesson from an effective high school mathematics department. *The Urban Review*, 31(3), 263-281.

Gutstein, E. and Peterson, R. (Eds.). (2006). *Rethinking mathematics: Teaching social justice by*

the numbers. Milwaukee: Rethinking Mathematics Ltd.

Hancock, T.U., Kledaras, C.G., and Waites, C. (2012). Facing structural inequality: Students' orientation to oppression and practice with oppressed groups. *Journal of Social Work Education*, 48(1), 5-25.

Hayes, C. and Juárez, B. (2012). There is no cultural responsive teaching spoken here: A critical race perspective. *Democracy & Education*, 20(1), 1-14.

- Hodge, L.L. (2006). An orientation on the mathematics classroom that emphasizes power and identity: Reflecting on equity research. *The Urban Review*, 38(5), 373-385.
- Juárez, B.G., Smith, D.T. and Hayes, C. (2008). Social justice means just us white people: The diversity paradox in teacher education. *Democracy and Education*, 17(5), 20-25.
- Kvale, S. and Brinkmann, S. (2009). Interviews: Learning the craft of qualitative research interviewing. Thousand Oaks, CA: Sage Publications, Inc.
- Ladson-Billings, G. (1995). But that's just good teaching! The case of culturally relevant pedagogy. *Theory Into Practice*, 34(3), 159-165.
- Ladson-Billings, G. (1994). What we can learn from multicultural education research. *Educational Leadership*, 51, 22-6.
- Ladson-Billings, G. (1992). Reading between the lines and beyond the pages: A culturally relevant approach to literacy teaching. *Theory Into Practice*, 31, 312-320.
- Mitescu et al. (2011). Measuring practices of teaching for social justice in elementary mathematics classrooms. *Educational Research Quarterly*, 34(3), 15-.39.
- National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Reston, VA: NCTM.
- Riessman, C.K. (2008). Narrative methods for the human sciences. Thousand Oaks, CA: Sage Publications, Inc.
- Rousseau, C. and Tate, W.F. (2003). no time like the present: Reflecting equity in school mathematics. *Theory Into Practice*, 42(5), 210-216.

Tate, W.F. (1995). Returning to the root: A culturally relevant approach to mathematics pedagogy. *Theory Into Practice*, 34(3), 166-173.

Yosso, T.J. (2006). Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth. In A. Dixson, C. Rousseau (Eds.) *Critical Race Theory in Education All God's Children Got a Song*. (pp.167-189). New York: Rutledge.

Appendix

Study Information Sheet

TITLE

Social Justice in Mathematics Education

INTRODUCTION

The purpose of this study is two-fold: (1) to determine whether and how social justice influences the teaching practices and curriculum of mathematics classes in grades 6-12 and (2) to determine how teachers define/view social justice in mathematics education. Teachers from three public school districts will be invited to participate in this research study.

THE PARTICIPANTS

Participants of this research study will include public school teachers of grades 6-12 mathematics from three school districts. A letter will be sent to the Superintendent of the selected schools asking for permission to solicit teachers for this study. Once written permission is granted, the appropriate personnel from each school district will be asked to provide email addresses or other useful contact information for communicating with teachers regarding their participation in this study. An information sheet on this study and an Informed Consent Form will be provided to each math coordinator and to each participant. The study's description will be emailed to all teachers of the mentioned school districts to introduce myself, provide the purpose of the study. An electronic survey will be sent one week after the initial email is sent to participants. The survey items will be available via Survey Monkey and should take approximately 20 minutes for participants to complete.

After the completion of the survey responses, participants will be asked to attend a semi-structured group interview and bring a sample of a social justice lesson/activity to the interview. Interviews will be conducted in small groups of 5-8 teachers on the respective school's campus. Group interviews will take approximately 45 minutes for participants and will be digitally recorded and transcribed for accuracy. Coding will be used to identify themes and to support the quantitative results of the online survey. Data will be analyzed and documented in dissertation form and implications for mathematics education and future research will follow.

Each participant who complete a survey will spend approximately 20 minutes completing the survey. Each participant who completes a survey and participates in the group interviews will spend a total of approximately 45 minutes to participate in this research study.

PROCEDURES

Participants will be contacted via email upon the consent of the respective districts' superintendents. Email addresses will be obtained from the appropriate district personnel. Participation in this study is voluntary and teachers may opt to leave the study at any time prior to its completion without penalty. A description of this study, the confidentiality pledge, and the consent form will be emailed to teachers of all three school districts.

One week after the initial email with the study's information is sent, an electronic survey will be sent to all teachers requesting their participation. The survey will take approximately 20 minutes for participants to complete. Submission of the survey items will be documentation of the participant's consent. A follow-up email will be sent to the teachers of the three school districts to ensure that everyone has had an opportunity to respond to the survey.

Semi-structured group interviews will be held at a mutually agreed upon location within each school district. Each interview will be digitally recorded for accuracy in reporting data. Transcripts of the interviews will be used to develop themes amongst teacher responses, support the literature review, and to provide insights on the issues surrounding social justice in mathematics education. Each interview will be scheduled to last approximately 45 minutes to one hour. Pseudonyms will be assigned upon completion of the interviews to protect the identities of the participants.

The data will be stored in a locked file cabinet. Only those affiliated with this project will have access to the data unless written permission from the participant is provided to do otherwise. The estimated time for the collection of all data is thirty days.

Data analysis

Survey data will be collected electronically. The survey will consist of several multiple-choice items and several short-answer items. Steps will be taken to ensure a secure server for the survey and its responses. This information will also preface the survey so the participants will be aware of the measures taken to protect their identities.

The data collected from the semi-structured group interviews will be analyzed according to the coding and analysis strategies of Kvale and Brinkmann (2009). Anticipated themes will be developed prior to data collection and emerging themes will also be documented as a result of the interview data. The interview data will also be used to provide narratives (Riessman, 2008) and detailed accounts of teachers' experiences to support or refute the literature.

RISKS

The risks to the participants of this study are minimal and will be given the utmost care to protect the identities of the teachers and their school districts. Confidentiality will be protected by using a special coding system for the responses. The participants of the group interviews will be given pseudonyms that will be used only during the interviews. Pseudonyms will also be created for each school district to reduce the risk of identity. All identifying information that is not pertinent to this study will not be included in the

written or oral presentation of the findings. For teachers who are uncomfortable participating in the interview, there will be instructed via the protocol to withdraw at any time during the interview process.

BENEFITS

The benefits of participating in this study include contributions to mathematics education curriculum in grades 6-12 as well as potential information for teacher preparation programs.

CONFIDENTIALITY

The information in the study records will be kept confidential. Data will be stored securely and will be made available only to persons conducting the study unless participants specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link participants to the study.

CONTACT

If you have questions at any time about the study or the procedures, you may contact the researcher, Renee Colquitt, at 1450 Oak Ridge Turnpike, Oak Ridge, TN 37830, or 865-425-9601, extension 2639. If you have questions about your rights as a participant, contact the Office of Research Compliance Officer at (865) 974-3466.

PARTICIPATION (

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed. Return of the completed survey (questionnaire) constitutes your consent to participate.

This information will be given to participants in written form. Return of the survey will indicate consent. A hard copy of the Informed Consent Form will be distributed to each interview participant and will be kept on file with the data from this study.

March 28, 2013

Name

Address

DEAR SIR OR MADAM:

The purpose of this letter is to request your consent to collect data for a research project on social justice in the mathematics classroom. This voluntary study solicits information from mathematics teachers in grades 6-12 in the Oak Ridge City Schools district. I am currently a doctoral candidate at The University of Tennessee, Knoxville and this study will serve as part of the dissertation requirement for the PhD program in mathematics education.

I am also a mathematics teacher and I value the time necessary to finish the school year. Therefore, I anticipate using as little of the teachers' time as possible.

If you are willing to grant permission to your mathematics teachers in grades 6-12 to voluntarily participate in this dissertation study, please indicate this decision in writing. If such permission is granted, I will submit your response, along with the research proposal and application, to the University of Tennessee's Internal Review Board prior for approval.

If there are any questions, please contact me using the information below. I look forward to hearing from you soon.

With regards,

SOCIAL JUSTICE IN MATHEMATICS EDUCATION

Interview Protocol

Introduction: My name is Renee Colquitt. I am a PhD candidate at the University of Tennessee, Knoxville. I am working on a dissertation under the supervision of my dissertation committee and in conjunction with The University of Tennessee's Internal Review Board. The study I am working on seeks to answer the questions: "How does social justice inform the teaching practices and curriculum of mathematics classrooms in grades 6-12?" and "How do you define social justice in mathematics education?" Your responses to the following questions will be used to help develop a better understanding of the use of social justice in public education mathematics classrooms. This semi-structured group interview will last for approximately 45 minutes and will be digitally recorded and transcribed for accuracy. Identifying information, such as your name and your school, will be changed and/or coded to protect your identity. Feel free to stop at any time during this interview if you are uncomfortable with answering the questions. Do you have any questions for me before we begin?"

I would like to use some familiar words to help start this conversation. Out of each pair of words, pick the one you feel is the better word.

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- fair - unfair
- mean - nice
- equal - imbalance
- success - failure
- access - denial
- equal - equitable

- How do you define or describe social justice in mathematics education?

- What does a socially just classroom look like? Design? Decorum? Desk arrangements?

- What does a socially just curriculum look like? Lessons? Quizzes? Projects?

- What kinds of discussions would take place when using social justice concepts to teach mathematics?

- What do you expect students to act like in a classroom that incorporates social justice topics? Freedom of expression? Generate ideas?

- What resources/experiences would be useful for teachers who plan to use social justice in the mathematics curriculum tool or a classroom management tool?

- What preparation, if any, is needed prior to teaching to help teachers prepare to teach in multicultural environments?

Vita

Renee Lenise Colquitt was born in Knoxville, TN to Joe and Gloria Colquitt. She is the second of five children: Candice, Joe, Michelle, and Michael. She graduated from Alcoa High School in Alcoa, TN. She then attended Berea College in Berea, KY, where she worked in the mathematics department as a teaching assistant. She earned a Bachelor of Arts degree in mathematics education from Berea College in 1996. She also earned a Master's of Science degree from the University of Tennessee, Knoxville, in Mathematics Education in 2003. Her PhD from the University of Tennessee, Knoxville was completed in May 2014.