INTEGRATING SOCIAL JUSTICE INTO MIDDLE SCHOOL MATHEMATICS

By
Erica Bialick

A Dissertation
submitted to the
Graduate School of Education
Rutgers, The State University of New Jersey
in partial fulfillment of the requirements
for the degree of
Doctor of Education
Graduate Program in Education, Culture and Society
written under the direction of

______________________________
Dr. Saundra Tomlinson-Clarke

______________________________
Dr. Daniel Battey

______________________________
Dr. Tanja Sargent

New Brunswick, New Jersey
October 2021
ABSTRACT

This dissertation is a qualitative exploration designed to identify the notions that mathematics teachers have about how teaching practices impact student learning and development in addition to exploring where there might be room for growth or change in teaching practices. A problem identified with current mathematics teaching supports the assumption that students who lack competence in mathematics are falling farther and farther behind their grade level peers. In this study, 11 middle school math teachers from two campuses in the same district were interviewed. Teachers were asked to provide insight into the inner workings of their classroom, and to consider strategies to improve student learning. Specifically, this study investigated the ways in which math teachers conceptualized culturally responsive pedagogy, and examined whether teachers were willing to implement these practices in their classrooms with their students.

Culturally relevant pedagogy (CRP) is a student centered, pedagogical approach supporting students as resources of knowledge and skills for teachers and for each other inside their classroom. Social justice pedagogy (SJP) helps students to be part of the solution to injustice. An underlying assumption is that analyzing and critiquing oppression can be incorporated into the mathematics classroom to help students build agency. Teachers who utilize these pedagogies can see students connect to the curriculum and become more willing to participate in their own education.

This study explored teachers’ perspectives on incorporating new pedagogies to learn to teach mathematics for social justice (TMfSJ). The focus of this study was to build on teachers’ ideas of what they believe they are successfully practicing in their classroom and create a plan to move forward with assisting the teachers in the process of integrating social justice into
mathematics. The findings of this study suggests that teachers can integrate social justice into the mathematics curriculum if they have the benefit of professional development. Most teachers were unable to conceptualize social justice, specifically in the context of mathematics. Although most teachers described evidence of cultural awareness, very few gave examples of teaching practices that included topics of injustice or other issues of diversity, inclusion, or equity.

A few of the participants in this study mentioned that social justice was something they would like to see in their classes. They would like students to become aware of social justice concepts in all subject areas not just History and English. Some of the participants believed that if it was fully integrated into the curriculum, it would be possible to be taught in mathematics. Through the interviews with teachers, it was discovered that most participants were willing to learn more about SJP and would attempt to implement this approach if they had more information. One teacher was able to clearly and confidently articulate how he used social justice ideas in his teaching, and how he taught with equity in mind.
Acknowledgments

I have been fortunate to have had an abundance of support throughout my process to complete this research work. I could never find enough words to express my gratitude to all those who have guided me and cheered my on throughout this journey.

First and foremost, I have to thank each and every person in my family. They have been my biggest support system through every step of the way and have inspired me to fulfill this dream. My mom encouraged me daily to never give up and always strive for the best. My brother Steven, who inspires me to work hard at everything that I do and my sister Melissa, who stands by my side and always made sure I was following through with my work. My brother and sister in law, Scott and Jaclyn were also huge supporters and cheerleaders for me throughout the years. My grandparents checked in regularly and believed strongly in my potential.

I want to thank my committee members, Dr. Saundra Tomlinson-Clarke, Dr. Daniel Battey, and Dr. Tanja Sargent who gave me their time and expertise to guide me through this endeavor. Their support and encouragement helped me reach the finish line. A special thank you goes out to Dr. Tomlinson-Claire, who led my group and me with her time, wisdom, knowledge and support. Her guidance as a scholar and teacher has been invaluable to me. I’d also like to thank my cohort at Rutgers who have been along-side me the entire time and continuously supported each other.
# TABLE OF CONTENTS

**ABSTRACT** .............................................................................................................................................. ii

**Acknowledgements** ............................................................................................................................... iv

**Chapter 1: Introduction and background information** ........................................................................... 1

- Equity and Mathematics Education ........................................................................................................ 3
- Career applications ..................................................................................................................................... 6
- Social justice and Mathematics Education ............................................................................................... 7
- Statement of the Problem .......................................................................................................................... 9
- Research Questions ................................................................................................................................... 10

**Chapter 2: Literature Review** ............................................................................................................... 12

- Culturally Relevant Pedagogy .................................................................................................................. 13
- Critical and Social Justice Pedagogy ......................................................................................................... 17
- Disparities in Mathematics Education ....................................................................................................... 21
- Real World Mathematics ........................................................................................................................... 23
- Teaching Math for Social Justice ............................................................................................................... 25
- Teachers Perspectives and Experience with Mathematics Education ..................................................... 28

**Chapter 3: Methodology** ....................................................................................................................... 30

- Design ...................................................................................................................................................... 30
- Sample and Setting .................................................................................................................................. 30
  - Table 1: Demographic Information about Interviewees .................................................................... 33
- Data Collection ....................................................................................................................................... 33
- Interview Protocol .................................................................................................................................. 33
- Researcher Positionality ............................................................................................................................ 34
- Ethics ........................................................................................................................................................ 35

**CHAPTER 4: Findings** ............................................................................................................................ 36

- Inclusive versus Exclusive Teaching ......................................................................................................... 37
- Flexibility versus Inflexibility .................................................................................................................... 41
- Content versus Context .............................................................................................................................. 44
- Comfort versus Discomfort ......................................................................................................................... 50
- Diversity in the Classroom ......................................................................................................................... 53
- Benefits versus Challenges ......................................................................................................................... 55

**Chapter 5: Discussion** ............................................................................................................................ 58

- Summary of Findings ................................................................................................................................. 59
  - Cultural Relevancy Connection and Care ............................................................................................... 60
  - Teaching Math for Social Justice Practices ............................................................................................ 63
  - Challenges with Social Justice Teaching ................................................................................................ 66
- Implications ............................................................................................................................................... 67
- Limitations ............................................................................................................................................... 70
- Recommendations for Future Research ................................................................................................... 71
Chapter 1: Introduction and Background Information

A key problem in our schools today is that we have an abundance of students failing high stakes tests and a majority are from marginalized populations (Morgan, 2016; Schoenfeld, 2002). Students of color are underachieving with their learning needs unaddressed, creating challenges for schools and teachers, especially as test scores become the primary method to evaluate schools and teachers (Morgan, 2016). “Test scores have come to dominate discourse about schools and their accomplishments” (Amrein & Berliner, 2002, p. 3). Starting in 2001 we saw “high stakes accountability tied to student achievement on externally mandated tests was becoming a dominant feature in U.S. instructional policymaking” (Coburn, Hill & Spillane, 2016 p. 245).

Classrooms around the nation utilize different curricula to teach mathematics to students. While there are many differences in the curriculum being used, students are assessed on the same content. Failing test scores affect teachers as much as students when they are evaluated based on students’ scores. Teachers become programmed to teach students to pass these high stakes tests instead of teaching all skills. This effects teaching and learning including the approaches to learning that take place in the classroom. Teachers return to rote practices instead of a variety of methods that could help students understand and think critically. When teaching to a test, students will lack fundamental knowledge and skills to succeed in many areas.

These failing results are shown in test scores that are utilized to measure educational progress. Studies show a gap in the mathematics achievement between White students and Students of Color (Ladson-Billings, 1996). Student academic achievement has been assessed and used to determine effectiveness of schools, teachers, and student ability. The National Assessment of Educational Progress (NAEP) tests students around the country in different subjects. Scores are collected at the end of grade 4, grade 8 and grade 12. The test is scored from
0-500 and then ranked on three levels. The scores for eighth graders reported are leveled at basic (262), proficient (299) and advanced (233). The average score for the Nation was 282, which is 17 points below proficient. In 2017, only 34% of students performed at or above Proficient and 10 percent scored at or above Advanced. Additionally, according to the NAEP in 2019, Black students scored 32 points lower than White students and 50 points lower than Asian students while Hispanic students scored 24 points lower than White students and 42 points less than Asian students in mathematics nationally (Nationsreportcard.gov, 2019). Moreover, students who receive free or reduced lunch also score 30 points lower than those who do not (Nationsreportcard.gov, 2019).

Bonner and Adams (2011) explain how this achievement gap in mathematics has not had a significant change since 1990. Students from historically marginalized populations are not making significant enough gains to catch up to their counterparts. According to NAEP data, 1990 and 2019 yielded the same average 30-point difference in scores between White students and African American/Hispanic students (Nationsreportcard.gov, 2019). With all the reforms that took place over the last 30 years, standards-based education movements, No Child Left Behind, Every Student Succeeds Act and the Common Core State Standards (Howard & Rodriguez-Minkoff, 2017) students of color continue to underachieve in comparison to their counterparts from other racial and ethnic backgrounds (Howard, 2010). These reforms did not provide students with an equitable education any more than prior education efforts did. Assessment scores however, do not measure success for all students. Data from these assessments are not a clear indicator of success, opportunity, or equity (Morgan, 2016). This is only one measure created to inform educators of the ability to score high on a test created to challenge students while inextricably placing questions that are more appropriate for a single culture. Esposito and
Swain (2009) are among the many who describe current testing as culturally biased and teaching and learning is affected as such. When questions on the test have material that is not relatable to the lives of minorities, minority students struggle more than their peers.

**Equity and Mathematics Education**

Moreover, students’ future relies on their education in many areas of their lives, especially employment. “Students with negligible skills wind up having access to the lowest paying jobs” (Schoenfeld, 2002, p.13). Children need to learn skills through their education in order to become better citizens and better workers. Education provides students with skills to have better jobs and build better lives. Researchers (Brantlinger, 2013; Schoenfeld, 2002; Sells, 1978) describe mathematics as a gateway to higher education along with professional and economic opportunities. Schoenfeld (2002) posit that there is a national obligation for students to have high quality instruction in mathematics. Additionally, mathematics is needed in many different areas and the stronger the math skills the better off students will be in their life. Gay and Howard (2010) elucidated that effective teaching of mathematics is essential for all students, especially those who are in the underrepresented populations. Those who are in the underrepresented population have historically received a lower quality education.

Equity has been an aim of the mathematics education reform according to the National Council of Teachers of Mathematics [NCTM] since rewriting its curriculum standards in 1989 and revision in 2000 (Gutstein, 2003). The NCTM standards focused on students’ engagement with mathematics rather than rote procedures (Ellis & Berry, 2005). Rosseau and Tate (2003) defined equity as the equal opportunities that result from the decisions, policies and practices that direct our classroom. Schoenfeld (2002) define equity as “high expectations and strong support for all students (p. 15). Equality and equity are terms that cannot be interchanged as they have a
very different meaning. As researchers have discovered, equity refers to giving what is necessary for all to attain success rather than equality which refers to giving all the same thing and hoping for success from all. Equality can be defined as given the same opportunities regardless of need (Ford, 2015). NCTM is focused on equity where all students are able to receive what they need in order to be successful. Different students have different needs and utilizing different pedagogies can help all children reach an element of success.

As a district, Chordsville Township Public Schools*, in New Jersey has made one of their goals a focus on culturally relevant teaching and multiculturalism. However, through my eyes, mathematics teachers have not entirely adopted the idea despite the plethora of workshops and resources. Marginalized students are consistently failing the standardized state testing in mathematics and required to take a remedial course each year in Chordsville Township. In 7th grade alone at Fortessia* Campus over 60% of the students are in this remedial class known as math lab. In Chordsville Township, only 33% of 7th grade students met or exceeded the state testing in mathematics. There is a 10% difference between Chordsville passing rate and the state passing rate (state.nj.us, 2018). Every student who does not pass the standardized test is placed in the lab classroom. Statistically, 13% are special education students and 15% are ELL students (Chordsville Township data source, 2018). Since these students are struggling in mathematics, they are required to take a daily double block math class in addition to a remedial math block every other day. This limits them from electives as they are required to be in this lab class during the elective periods.

The purpose of this qualitative exploration was to investigate the middle school math teachers' experience and perspectives at Fortessia Middle School about integrating social justice into the mathematics curriculum using culturally relevant pedagogy (CRP). CRP is defined as a
method and practice of teaching that “empowers students intellectually, socially, emotionally and politically by using cultural references to impart knowledge, skills and attitudes” (Ladson-Billings, 1995 p.16-17). It is a multicultural approach to teaching that takes into account teachers’ beliefs about students along with the content, material and instructional approaches. CRP focuses on the academic and personal success of students both as individuals and as a collective whole. It does so by having all students engage in academically rigorous curriculum and learning. Ladson Billings (1995) also posited that students will understand and feel affirmed in their identities and experiences more. Teachers should be equipped and empowered to identify and dismantle structural inequities—positioning them to transform society. Also considered are the teaching environment that is created (Ladson-Billings, 1994). Common traits among culturally relevant teachers include an ethic of caring, an ethic of personal accountability, cultural competence and cultural critique. CRP teachers work towards overall academic achievement specifically student learning not just test scores (Aronson & Laughter, 2016).

Ladson-Billings (1995) described the need for teachers to develop a sociopolitical consciousness which help students “recognize, understand and critique social inequalities” (p. 476). Sociopolitical consciousness allows teachers to extend learning beyond the classroom using other skills to identify, analyze and solve real world problems (Ladson-Billings, 2014). The goal of this study to identify teachers that use sociopolitical consciousness in their approach to teaching. Teachers who have developed or have the potential to develop a sociopolitical consciousness that guides their teaching practices will be better able to enhance student learning. Sociopolitical issues such as race, class and gender need to be recognized by the teacher in order to incorporate multicultural and diversity issues into the classroom. Sociopolitical consciousness is not the only requirement for CRP success among teachers and their students. Two other major
domains of teachers work that Ladson-Billings (1995) identified were academic success and cultural competence. Academic success is used to describe the intellectual growth of students resulting from classroom instruction and their learning experiences. Cultural competence is the “ability to help students appreciate and celebrate their cultures of origin while gaining knowledge of and fluency in at least one other culture (Ladson-Billings, 2014, p. 75).

**Career Applications**

Education provides students access to higher paying jobs and a better future for themselves (Shoenfeld, 2002). Researchers (Brantlinger, 2013; Schoenfeld, 2002; Sells, 1978) describe mathematics as a gateway to higher education along with professional and economic opportunities. Mathematics as a gatekeeper can allow or deny students to colleges and careers. An increased focus on efficiency measures in the workplace have resulted in the necessity of mathematical understanding and application. It is becoming a critical skill for all workers, even in what is known as relatively unskilled jobs. Mathematics is utilized in a multitude of ways in many different careers and those with low mathematical skills are forced away from jobs. Most jobs require in the very least, problem solving throughout the workday. “Across a wide range of industries and occupations, people are required to use, develop and communicate mathematical ideas and techniques in a diversity of ways” (FitzSimons & Bjorklund Boistrup, 2017, p. 329).

Underrepresented youth are far less represented in mathematical fields and college classrooms relating to mathematics (Matthews, 2017). Matthews posits “supporting Black and Latino adolescents in understanding the value of mathematics during these precollege years can be instrumental in creating opportunities” (p. 727). Math values and beliefs in the middle grades affects later representation in math-related majors and careers (Wang & Degol, 2013).
**Social Justice and Mathematics Education**

Social justice in education can be defined as a process that analyzes oppression and critiques inequities while connecting to students' lives (Gau, 2005). Social justice teaching engages students in purposeful action which challenges inequity. Appelbaum and Davila (2007) make a powerful statement claiming that “teaching math for social justice is teaching ‘real’ math” as teachers strive to “empower their students” (p. 2). Gutstein (2006, 2007, 2012) found that the leading importance for students is the understanding and application of mathematics beyond a set of rote skills. One of the important issues that he highlights in his teaching practice is engaging students academically (Gutstein, 2012). Students who develop mathematical power not only become more confident in their mathematics skills but will also be able to demonstrate their mathematical reasoning and problem-solving strategies. Teaching for social justice requires the use of CRP in instructional practice (Esposito & Swain, 2009). Utilizing CRP is one way in which multicultural perspectives can be incorporated to promote change in students’ lives. CRP posits that teachers recognize students’ talents and abilities and encourage success no matter what their culture is (Ladson Billings, 1998). Giving students an opportunity to connect to the mathematics they are learning, and empowering them in the classroom is a way to build confidence and ability instead of discouraging them. Culturally responsive teaching (CRT) suggests that every subject has room to encompass cultural diversity and multicultural instructional strategies (Gay, 2002). CRT can be defined as an integration of “critical pedagogy’s emphasis on sociopolitical consciousness with multicultural education’s commitment to culturally diverse content” (Dover, 2013, p. 5). CRP concerns itself with pedagogy while CRT focuses on teaching. Aronson and Laughter (2016) clearly delineate between Gay’s (2002) and Ladson-Billings (1995) approaches.
Gay’s focus on teaching primarily seeks to influence competency and methods, describing what a teacher should be doing in the classroom to be culturally responsive. Ladson-Billings’s focus on pedagogy primarily seeks to influence attitudes and dispositions, describing a posture a teacher might adopt that, when fully embodied, would determine planning, instruction, and assessment. (Aronson & Laughter p.166-167)

While these two ideas vary slightly, both are committed to promoting social justice in the classroom which can be a site for change to occur. Both of these concepts portray an approach to building the success of African American and Hispanic students.

Typically, social justice teaching is reserved for the social studies and literacy classrooms. Mathematics is not typically thought of as a class with an opening for teaching social justice concepts. However, incorporating social justice in mathematics may lead to a more complicated mathematical understanding of history and how society is structured (McGee & Hostetler, 2014). Moses and Cobb (2001) challenge the idea that mathematics learning is powerful and African American students need to learn how to solve problems of the poor and powerless in order to gain agency. Incorporating SJP into mathematics creates this opening for students to engage in both mathematics and social justice at the same time. It allows for a critical analysis of the math behind the concepts and opens students’ eyes to the real world application mathematics entails. This is helpful because at times when conventional mathematics is separated from the lives of students, they lose interest (Kwako, 2011). Teaching Math for Social Justice (TMfSJ) concerns itself with social and political contexts and pedagogy and contributes to the teaching of equity and social justice (McGee & Hostetler, 2014). Teaching for
social justice has a goal of teaching underrepresented forms of student diversity. Mathematics learning can serve as an opening into social justice issues using CRP to reach all learners.

**Statement of the Problem**

As a current math lab teacher, I am interested in better understanding what aspects of pedagogy are related to students’ failure rates in Chordsville Township requiring the need for students to take math lab classes. This occurrence has become associated with a negative connotation for the students as well as for their parents. Entering the 2018 school year, approximately 54% of the students at Fortessia Campus were placed in mathematics lab classes due to failing scores (Explore Fortessia Campus, 2017). These students scored below proficient on State regulated testing the previous year. As Rose (2015) described, students who have a more difficult time showing improvement on these tests are often given more rote learning practices such as memorization and basic recall which may not help them to master content.

Most teachers are required to follow a set of curricula given to them by their state or district. There is usually little room for creativity or to include excess information that is outside of the requirements. A process-based form of mathematics that give students “open-ended practical and investigative work that required them to make their own decisions, plan their own routes through tasks, choose methods, and apply their mathematical knowledge” (Boaler, 1998, p. 42) can be implemented to integrate social justice concepts. Students would have to do more than step by step algorithms, whether they are at the simple or complex levels. This would involve more than repetition of skills that are taught by a textbook or a teacher standing at a blackboard. However, mathematics teachers are not trained on social studies concepts such as issues of injustice and how to teach it.
As a precursor for an action research study, this qualitative exploration gauged teachers’ beliefs and attitudes towards using other approaches such as CRP or SJP in affecting student learning. This research was designed to identify the notion teachers have about how teaching practices impact student learning and development in addition to understanding where there may be room for teacher growth and change in teaching practices. The goal was to find out what teachers believe they are doing that is successful and what challenges they face when applying these pedagogies into mathematics. Change is not possible without the understanding and openness from the teachers. The focus is to build on teachers’ ideas of what they believe they are successfully practicing in their classroom and create a plan to move forward with assisting them in the integration process.

This study was meant to explore teachers’ perspectives on incorporating CRP and SJP into their lessons. Their classroom experience is utilized to determine next steps on the journey of integrating social justice into mathematics classrooms. A combination of these can help teachers reflect on what they are doing in the classroom while determining how these concepts can be integrated positively in this population.

**Research Questions:**

1. How do middle school mathematics teachers conceptualize social justice?

2. How might middle school mathematics teachers perceive the integration of social justice into the mathematics curriculum?

   a. What challenges do these teachers foresee in integrating social justice into the mathematics classroom?
b. How could the middle school mathematics teachers structure instructional practices and interactions while establishing a learning environment that results in mathematics success using culturally relevant pedagogy?
Chapter 2: Literature Review

As teachers are under more scrutiny to produce higher test scores (Tarr et al., 2008), many students are failing high stakes tests and a majority of failing students are from marginalized populations (Schoenfeld, 2002). Across many national surveys of student achievement, African American and Hispanic students remain largely overrepresented in the lower tails of achievement distributions and underrepresented in the upper tails of these distributions (Rousseau & Tate, 2003). According to 2019 National Assessment of Educational Progress (NAEP) data, this trend is still the case. The question of what can be done about this lies in the hands of the teachers, although there are many challenges for them to create different learning environments conducive to all learners. The revised Principles and Standards opens with “Imagine a classroom, a school, or a school district where all students have access to high quality, engaging mathematics instruction” (NCTM, 2000, p. 6). Looking back quite a few decades, we can see the inequities in mathematics education. While the 1989 National Council of Teachers of Mathematics [NCTM] standards and revision in 2000 discuss the need for equity, they do not provide solutions for attaining equity. As a result, there is no uniformity in academic integrity or instruction provided to students nationwide (Gutstein, 2003). Using Culturally Relevant Education (CRE) to understand racial inequities and how mathematics can help with the counter-narratives and storytelling led to Teaching Mathematics for Social Justice (TMfSJ).

The purpose of this review of literature was to define and discuss teaching mathematics for social justice, how culturally relevant pedagogy (CRP) and social justice pedagogy (SJP) can be applied to mathematics education, the need for TMfSJ and to analyze empirical studies in which this has been done successfully and not so successfully (unsuccessfully?). While there is a lot of research on social justice, the integration of social justice and mathematics is a difficult
pursuit, especially for the middle grades. Some researchers have taken the step to move forward in this area, although there is not an abundance of studies conducted on middle school specifically integrating social justice into mathematics since Gutstein started in the mid-late 1990s. While there are a few middle school lessons, there are however, many more studies from both elementary and high school experiences and from pre-service teachers attitudes and beliefs while preparing for these lessons (Bartell, 2013).

**Culturally Relevant Pedagogy**

Over the last 25 years, there has been a fast-growing push to integrate CRP into classrooms across the country (Dee & Penner, 2017). CRP was developed by Gloria Ladson-Billings (1994) in effort to “use student culture in order to maintain it and to transcend the negative effects of the dominant culture” (p. 19). There are three key domains of CRP: students must achieve academic success, develop or maintain cultural competence, and develop sociopolitical consciousness (Ladson-Billings, 1995, 2014). *Academic success* refers to students experiencing intellectual growth as a result of their learning experiences tied with their instruction. *Cultural competence* is defined as “the ability to help students appreciate and celebrate their cultures of origin while gaining knowledge of and fluency in at least one other culture” (Ladson-Billings, 2014, p. 75). Lastly, *sociopolitical consciousness* can be defined as taking the learning from the classroom and using it to solve real world problems. Dee and Penner (2017) state that CRP is a “compelling way to unlock the educational potential of historically marginalized students” (p. 128). Marginalized students are less likely to be successful in school, especially in mathematics without any type of intervention or support.

Additionally, teachers tend to expect less from students from these different minority groups. When teachers have low expectations of Black and lower SES students and emphasize
only on basic, low-level skills when teaching these students, the students are set up for failure (Ferguson, 2003). Students need more access and opportunities to show their abilities within the curriculum. CRP posit that teachers recognize students talents and abilities and encourage success no matter what their culture is (Ladson-Billings, 1998). Teachers who have lower expectations do not challenge students as much as they are able to be challenged leaving them to strive for less than other students. Student beliefs build off teachers’ beliefs in their students and when expectations are low, that’s what students reach for. Students need to know that their teachers believe in them in order to build on their own attitudes and behaviors inside the classroom. Ladson-Billings (2014) describes academic death in the classroom where teachers stop trying to reach every student and become “functionaries of a system that has no intent on preparing students – particularly urban students of color – for meaningful work and dynamic participation in democracy (p.77). Students suffer from “academic death” when they are not offered the same opportunities for learning as other students. This allows for students of color to fall behind academically and results in a gap in achievement. Ladson-Billings (2014) explains that this type of academic death results in unemployable for these youth who also may become subject to the criminal justice system.

On the other hand, when teachers have a multicultural perspective and mindset while expecting academic success from all students, students are more likely to attain better results (Ladson-Billings, 2014). These are the students that exceed expectations and continue on in life to achieve more for themselves. Ladson-Billings (1994) describes part of CRP as treating students like they are competent which will likely result in students demonstrating competence. Culturally relevant teachers hold students to high standards, and expect them to succeed which leads students to believe in themselves as well. CRP promotes the idea that “students of color
possess a rich, complex and robust set of cultural practices, experiences, and knowledge that are essential for learning and understanding” (Howard & Rodriguez-Minkoff, 2017, p. 4). These students have the ability to learn, grow and succeed with the appropriate support that they need in schools. Without given these opportunities to succeed, students will continue to remain with low level skills and the achievement gap will continue to stretch.

Moreover, CRP is more than a simplistic way of teaching, and not a pre-determined curriculum given to teachers to utilize in their classrooms (Howard & Rodriguez-Minkoff, 2017). Teachers need to have an open, particular mindset and be willing and open to explore culture and advocate for student achievement in multiple areas. It is a pedagogical approach that believes that students can be resources of knowledge and skills inside the classroom (Ladson-Billings, 2009). When students are seen as resources instead of simply teaching to students, teachers will teach with students’ abilities and allow them to build on their own skills. It is a theoretical tool utilizing a cultural centered approach that allows for communicative and cognitive processes to take place. When these processes take place, ultimately the goal of education – to see students succeed in life is met.

In connection with CRP, Geneva Gay (2002) defines culturally responsive teaching (CRT) as “using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively” (p.106). The difference between CRT and CRP is that “teaching affects competence and practice whereas pedagogy affects attitude and disposition” (Aronson & Laughter, 2016, p. 167). Aronson and Laughter describe both frameworks as a commitment to social justice where the classroom is a site for social change to happen. These ideas lead to competence from all students, not just those who are considered to be academically advantaged. Both Gay (2002) and Ladson-Billings (1994,1995, 2006) have a
framework for teaching culturally diverse youth more successfully. Dover (2013) coins the term Culturally Responsive Education (CRE) which “integrates critical pedagogy’s emphasis on sociopolitical consciousness with multicultural education’s commitment to culturally diverse content” (p. 5). In a study of urban STEM teachers, there is a need for teachers to develop a deep understanding of how the content impacts the culture of their students (CRP), while also understanding what pedagogical moves they must make to improve student learning in relation to students cultural and linguistic practices that are brought into the classroom to be subsequently leveraged by the teacher (CRT) (Brown et al., 2019, p.782).

They described CRE as a *theory-to-practice framework* which infuses both CRP and CRT. This connection between the different frameworks shows the relationship and the necessity of both theoretical practices within the classroom. Teachers who practice culturally relevant pedagogy are essentially similar to culturally responsive teachers. When these ideas enmesh classrooms become an open, inviting place for students to grow and feel successful.

Culturally responsive teachers enable students to think critically both about their world and about the injustices involved in their world (Bartell, 2011). These teachers not only foster this idea in children but equip them with the knowledge and ability to change the injustices. Teaching students according to the way they learn best is an essential factor of CRT (Rychly & graves, 2012). This empowerment students to construct knowledge from their own world. Engagement is a facet of both CRP and CRT as this is essentially how students learn best. Students who are engaged in their learning have a desire to not only be in the classroom but succeed in the classroom. Culturally responsive teachers build community within the classroom and engage students in the learning process through a caring attitude (Howard, 2001). Care is an
integral component of cultural relevance and cultural responsiveness and requires establishing positive and productive teacher-student relationships, especially in the mathematics classroom. These relationships have a direct implication for equity within these classrooms. When students perceive that their teachers care for them they perform better in mathematics due to challenging the negative effects of stereotypes (Bartell, 2011).

This pedagogy bridges the students’ home and school cultures, incorporates students’ cultural values, experiences and perspectives into the classroom (Gay, 2002). Gay also posits that students have a higher interest and learn more thoroughly when knowledge and skills are placed within the lived experiences and frames of reference of the students. It becomes more personally meaningful to them and they connect what they learn to their own life in order to retain and understand it. Esposito and Swain (2009) report that culturally relevant teachers positively effect culturally and ethnically diverse students on an academic and social level. Students who are challenged both socially and academically are more apt to succeed more often. CRP unlocks the educational possibilities for marginalized students (Dee & Penner, 2017) by reaching them on a different level.

Critical and Social Justice Pedagogy

Critical pedagogy first theorized by Paulo Freire (2000), was and remains a radical approach to education based on freedom of the oppressed and questioning of the oppressor (Freire, 2000). Based primarily on the socioeconomic degradation witnessed and experienced in early twentieth century Brazil, Freire theorizes critical pedagogy as a vehicle to liberate both the oppressor and oppressed from the traumas inflicted by inequitable societies through a reimagining of the education system (Freire, 2000; Shor, 2014). Through its principles, methodologies and practices, critical pedagogy examines traditional educational practices that
Freire and his contemporaries described as upholding oppressive systems of domination and hierarchy and antithetical to democratic principles and social change (Shor, 2014). Critical pedagogy posits that students who do not learn to be critical, active, and engaged learners engaged in rigorous inquiry of structures and systems around them are not only unable to reconcile their own structural oppressions or traumas, but are ill-prepared to assume productive citizenry in a democratic society thirsty for positive social change (Shor, 2014). Ultimately, the goal of critical pedagogy is to not only affect social change in oppressive and inequitable societies, but to achieve individual and collective liberation that will have ripple effects across society for generations for both oppressed groups and the oppressors (Freire, 2000), and to build the academic and social emotional capacity (Giroux, Freire, & Steinberg, 2017). This is achieved through students’ awakening of their critical consciousness, or conscientização in Freire’s native Portuguese, which is defined as a person’s unique, and critical understanding of the world and its systems, particularly socio-political systems. Critical pedagogy finds an alignment with CRP (Ladson-Billings, 1995) since at its core, is a critical pedagogy is centered around liberation for the oppressed (Freire, 2000), oppression that is structural and systemic, such as classism, racism, or sexism (Freire, 2000). Structural and systemic oppression lends itself to the inequalities SJP focuses on.

According to researchers, it is essential to have social justice incorporated into educational practices (Gau, 2005; Kwako, 2011). Social justice pedagogy (SJP) gives students an opportunity to become part of the solution to injustice, both in their present as a child or teenager and as an adult in their future (Gutstein, 2003). Gutstein defines SJP as helping students develop a sociopolitical consciousness, sense of agency and positive social and cultural identities. Gutstein built his practice off of Freire’s critical pedagogy, leading the way to SJP inside the
classroom. Through its principles, methodologies and practices, critical pedagogy examines traditional educational practices that Freire and his contemporaries described as upholding oppressive systems of domination and hierarchy and antithetical to democratic principles and social change (Shor, 2014). Ultimately, the goal of critical pedagogy is to not only affect social change in oppressive and inequitable societies, but to achieve individual and collective liberation that will have ripple effects across society for generations for both oppressed groups and the oppressors (Freire, 2000), and to build the academic and social emotional capacity.

Analyzing and critiquing oppression and injustices is just one way that moves critical pedagogy into social justice and can be incorporated in the classrooms. Povey (2002) exclaims “we live in an unequal world, unequal in terms of power, opportunities, access to resources” (p.191). Knowing that students live in an unequal world these pedagogies combat the inequities and allow students to become change agents. Students need to be aware of the world in which they live and where they can find guidance along the way. Injustices are everywhere; Gau (2005) posits that it is important for students to “identify how those issues connect to their lives, and engage them in purposeful action to challenge those inequitable structures” (p. 7). Social justice incorporates democratic education, social justice education (SJE), critical pedagogy, culturally responsive education and multicultural education (Dover, 2009). Democratic education emphasizes the importance of self-governance, community engagement and experiential education (Dewey, 1916). Additionally, Dewey describes education as a system that should challenge false beliefs and ideals which is what SJP does. SJP utilizes CRP in most cases to teach students about injustices around them and how to become part of the solution. “CRP is a vehicle for examining social injustices” (Esposito & Swain, 2009, p.38). SJP also gives students the opportunity to effect change around them. Students can become change agents in the world
in which they live with the guidance and support of teachers and other adults in their communities.

Gates and Jorgensen (2009) write “what is unjust for some is not unjust for others; whether we consider something is socially unjust or relationally unjust will likewise differ” (p. 165). This suggests that what is fair is not always equal and we have to look at things through different lens’ at times. Students’ eyes first need to be opened to the injustices around them in order to be able to take action on the issues around them. Often times, students are unaware of the injustices happening within their own world and through reflection and questioning, students have the ability to become aware. Bartell (2013) created a lesson study for teachers to learn how to apply TMfSJ in their classroom through a college course. She learned how unexposed teachers were to this topic and saw the transition in their learning along with their students throughout her study. In order to provide support for this study it is essential to develop knowledge of teachers’ perspectives of social justice and their ideas about the integration of social justice in mathematics education. For more information to be even more successful this could have begun with interviews or focus groups to gain insight on the teachers’ perspectives before engaging in the lesson study.

In another study by Mitescu et al. (2011) social justice curriculum was implemented in elementary school classes. In this mixed methods study, it was found that students demonstrated higher levels of reasoning which led them to score higher on state tests when they were exposed to social justice content. Similarly, Gutierrez’s (1999) qualitative study found that low SES Latina/o students were capable of achieving the same success as their White counterparts due to the sensitivity and dedication of teachers who believed in them. Incorporating SJP into the classroom opens new avenues for students to be successful in a multitude of ways.
Disparities in Mathematics

Duncan (2002) is one of many who exclaims that racism is endemic in North America which leads to negative connections for nonwhites. This lends itself to student failure combined with lack of self-esteem related to schooling and motivation. Throughout the last few decades, disparities in education are seen around the United States (Flores, 2007). Researchers have looked at issues such as access to mathematics, achievement gaps and pedagogy utilized to teach minority students. Marginalized student gaps are often seen as deficits, specifically in the areas of test scores, intelligence and ability (Battey, 2013). These gaps in particular have been studied and analyzed by researchers around the United States especially in the most recent decade.

Significant differences are seen in performance on state and national mathematics tests between different groups of students, often recognized in ethnic group and income level (Flores, 2007). Lower socio-economic, African American and Hispanic students are typically labeled as low achievers academically, especially in the area of mathematics. This leads to tracking students into different classes labels students with terms such as "gifted," "advanced," "special education." A disproportionate of these minority students are being placed in lower- level mathematics courses (Oakes, 1985) which is seen today according to test scores and math lab requirements. Labeling students is just another way of providing not only inequities in academic classes, but in their general academic careers as well. They go through schooling with these labels, feeling entitled or less than, leading them to different levels of success; social reproduction. All students should have access to the same high-quality education and education materials according to Gutstein (2003) and NCTM (1989). Oakes (2005) further explains how advanced students are not held back by slower learners but those learners are in fact held back by
homogenous groupings. Therefore, the assumption that homogenous grouping of students - tracking is better for learning is actually, false.

Gutierrez and Dixon-Roman (2011) posit that researching the achievement gap is only the first step towards addressing hegemony and that is where most research ends. Equity is the aim of the NCTM in the mathematics classroom; however, equal does not mean fair. What works for one student may not be sufficient for another student in the same classroom. Allexsaht-Snider and Hart (2001) begin their definition of equity with “the premise that all students, regardless of their race, ethnicity, class, gender, or language proficiency, will learn and use mathematics” (p. 93). This aligns with the NCTM (2000) standards which highlighted equity in its first principle for reform of mathematics education.

Many researchers found that multiple factors are associated with achievement; there is not yet a single solution to solve this problem (Boaler, 1998; Gutstein, 2003; MacLeod, 2008; Tarr et al., 2008). The type of socio-economic status (SES) measure, students’ age and grade level, minority status, and geographical location all play a role in the relationship between SES and academic achievement (Sirin, 2005). Flores (2007) posits that students in these minority groups do not have the same opportunities for learning as others. For example, students who are in the lower SES class have less access to resources, especially technological resources. Additionally, all students do not have equal access to highly qualified teachers, and school funding. According to Flores (2007) “qualified teachers who care committed to the learning of their students are the single most important factor for students’ success” (p. 38). Qualified teachers come in many forms, not only do they have the proper credentials, but they are prepared to teach culturally diverse students in an everchanging world.
Gutierrez (1999) and Ensign (2003) both conduct studies in urban settings and find that when students of color and those from low SES households are supported, they have outcomes that are similar to their counterparts. Multiple researchers (Boaler, 1998; Ladson-Billings, 1995; Sirin 2005; Tate 1995) find that often teachers give direct instruction to their students in mathematics, sampling or modeling a set of steps or procedures and then assign work similarly to students to practice independently. Often times they are using textbook problems that does not relate to them contextually and they just follow a series of steps they have been provided with little connection to the material.

Rote memorization does not allow students to connect to their learning and leaves them with a disadvantage on state tests. Marginalized students are set up for failure when they are not provided with the same opportunities and support in school as their counterparts. Failure in education leads to negative life circumstances in future careers and reproduces social inequality.

Real World Mathematics

Classrooms around the nation utilize different curriculum to teach mathematics to students. While there are many differences in curriculum being used, students are all being assessed on the same content. Tarr et al. (2008) found that there was no correlation between textbook curriculum and achievement on high stakes tests. Boaler (1998) started with the idea of open versus closed mathematics with a study in England. She found that when students are given the opportunity to utilize real world mathematics problem solving instead of rote mathematics out of a textbook, they have a much more positive outlook on utilizing mathematics skills. She depicts a clear representation of positive student attitudes towards mathematics when they are given the opportunity to use real world phenomena to make sense of mathematics versus using a textbook. This is essentially what Gutstein (2003) was promoting in his studies as well. Although
Boaler (1998) did not focus on the equity piece her focus essentially was to remove students from rote mathematics and start them in the process of real world mathematics. Students in her study showed through survey methods and interviews a stronger interest in the subject matter and more drive to perform. A possible downside to this approach to teaching is that it is time consuming with less concepts taught in the same amount of time. However, due to the way they were taught, they were able to reason better and make meaning of unknown material and solve using what they did know (Boaler, 1998). In connection to Gutstein, this also shows a growth pattern in students’ ability. It shows that students who learn skills and strategies rather than formulas and facts are more apt to be able to succeed with challenging tasks and more prepared for the real-world.

In relation to Boaler’s (1998) study, Ensign (2003) also found that mathematics textbooks are not authentic to students and therefore provide less interest and motivation. Students need not only the support but also the contexts that are conducive to their learning in order to receive positive outcomes. Students need to be able to make connections between the math they are learning in class and their lived experiences. Mathematics learning can be built and connected to students when they bring the mathematics from their own communities into their learning.

Real world connections to mathematics significantly affects student learning and retention. Matthews (2017) found in a mixed methods study, that teachers who utilized real world applications and concrete examples showed more student growth over the school year. Students in classrooms where teachers provided these real world problems showed less frustration and negative values of mathematics. Students are then able to see mathematics as interconnected concepts instead of a set of rules and procedures.
**Teaching Math for Social Justice**

As the founding father of the social justice for mathematics movement, Dr. Eric (Rico) Gutstein studied the importance of giving students a voice through mathematics in “Teaching and Learning Mathematics for Social Justice in Urban, Latino School” (2003). Gutstein is the first well known teacher-researcher and activist to integrate social justice practice into mathematics within the classroom, specifically on the middle school level. He found that the leading importance for students is the understanding mathematics beyond a series of rote skills. One of the important issues that he highlights in this teaching practice is engaging students academically (Gutstein, 2012). Students who develop mathematical power not only become more confident in their mathematics skills but will also be able to demonstrate their mathematical reasoning and problem-solving strategies. These students learn that mathematics is a valuable tool to make sense of the world and things that are important to them. According to Powell (2012), ethnomathematics, critical mathematics and teaching math for social justice have some differences but they all signify the teaching of mathematics to incorporate learning for social change. Both CRP and SJP have been important discussions in mathematics education for more than three decades (Frankenstein, 1990; Gonzalez, 2009; Gutstein, 2006; Ladson-Billings, 1994).

A working definition of TMfSJ can be developed as teaching students mathematics through tasks that help them challenge the injustices they see and face as they read and rewrite their world through mathematics (Friere, 1993; Gutstein, 2006). Gonzalez (2009) defines TMfSJ with four components: access for all students to have high quality mathematics instruction, centering curriculum around the experiences of marginalized students, using mathematics as a tool to understand issues of power, and using mathematics to address inequities. Although many
Researchers have written about TMfSJ over the years, especially in early 2000s (Bartell, 2013; Gutstein, 2003, Leonard et al., 2010; Stinson et al., 2012) not many have written about how to practice it, or successfully carry out lessons in the middle school classroom. Other than Gutstein (2006) most have not studied the application of TMfSJ in middle school, just the theory and preparation of it for teachers. This could explain why there are many teachers and pre-service teachers who are inexperienced in how to utilize mathematics to explore social justice topics.

There have not been a plethora of studies about how to train teachers or teach teachers to break through the curricula barriers districts and states mandate to allow them to integrate this teaching into their courses. Nolan (2009) claims she attempts to teach social justice to prospective middle school mathematics teachers in her course but the students do not always understand the connection. According to Nolan (2009), social justice is part of both the context and content of the mathematics classroom.

Social justice is about what is unsaid, as well as said; about what is absent as well as present – where what is unsaid and absent lie dormant in the lived mathematics classroom realities of issues such as inclusion/exclusion, gender equity, power distribution, elitism, and the perceived fallibility of mathematics and mathematics teachers (Nolan, 2009, p. 212).

The structure and regulation of mathematics requires students and teachers to ask critical questions about the teaching and curriculum that is applied in mathematics. Leonard et al. (2010) note that “to be effective, the approaches [CRP & SJ] require teachers to carefully reflect on, attend to, and pedagogically plan for the nuances and complexities inherent in concepts such as culture and social justice (p. 261).
A widely used practice is utilizing lesson study to train teachers on how to implement a specific aspect of education. Bartell (2013) created a lesson study with secondary education math teachers to develop a social justice mathematics lesson to utilize in their classroom. She described the complications and limitations in her study while explaining conjectures for future research. While the teachers in her study had a difficult time focusing on both social justice and mathematics at the same time, she did learn some valuable things from her study. She uses the term *mathamacy* taken from Skovsmose (1994) and utilizes it for empowerment. *Mathamacy* means to “organize and reorganize interpretations social institutions, traditions, and proposals for political reforms (Bartell, 2013, p.131). This is saying that using a critical approach to social issues with mathematical concepts can promote and empower students. Frankenstein (1990) talks of critical mathematical literacy and what she calls ethnomathematics, very similar to TMfSJ. Ethnomathematics illuminates the perspectives of others while utilizing mathematics to study non-mathematical concepts (Frankenstein, 1990). She states “critical mathematical literacy curriculum can be relevant to getting more people of color into mathematics and science fields” (Frankenstein, 1990, p.346). This is shown in Bartell’s (2013) study with the unexpected students’ responses to social justice issues from the minority populations. Some of the teachers were impressed by some of the responses of some of their students, especially with Jamie (one of the participants) when her student said, “maybe we should be spending more money in schools so less students go to jail” (Bartell, 2013, p.150). Student recognition of solutions to important issues highlights the usage of TMfSJ. However, Bartell (2013) also noticed that the definition of TMfSJ that teachers used impacted the types of lessons they were creating.

TMfSJ allows students to travel through different cultures and places and experience other perspectives (Skovsmore, 2005). A major goal of TMfSJ is to use mathematics to explore
critical and often controversial issues through a mathematics lens (Gutstein, 2006). This gives students a critical lens into issues they might otherwise not have as much knowledge or be able to make their own intellectual opinions about. It allows them to make connections they might not otherwise have made. Teachers who have begun to have different experiences with these opportunities have grown from their experiences. Koestler (2012) depicts a classroom where students can use mathematics to “understand, analyze, critique, and address issues of social justice in their community and the world” (p. 83). She writes about her work with pre-service teachers in order to prepare them to teach socially just curriculum in their future classrooms.

Mathematics educators who teach for social justice teach for understanding rather than memorization of facts and information. They engage students to “reflect critically on both the substance and process of their learning” (Powell, 2012, p. 31). This learning stems from topics relating to the subtleties and dynamics that are in power to understand the effects of these social issues. Some issues that arise in TMfSJ are racism, sexism, capitalism and other institutional structures. TMfSJ is more than curriculum or a set of resources, “it is a process that begins with students and ends with advocacy for change” (Gonzalez, 2012, p.129). Incorporating social justice into mathematics curriculum could change the way students not only feel about mathematics but approach their education.

**Teachers’ Perspectives and Experience with Mathematics Education**

While these issues talk about the effect on students, the empirical studies on teachers’ perspectives about TMfSJ is extremely limited. Teachers do however, come to the classroom with a plethora of their own experience, math and social justice related. Simic-Muller, Fernandes, and Felton-Koestler (2015) studied pre-service teacher beliefs on controversial topics in mathematics education. They decided on 5- four different subscales of controversial topics
from real world situations such as choosing a cell phone plan or designing buildings, to controversial issues such as the cost of war on drugs or government spending, to issues of injustices such as animal cruelty or living space in a refugee camp, to family backgrounds or community practice such as cooking certain foods or family and community heritage (Simic-Muller et al, 2015). Of these issues, most pre-service teachers had a very difficult time answering the interview questions that they were unable to gather substantial data. They state that most of their participants had very little experience with how to use mathematics to explore these issues.

While pre-service teachers do not have the experience that in-service teachers have, the issues seem to coincide. Teachers in general shy away from controversial topics, especially seen when majority of teachers are White and students are of different backgrounds. Gay and Howard (2010) feel that teachers are often uncomfortable with the issues of race and teaching from a multicultural perspective especially mathematics teachers. They also posit that all teachers are responsible for teaching with cultural sensitivity and social justice in mind, despite the difficulty.

Teachers need to see the way that TMfSJ impacts their students in order to “buy in” to the concept and begin to utilize it in their classrooms (Leonard & Evans, 2012). When teachers find things that work for their students, they will typically be more inclined to explore those avenues. When teachers become willing to explore these pedagogies, implementation can take place.
Chapter 3: Methodology

Design

The purpose of this qualitative exploration was to describe the experience and perspectives of current middle school mathematics teachers related to incorporating CRP and SJP into their classroom. Additionally, the goal was to determine the feasibility of incorporating teaching for social justice into their mathematics classrooms. The qualitative exploration was selected due to the nature of the research questions and the goal of allowing teachers to reflect on their classroom practices in order to determine future steps to assist these teachers. Most teachers do not have a comfortable understanding of the topic let alone the familiarity of utilizing it. The interview consisted of giving teachers information about CRP and SJP after allowing them to come up with their own definitions of each. Teachers were given information to help determine if there is a feasibility in their current placement to incorporate these pedagogies.

Sample and Setting

The district chosen to do this study is located in a highly diverse town in New Jersey. In the entire district 35.1% of students receive free or reduced lunch and free breakfast (public-schools.com, 2017). Since the demographics at certain schools are distributed differently, 6 of the schools receive Title I funding based on the number of students receiving free or reduced lunch pricing. There is a population of about 64,000 in 2015 (US Census Bureau, 2015). There are 17,047 Black /African Americans residing in this town (US Census Bureau, 2015) 14,427 are Asian (US Census Bureau, 2015) and 251 are American Indian and Alaska Native (US Census Bureau, 2015). The Hispanic or Latino population alone are comprised of 8,457 people and those that are two or more races encompass 2,067 persons (U.S. Census Bureau, 2015). Those that consider themselves another race are 1,832 (U.S. Census Bureau, 2015). About 20,000 people in
Chordsville Township are foreign born citizens (U.S. Census Bureau, 2015) and 30.4% of the population speaks a language other than English at home. Less than half of the population considers themselves of the white non-Hispanic origin (U.S. Census Bureau, 2015). At least 6% of the population recorded lives below the poverty level (U.S. Census Bureau, 2015).

This town was chosen as a site that currently uses problem-based learning tasks in mathematics. In addition, the town is extremely diverse within its public school system. The mathematics department implemented the use of problem-based tasks within each of their units two years ago which allowed the teachers the opportunity to provide students with different views of real world mathematics. The curriculum the district follows is based on the Common Core State Standards adopted in 2010 in New Jersey. While this is the town my grandparents came to when they immigrated to this country, I am also a current educator in the district. Therefore, it was also chosen for ease of access and through rapport and trust (O’Leary, 2004).

The teacher sample included eleven middle school (grades 6-8) mathematics teachers from two different campuses of Chordsville Township Middle School. Criterion sampling (Patton, 2002) was utilized in order to find teachers who were already utilizing some form of open-ended teaching in their classrooms. All teachers included in this sample met predetermined criterion. Teachers were invited based on the following predetermined criteria of importance:

- The teacher is a middle school mathematics teacher.
- The teacher teaches regular education mathematics classes.
- The teacher is using problem-based learning tasks in the classroom which is a district mandate. However, I will also ask for advice about what teachers would be open to discussing their classroom experiences from our math coach in the building who is aware of what is happening in each classroom. (advice about what?)
The purpose of having a teacher who is using problem-based learning tasks is that it ensures the teacher is open to having the students apply their skills and not just use rote mathematics.

- The teacher is willing to participate in the open-ended interview process.

For each campus, principals were sent a recruitment letter asking for permission to invite mathematics teachers that are utilizing problem based learning in their classroom. Once permission was received, the teachers selected were invited with a recruitment email designed to incite interest in the study. This recruitment email was sent during the summer months where teachers were not at work at that time. After receiving the participants interest via email, scheduled interviews took place via zoom, a virtual platform. Teachers were given the opportunity to complete the interview before school started or in the beginning of the upcoming school year. However, there was a lack of willingness by teachers to participate and only eleven volunteered. Three participants were from Campus A and the other 8 were from Campus B where the researcher also works. Each campus has different administrators and a slight variety of students, but the township has determined it to be one school with two campuses. While there were only eleven participants, those that volunteered showed an accurate representation of the teacher population in the district. There was a mix of male and female participants and a mix of ethnicities that was proportionate to the actual teacher population in these schools. The interviews ended just as the district started to provide mandatory professional development on culturally and linguistically responsive pedagogy. It was determined that further interviews would skew the data as it would not give the raw information of what the teachers know and are aware of prior to the professional development. In order to maintain confidentiality, pseudonyms were utilized for all participants.
Table 1

Demographic Information about Interviewees

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Gender</th>
<th>Years of Experience</th>
<th>Ethnicity</th>
<th>Grade(s) taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackson</td>
<td>Male</td>
<td>24</td>
<td>Black</td>
<td>8</td>
</tr>
<tr>
<td>April</td>
<td>Female</td>
<td>12</td>
<td>White</td>
<td>6</td>
</tr>
<tr>
<td>Sofia</td>
<td>Female</td>
<td>20</td>
<td>Hispanic</td>
<td>6,7,8</td>
</tr>
<tr>
<td>Meredith</td>
<td>Female</td>
<td>9</td>
<td>White</td>
<td>6</td>
</tr>
<tr>
<td>Amelia</td>
<td>Female</td>
<td>9</td>
<td>White</td>
<td>8</td>
</tr>
<tr>
<td>Callie</td>
<td>Female</td>
<td>6</td>
<td>White</td>
<td>8</td>
</tr>
<tr>
<td>Miranda</td>
<td>Female</td>
<td>3</td>
<td>Asian</td>
<td>8</td>
</tr>
<tr>
<td>Christina</td>
<td>Female</td>
<td>12</td>
<td>Black</td>
<td>8</td>
</tr>
<tr>
<td>Mark</td>
<td>Male</td>
<td>20</td>
<td>White</td>
<td>6</td>
</tr>
<tr>
<td>Lexie</td>
<td>Female</td>
<td>16</td>
<td>White</td>
<td>7</td>
</tr>
<tr>
<td>Derek</td>
<td>Male</td>
<td>17</td>
<td>White</td>
<td>6,8</td>
</tr>
</tbody>
</table>

Data Collection

First, the principals and supervisors were solicited for possible participants for the study. Once a list of names were given, a formal email was sent to those teachers asking for voluntary participation in the study. Due to the nature of the current situation the world was in given the COVID-19 pandemic, interviews took place using a virtual platform. All teachers who volunteered for the study participated in a 30-60 minute semi-structured interview (Patton, 2002). Interviews were recorded with permission from the participants and transcribed into a word document to use for coding.

Interview Protocol

“The purpose of interviewing is to allow us to enter into the other person’s perspective” (Patton, 2002, p. 341). Therefore, the interview process was used to dig into teachers’ perceptions of their teaching and how they incorporate culturally relevant and social justice pedagogies into their classroom. This affords the opportunity to gain individual insight on the practices teachers
are currently utilizing and how that can be strengthened with these pedagogies. I created a protocol for the interview which is open-ended and included many follow up questions to deepen teachers’ reflections on questions (Patton, 2002). The interview protocol was created based on an extensive review of the literature.

After the development of the initial protocol, a pilot study was completed to determine the efficacy of the protocol. A series of questions were added to the interview protocol in attempts to get deeper into the perspectives of teachers. The questions added were able to provide teachers with the opportunity to be educated on the terms used in order to see what they are willing to take into consideration when working with their students.

**Researcher Positionality**

My role as a researcher in this qualitative study was to collect data through interviews in order to develop a plan to build CRP and SJP into the curriculum in this district. The goal of the study was to determine teachers’ beliefs and attitudes toward the pedagogies and determine how to help them integrate CRP and SJP into their mathematics classes. First, as a colleague of the participants, I have no authority over them which should allow the participants the opportunity to be more honest with me than if I were an administrator. Participants were made aware that this interview would not be shared with administration and all data collected would remain confidential. Having a rapport with the participants allowed for open communication and the ability to gain more insight. Most of the participants in the study know who I am and what I do in the district as well as what I have been studying. Being a teacher in the same district, I needed to stay with the data and keep my opinions out of it. I had to stay consistent as a researcher and not a participant. However, I have the same empathy the teachers do for the students which is
what led to this project in the first place. My role was consistent with that of a qualitative researcher.

**Ethics**

Anytime research is conducted in an educational setting there are issues of ethics that must be taken into consideration. I created an audit trail highlighting the steps of data analysis to institute confirmability. Dependability will be established within the interview protocol as the given questions could be used by any researcher.
Chapter 4: Findings

This exploratory qualitative study was designed to explore teachers’ beliefs and teaching practices aimed toward integrating social justice into the mathematics curriculum. Data were collected from semi-structured interviews of eleven middle school mathematics teachers from two campuses of one middle school who volunteered to participate. Interviews were utilized in order to better understand how middle school mathematics teachers conceptualize social justice and the implications that their perspectives have on their pedagogy. A specific purpose of the study was to explore teachers’ perceptions of the challenges and barriers associated with integrating social justice into the mathematics curriculum.

Overall, the results of the study confirmed that most teachers were unable to conceptualize social justice, specifically in the context of mathematics. The participants in this study had no previous knowledge of teaching math for social justice (TMfSJ) or utilizing culturally relevant pedagogy (CRP). The majority of teachers interviewed asked for information and definitions rather than having their own understanding of what it meant to teach for social justice or to include CRP as part of a classroom instruction. Interesting to note, the teacher participants were able to give examples of “real world math” that takes place in their classroom but were unable to connect these examples to social justice. Real world math is inclusive of problems that students can apply to their lives both inside and outside of school. This consists of problem solving using higher order thinking, and requires students to think about concepts rather than practice rote procedures. Also, most of the examples teachers gave were in terms of word problems using students names or interests, not practical applications to their life. One participant, Meredith stated “I will put their name in the problem and make it about something they like. For example, if they like Roblox, I will make the question about Roblox.” Another
participant Mark used the same idea in his practice as well. He stated, “I’ll make up a problem and I’ll include a student and I will put information in there like their sibling, pets or hobbies and kids love that.” When participants discussed their teaching in their own classes, very few of the examples included culture, injustice or other diversity, inclusion or equity issues. Some of the comments expressed by the participants when discussing math and social justice included: math is not flexible, real world math is non-controversial, social issues should be taken lightly in mathematics courses, the strength in diversity, the benefits of SJ in the math classroom and challenges that prevent this type of teaching.

In analyzing the data, 22 codes were utilized. Using these codes, four major themes emerged: inclusive vs exclusive teaching, flexibility vs inflexibility, content vs context and comfort vs discomfort. Each theme suggests the dichotomy from which teachers struggled incorporate social justice into their practice. Overall, teachers were unclear as to how to include social justice in the curriculum as indicated by their reluctance to address these issues. Through analysis of the data, the lack of social justice teaching in mathematics was evident.

Inclusive vs Exclusive Teaching

While most teachers struggled to come up with ideas of what teaching for social justice meant to them, only one participant was able to conceptualize it in relation to mathematics. Jackson, who has over 20 years of experience teaching mathematics on both the high school and middle school level clearly and confidently articulated how he integrated social justice in the math classroom. He seemed to teach with equity in mind based on his thoughts, feelings and descriptions of what went on inside his classroom. He discussed the accessibility of mathematics in relation to all students. Jackson stated, “so many people think it is inaccessible and I’ve been working since 1995 to help kids realize the opposite.” He continued to talk about how he makes
sure students know how they fit into the curriculum by making connections to things that they know. He also explained that he previously worked in a different district where the students did not relate to him as well. According to Jackson, he is now in a district where he grew up with similar experiences and cultures to the kids so it’s easier for them to relate to him. It is possible that he understood more of the social justice application because he was able to bond with the students through shared experiences. Jackson also described projects he has done with the students that help them explore other cultures with mathematics. He explained about a “portfolio project” where the students share their work and they also have to research mathematicians that have something in common with them. He lists mathematicians for students and tries to “pick people from all different walks of life” in order to find people they can relate to. When students share about math from different cultures, it gives them an opening to learn about cultures other than their own. Some of the examples Jackson listed were the Hindu numeric system, Jamaican multiplication method, and Roman numerals. Derek, a teacher who is new to the district but has many years of teaching experience listed examples he related to such as the “Caribbean style math lessons” that he utilized or interesting ways other students brought examples from their math teachings into the class. One specific example that he provided was,

“I’ve always used the acronym PEMDAS to talk about order of operations. Students have come in with different backgrounds learning from different countries and showed me the same concept but with different acronyms such as BODAS or BEMDAS or GEMS, which all came from different cultures and I found it pretty interesting.”

He explained that the specific language used gave students other ways to talk about the same concepts. “They used the b for brackets where we use p for parenthesis,” he explained. He said
that he loved when students brought their own ideas from different learning styles into his classroom.

Additionally, Derek tried explaining how he discusses classism with his students. He was unsuccessful in giving examples of how he uses classist issues in his teaching of mathematics. He did discuss the topic with his students, but he did not connect it with math. He stated that “math is too difficult to incorporate into social issues.” As a public school educator he attempted to talked to his students about privilege. He said that he explained the differences between public and private school education since he previously taught at a public school. In his discussion he elucidated that private school students have more resources and they do not have a “level playing field with others when they graduate high school.” His purpose in teaching this was to have his students understand that they need to work twice as hard to compete with others. Derek explained that he did not do any social justice math lessons, but he gave students facts. He stated, “we spend time on real world topics but I have not spoken anything I would consider controversial, but I do give students straight facts.” The facts he referred to related to taxes and budget cuts in towns related to education. Students ask questions but he stated that he answers them very carefully.

Miranda, the least experienced teacher out of all participants described learning about social justice in college training to become a teacher. She stated however, that she did not know how to relate social justice in mathematics. When asked about making connections to controversial and social justice issues in her teaching practice, Miranda stated that she would be comfortable teaching around those topics if it was “normalized.” She stated “I really do want to talk about those things because I feel like I am very passionate about them” but she continued by saying that she does not have enough training on how to incorporate the concepts into her math
class. She did however give some examples of things she utilizes in her classroom and labeled them “passive attempts” to include culturally relevant topics into her lessons. Miranda described how she plays music for students while they work but she lets them choose music they like as long as she can find the clean version. She also described scenarios where she places quotations on the bottom of her presentation slides that come from famous mathematicians from different cultures. She also includes quotations during special months like black history month or Hispanic heritage month relating to such topics. Additionally, she stated that she uses backgrounds in her slides that relate to cultural holidays or events.

In one other case, Callie, a sixth-year teacher, also new to the school said that she tries to keep equability in mind but she hasn’t seen too many instances where she felt it was not equitable. She stated, “I couldn’t imagine how it would feel for students to come to school every day and have situations that prevent them from doing what everybody else is doing.” Her lack of explanation of how she shows equity in her classroom shows that she did not necessarily teach with this in mind but she does provide support to all students. She felt that all her students had equal opportunities to succeed in her classroom and she did not need to change anything. She stated that she encouraged all students, “no matter what their culture or background is, it’s just important to support them.” Amelia, a veteran teacher in the district, stated that “math is so universal that I do not see boundaries that prevent me from sticking to mathematical concepts” in her classroom. She felt that language and culture did not have a place in her curriculum and she did not need to modify anything for students from different backgrounds. Other participants had some ideas of equitability and inclusiveness but did not really put the ideas of social justice and mathematics together. They mentioned the difficulty of incorporating equity into their courses since math in their minds does not relate.
Flexibility vs Inflexibility

A majority of the participants stated that social justice does not belong in a subject like mathematics. Out of eleven participants, ten made note in some way that math does not lend itself to social justice topics. While most teachers felt comfortable with these topics they did not think that outside of a brief discussion there was a need for a focus of social justice in their class. When asked about teaching social justice issues, Mark, a twenty-year veteran teacher, strongly stated that “Social studies, English and some specials, those offer themselves, it’s a better environment, a better situation than a math class.” He indicated that the course he taught “did not require or request the need for social issues where the students had the ability to focus on these larger issues.” Mark was against the idea of implementing social justice projects because he felt the mathematical concepts were more important and he believed in teaching from the textbook. He did not think that incorporating issues that are not directly related to the math he needs to teach is necessary in his classroom. He proclaimed that it is however, possible to do and he gave an example of going into the town of Chordsville and finding the utilities department issues and looking for real world problems that affect the students and their families. At the same time he said he would “avoid these issues like the plague” and make sure it does not enter his classroom.

Mark was not the only one who felt this way about incorporating social justice in mathematics. Lexie, the same teacher who self-identified as the “real world project queen” stated that as a math teacher, issues of injustice and controversial issues are “out of my wheelhouse.” She felt strongly that math was not the correct place for those topics. Callie, a non-tenured teacher, explained that students are not used to seeing culture within the math setting and would be confused if it were discussed. She stated, “Students are almost trained to think that they are not going to hear about culture in their math class.” Callie felt as though her students would
question what it is they are learning mathematically if issues of culture were brought up. While feeling this way, she also said that she wants it to be something they see during their entire school day and not just in English or Social Studies classes. These participants all mentioned the other subjects that would be more flexible and have more room to talk about culture, injustice and other controversial issues.

Amelia explained that there is not a lot of flexibility in what is being taught and how it is being taught. She stated

“There’s a lot of things where you have to teach it a certain way with a certain vocabulary so it leaves it a little more difficult to use these open ended projects and things for them to learn because then you’re not sure they’re going to learn the specifics that are necessary to the curriculum.”

According to Amelia, the rigor and rigidity of the topics require rote practice more than open-ended real world applications. More participants also spoke of the lack of flexibility in mathematics in their district when talking about their supervisor and the specifics needed for this school year. Miranda stated that the structure is “too strict” to spend time on issues that do not directly relate to what needs to be taught. Her idea of flexibility was stated that “within small groups, we can reteach and bring in other topics but we do cover all the topics that they need to cover in 8th grade.” Her contradictory statements represent that there is some room for flexibility it just needs to be found within their workshop model. This year the teachers are required to pilot a new textbook and according to their supervisor they have to “implement with fidelity” both Lexie and Meredith stated. Therefore, in sticking to a strict textbook curriculum, there is little room for them to add practical applications or social justice pieces into their coursework.
While some of the participants used to utilize projects a lot, and it was a prior mandate of the district, now the focus is on these textbooks. The new textbooks that are being piloted do have some culturally relevant topics some teachers mentioned. One example that multiple teachers used was the mentioning of Juneteenth, the holiday Senate passed a resolution on in 2018 to honor the day. Teachers stated that students were unaware of this holiday and time was spent explaining it which led to a very brief discussion on emancipation for African Americans. According to Meredith, the new textbooks have a separate section in each chapter called “connect to culture.” She also stated that in addition to the connect to culture, the textbooks also have differentiation for different levels of English language learners which Meredith states is “really very helpful.” Cristina also stated that “as we move forward in the years, textbooks try to incorporate culture, like even with the names or situations of students.” She acknowledged that the textbooks have advanced, and while she is required to stick to the textbook, it has new material that the students can relate to.

When asked about CRP, most participants did not understand how and why this should be necessary in mathematics. Amelia stated that “math is so universal that I do not see boundaries that prevent me from sticking to mathematical concepts” in her classroom. She did not feel a need to incorporate anything outside of the straight curriculum into her daily class activities. During the interview teachers were told that one of the three key domains of CRP is that all students must achieve academic success. Each participant said that they measure success and intellectual growth through assessments both formative and summative. However, some teachers talked about the knowledge of their students. These participants explained that the only way to see true intellectual growth was through talking to their students and watching them work. When talking about academic success Callie stated, “I think more of my understanding of
student success comes from the part of the class where students are working on an activity, the most unstructured part of the class, and I can have those conversations with them to see what they know.” She noted that assessments are not the only way to measure student growth. Only a few participants mentioned that students can grow in other ways and that assessments do not give an entire picture of growth. The rest of the participants believed that assessments were the only way to measure student growth.

On the other hand, while teachers like Miranda state that the structure they have is “too strict” to spend time on outside issues, in terms of being flexible, Cristina talked about the adaptability of her team and the way they view the curriculum. She has a different opinion than most of the participants when it comes to the flexibility they have in their teaching. She stated, “I feel like we are flexible and we work with what is happening and trying to hit all goals that are set in front of us.” She names it as a strength of her colleagues, her school and in relation to the content. She did agree that there is a lot of testing and requirements but how they go about meeting their goals can be adapted in many ways.

**Content vs Context**

Other teachers talked about the lack of flexibility in math makes it difficult to incorporate outside concepts. Participants were more concerned with the content they needed to teach, in a certain time-frame and did not acknowledge the context in which it could be taught. Miranda, one of the teachers who was interested in the social justice issues stated that the structure is “too strict” to spend time on issues that do not directly relate to the content required to be taught. Miranda was one of the teachers who utilized a self-described passive attempt to integrate cultural relevance into her lessons. She claimed that she taught with equity in mind but was not sure if she truly was being culturally relevant when it came to the mathematics. Some examples
she gave of being culturally relevant were “using backgrounds of our do now or lessons of holidays like Rosh Hashana, Kwanza and Dwali.” She continued to explain how she would explain certain holidays to students that they were unfamiliar with but she did not relate it to the mathematics they were learning. She claimed it to be “passive attempts to include culture in the lessons.” While it may have been passive, it was more than other teachers described as what was utilized in the classroom to represent different backgrounds students might be familiar or unfamiliar with and able to connect or learn from these scenarios.

When asked about cultural competence and sociopolitical consciousness, most teachers needed to be given the definition. After given the definition a few of them explained that they did not believe cultural competence can be measured. Derek state that he just shows students things about different cultures but he also claimed, “We do not have a benchmark to say if they gained appreciation of another culture, like there is no test on it.” He was aware that there were different things he incorporated or discussed but was not aware of how much the students were able to acknowledge it. In the same regard, Cristina gave examples of ways she has seen culture incorporated in other grades or schools such as international days or gallery walk of different cultures but she stated “The problem is I don’t know if you want to assess something like that.” She also stated, “You don’t want it to feel like a chore to learn about others’ culture so it should be kept to minimal discussions, especially in mathematics class.” Other participants also continued to explain why they did not believe that either of those things belonged in mathematics. They felt that students would question the content and ponder over the real mathematical issues that needed to be understood. When asked, examples were provided for the participants and most found them intriguing and wanted to know more about applying these issues with their curriculum. A few of them mentioned the willingness to incorporate lessons
involving social justice issues if the lessons were presented for them. Most teachers agreed that if the district and their supervisors supported this integration, they would happily incorporate it into their curriculum.

Both April and Derek explained that in order to incorporate what they were told is TMfSJ or CRP, it needs to be completely integrated into the curriculum. April stated,

“I think it’s easier to incorporate it in a social studies or English classroom so I feel like it just takes a little bit more thinking you know you have to work a little bit more to figure it out and how to best integrate it in so it doesn’t just look like you’re throwing it in to throw it in.”

April believes it is possible however she just does not know how to make it possible. In reference question of how to incorporate social justice, Derek stated “It needs to be included into the curriculum not just an add on after the fact.” He explained that he helped write the curriculum and he knows that this is not built in, he termed it a “regular math curriculum” and stated that including this was not one of their mandates. He said at no point was that ever a focus, it is a straight regular math curriculum that focuses on what students need to know and how they are going to get there.

All participants agreed that mathematics has real world applications and they have utilized examples of such in their teaching. Only one teacher, Amelia, was unable to give an immediate example when asked about real world applications in their classroom. With prompting, she acknowledged that a lot of real world examples are utilized especially in her geometry lessons. She said, “Pretty much everything that we’re doing can be related or is real world situations.” When discussing how real world applies in their class all teachers stated that they use student names and interests in word problems. A few of them even talked about the
practical application of problem solving and how it goes beyond the curriculum. Two teachers explained that the purpose of teaching problem solving skills is more than just learning content. None of the participants made note of using social justice issues in their teaching. An example of something they brought up was teaching around topics such as cooking when teaching about ratios, proportions and fractions. Also mentioned was shopping, students creating their own problems about themselves when talking about inequalities, and ideas about researching math topics and mathematicians from other cultures. In talking about cultural aspects, participants discussed questions they posed about holidays and recipes of foods from students own families and traditions. Sofia, a twenty-year veteran bilingual math teacher, explained how she uses cooking to relate students to different math concepts. She stated, “My students tell me how they volunteer or help their families in restaurants that their family owns. Using examples from their work experience she talks about making change for customers and making recipes for cooking. “It is a good opportunity for my students to relate the math to what they participate in outside of school,” stated Sofia. She truly wants her students to connect to the topics in their own ways. April, a teacher who self-proclaimed that she used a lot of real world examples for her students throughout the year said, “Students can use recipes of things from their cultures of origin to make it more culturally sensitive than just a basic old recipe.” She was explaining how she tries to have students bring their home life into the classroom through mathematics lessons. While many had these real world examples, no mention was made to statistics or studying issues of importance that would give students agency in their own learning.

Utilizing the four subscales from the Simic-Muller et al. (2015) study, participants were asked questions about their level of comfortability in teachings with those connections. All teachers agreed that when they teach math, they make connections to real world situations. When
asked about controversial issues and issues of injustice most teachers stated that they feel comfortable making these connections but do not currently do it. Miranda stated, “If I could properly incorporate controversial issues, I would definitely feel comfortable.” She continued with, “There are a lot of times where I’ll see things happen especially now with Black Lives Matter and their protests, but I do not know how to incorporate that into mathematics.” Like some of the other participants, Miranda is willing to try to incorporate issues if she knew how. April also explained that she would be comfortable teaching around controversial topics if she was more knowledgeable. When asked if she teaches with issues of injustice she stated, “I think that my answer is going to be a hard yes after this school year because I think that it is important for these kids.” She recognizes the importance of students having a voice to talk about social justice issues but claims she would need to “do more research” in order to teach it. Some gave examples of issues they encounter and believed to be controversial, but such issues are not leading students to become change agents in their society. Examples given by participants closely related to real world issues, but evidence was not present that any of these teachers are teaching with controversial issues or social justice in mind.

Those that said they are uncomfortable teaching around those topics gave two different reasons. Some stated it was because they do not know enough and would like to do more research or find out more about it, and others claimed it was not something they feel belongs in mathematics. Mark claimed that it was important for him to keep political or religious issues out of his classroom. He stated, “I don’t know if that is old school, I don’t know if that’s playing it safe, but I am not inviting that into my classroom at all.” He clearly would be uncomfortable teaching around sensitive topics and would make sure he did not have to do so. Sofia was another teacher who was extremely uncomfortable incorporating these issues into her
mathematics class. She stated, “I would never bring it up because my students are minors and parents would not like their students to be taught about such issues.” She felt it was not only important to keep out of mathematics but important to keep out of school in general. She did not feel that these students are mature enough to talk about injustice issues in an academic manor. Lexie was somewhat indifferent to the idea of teaching around issues of injustice. She stated that it would be great because “we’re literally raising the next generation of leaders” but she continued with “that’s currently out of my wheelhouse.” So while she felt it was important for the students, she was not comfortable teaching it.

In one case, Derek understood that real world examples are not the same thing as real world problems. He was the only teacher to note the difference between the two. All teachers claimed they use real world problems when they write word problems for their students and ask them to apply it in their world. The problems they described as real world problems were not ones that directly relate to students lived experiences and allow students to make connections to the mathematics. Additionally, Derek also did not believe these students are capable of solving real world problems. “I kind of laugh at the idea of real world problems, they’re 6th, 7th and 8th graders, they’re not solving real world problems,” he exclaimed. Derek, along with a few others felt strongly that students are not old enough or prepared enough to encounter problems dealing with situations beyond their power or control. They believe the content students should be exposed to should be censored and limited to situations that will not provide controversy. They diminished students’ ability to enact change in the world around them and did not see how they had the ability to participate in the challenges that face their society. This also speaks to the notion that teachers struggle to conceptualize SJ teaching within the constraints of their
curriculum. Participants lacked the ability to interpret the context in which material could be presented could change the way students view mathematics.

**Comfort vs Discomfort**

All participants mentioned the difficulty of talking about social justice issues in their classrooms. The participants in the study were predominantly White, middle-aged women, working in a school of an extremely diverse population. Teachers were aware that their lived experiences do not match those of their students and it made it difficult to relate on certain issues. One teacher, April stated “I get nervous, what if I say the wrong thing or what if what I’m trying to get across comes out different and not as tasteful as I wanted it to.” Other participants echoed that feeling making very similar comments. Meredith, a newly tenured teacher made notion of this in stating that she would not show certain examples to a minority population when she was a white woman. She said she would “tread carefully on social justice issues” and included that the reason was because her students were of a different background than her. She explained that she would love to have these conversations with kids, but she is “not super comfortable with it.” She felt a barrier between her and the students due to their differences in cultural backgrounds. Even Jackson, a Black male teacher mentioned “I am careful about how I say certain things because I think they can be misconstrued based on who I am talking to,” when referring to discussing social justice issues in class. Teachers are afraid to dig into controversial issues due to the lack of support from the district. Many participants stated that the district would support the teaching of SJ in their classes but the way in which it was taught needed to be carefully planned. Derek stated, “I do think this is a direction that the district would like to go, I just do not think they know exactly how to go about doing it.” He said this in talking about
incorporating issues of social justice into the classroom, and he specifically stated that the intentions are good but the application is where it needs work.

Of the participants that were non-white, all four of them mentioned being unable to talk openly about controversial issues especially issues of injustice. In one interview with Sofia, another twenty-year veteran teacher, the issue of talking about controversial issues with minors came up. Sofia explained that she lets her students talk about issues but she as a teacher is never the one to bring up certain topics. Her students are all immigrants and non-English speaking students. She said that her students do talk about issues of abuse or sometimes specifically police abuse and compare it to things they have seen in their countries. However, she does not want to upset the parents by bringing up such issues. Sofia stated, “I do not bring these issues up because maybe a parent would say you cannot talk like that to my son or daughter.” She did however relate a lot of lessons to real world applications for her students and talked a lot about incorporating “American culture” into her classroom. She stated that it was important for her students to become familiar with their new country and the benefits they have of living here. She mentioned the context in which she taught, with the idea that her students needed to be brought into the mathematics. She used contexts of business and money to help students relate and reiterated to her students that “math is everywhere.” She used sports examples and weather examples to explain the difference to students between language and measurements in different countries. When talking about weather, she stressed the importance of knowing the difference between Celsius and Fahrenheit. Her example for her students was, “if you call grandma and say the temperature here is 90 degrees, oh my goodness grandma would go crazy because she would say that you are burning, that’s very high.” Most of her students and their families come from countries that use Celsius so the students need to know that in this country we typically use
Fahrenheit. While these are not controversial issues, she knows that important real world lessons are necessary for her students and she needs to teach in a context her students will understand.

Miranda discussed the importance of setting boundaries to ensure that when current event issues are brought up, students do not turn the content into a debate class. She said she would need to teach students that “they can kind of agree to disagree and still be friends.” She continued by explaining the need to teach SJ properly “especially now with like black lives matter and their protests, it needs to be incorporated.” She mentioned however that she would not currently know how to teach to these topics properly. Miranda along with others were open to the idea of SJ but they wished for professional development or examples to be provided for them. When asked about teaching towards social justice topics, Cristina stated “I feel comfortable but I would want guidance on what this would look like.” She was one of many that felt this way. She knew that it was possible to teach towards these topics but she did not know how to go about doing it.

In another case, Callie stated “I want them to feel comfortable talking about issues, even if I am a different race then them.” She wanted her students to feel supported in all areas and was clear about this in her interview. She felt it was important to include topics that were relevant to students lives, issues that were meaningful for them. On the other hand, Mark, the only teacher who claimed to feel this way, explained that he did not want to get involved with students personal lives and that should be left outside of the classroom. Mark stated, “No, I am not inviting that into my classroom by any means.” He believed he should not dig into students perspectives or opinions on specific matters that do not directly relate to the math concepts he needs to teach. He said there was no way he would incorporate SJ issues into his class and would not be interested in learning more about it.
Diversity in the Classroom

Every single participant mentioned the diversity of their classes when asked what it is like to be a math teacher in this district. Miranda even described it as a “culture shock” her first year of teaching. While she is an Asian woman, she explained that she was not brought up with knowledge of other cultures and was surprised to see so many cultures in one place. She found it interesting that “there are students from very different backgrounds all from one town.” Students from Chordsville Township come from many different walks of life and teachers recognize that. Meanwhile, Cristina, a new teacher to the district described the strength that comes from her diverse population. She said of the diversity, “it allows for various different perspectives. There is a platform to be open-minded and exposed to different things when cultures come together.” She describes the ability of students from different backgrounds to come together for a joined purpose, education. Her perspective was echoed by other teachers as well. Derek described his view as “a wide range of kids from an extremely wide and varying backgrounds,” when discussing his students. He mentioned this as a strength of the district, but also as a challenge to “get to know each student on a personal level.” He enjoyed the diversity in his classroom but he knew that came with challenges. Even Mark, who did not have any interest in CRP stated that his students are “extremely culturally diverse and bring many strengths to the classroom.” These teachers are aware that by having such a diverse population, students are able to learn from each other about their different cultures and experiences.

Participants discussed the growth not just of the students, but of themselves as well by working with such a diverse group of students. April stated, “It’s helpful for me personally because I feel like it’s also furthered my growth as a teacher because it taught me a lot of new techniques and how different students need to be treated.” An example she gave was of a student
who moved from Afghanistan who she treated differently than kids who were born and raised in the United States. What she explains as different is simply modifying work or having lower expectations of the student. She learned to use programs to translate the student’s material into his language and allowing him the opportunity to reply in his language, even though it required extra work for her. She believes she is being culturally competent but stated that she does not know how to measure that.

Diversity for these participants was described not just as cultural backgrounds but also socio-economic status and academic levels as well. Participants placed students in different social, economic, cultural and intellectual groups when talking about their students. Derek stated, “You can clearly see the class division, there are no English language learners or poor students in my honors class.” He described poor students as those who are receiving free and reduced lunch, and do not have resources outside of school to assist them in their success. Derek also stated that all students in his honors class have parents that are involved in their child’s academic life. He noted, “I teach one higher level math class and that’s the class that I have the most parents show up to back to school night and show support in their child’s education.” He explained he felt like this support led to more student motivation and success. Both April and Meredith had similar beliefs about the students in their leveled classes. They noticed the difference between students who had family involvement versus students who did not. Meredith talked about students who come from Africa where it is a privilege to go to school. She stated, “Parents of these student are really strict and that leads to students getting A’s and B’s in class.” She continued, “Students who grew up in New Jersey and do not have the parental support do not show the same effort.” She saw the difference in the student motivation based on the parental support and the background of the students. April explained that the “needs of these students vary from language
barriers to the need for support and attention.” April and Meredith agreed that students from different backgrounds require different supports. According to all participants, all students have the ability to succeed in their classes, and the support required for these students is always provided, if not by the parents, at least by their teachers.

**Benefits vs Challenges**

All participants agreed that including SJP and CRP in their classroom would strongly benefit their students. Most of them explained that it would make them better citizens and more socially aware of the world around them. Callie mentioned the fact that it would be “exposure to things that they would probably never talk about in a classroom consistently.” She continued by stating that it would help them “take it to the next level.” In saying this, she is aware that students would grow immensely from SJ teaching and she would like to see it in her classroom. Jackson stated, “It would help them become better global citizens, aware of the world outside of the 8th grade, age twelve and help them understand that there’s a world outside of twelve year old student in Chordsville Township.” He acknowledged that students would be able to see the larger society that they are a part of with SJ teaching. Some teachers also stated that it would better prepare them for the real world that they are living in as well as their future. Jackson stated, “it would help them become better global citizens and be aware that there is a world outside of the 12 year old in Chordsville Township.” He realized the big picture for his students, they need to become citizens in their world.

One of the major benefits discussed by the participants is the ability to produce critical thinkers. April said, “Their critical thinking would be stronger because it’s not like they are critically thinking to solve a multistep math problem, like straight up math (yeah sure there’s math involved) but there is more to it than just the physical math.” She explained the purpose of
thinking outside the box for these students. The stronger their critical thinking is, the more successful they will be, according to April. The interest rate in mathematics would grow, according to Derek and others. A stronger interest in math will produce harder workers and lead to critical thinking stated one participant. Derek said if you redo everything in the curriculum to a level that really spoke to them [the students] it would benefit them tremendously. He gave examples he would love to include in his class such as poverty, careers, classism, after he was given the definition of TMfSJ. The incorporation of this would take a lot of planning and time to implement indicated a majority of the participants.

According to a majority of the teachers, the biggest challenge in implementing social justice in the math curriculum is time. The participants explained that there is an abundance of material that they need to get through and the focus is always on the test scores. Mark explained the lack of time in describing the importance of testing. He put it simply, “We are so much about the numbers, and the data and testing and everything that, sorry I just don’t have time.” Cristina talked about the other goals and requirements and said that even if taught how to incorporate this, it would be difficult to do on a daily basis. A few teachers who began to understand the concept of TMfSJ after thorough discussion talked about how time consuming it would be to prepare social justice lessons since it is not something that they have utilized before.

Other challenges implementing SJP in mathematics ranged from district and supervisor support to maturity level of the students. Meredith said “I don’t know if I think that would be appropriate for middle school, I just don’t think they’re at that maturity level yet” when asked about incorporating these issues into her lessons. On the other hand, she thought that students do vocalize their opinions often throughout the school day, so she said, “Why not in math? I think it would give them more of a voice.” While other participants agree that students voice their
opinion, Meredith states the challenge as students thinking their opinion is the only option. The contradictory statements of student opinion is positive, because it shows they are given a field to voice their opinion. SJP posits that students can do more than voice their opinion in the classroom but also, promote change in their society if given ample opportunities. While teachers presented their age as a challenge for implementing social justice into the mathematics curriculum, this could also benefit them. Teachers feel as though students of this age would not want to partake in social justice issues despite the need to relate to the curriculum. However, having a different mindset at this age, really makes them question the usage of mathematics. “Building into their culture and lives lessons that are going to make sense to them and help them become better citizens can benefit students especially at this age,” stated Cristina. She felt the time it would take would be worth it for her students.

In all, the major perceived barrier is the lack of math teachers’ ability to conceptualize social justice. Without knowledge of social justice issues, it is extremely difficult to learn to incorporate into their classes. Only a few of the teachers were able to “wrap their head around this idea,” as Callie described when TMfSJ was explained to them. Theoretically, the participants liked the idea but conceptually they did not really know what to do with SJ teaching. More knowledge and training would help these teachers to conceptualize SJP in their mathematics courses.
Chapter 5: Discussion

The aim of this study is to identify the notion teachers have about how teaching practices impact student learning and development in addition to understanding where there may be room for teacher growth and change in teaching practices. This study was meant to explore teachers’ perspectives on incorporating new pedagogies for teaching mathematics for social justice (TMfSJ). A problem identified with current mathematics teaching especially in Chordsville Township supports the assumption that students who lack competence in mathematics are falling farther and farther behind their grade level peers. Studies show that students who have difficulty showing improvement on standards-based tests are often given rote learning practices such as memorization and basic recall, which does not appear to help them to master content (Rose, 2015). Interviews with mathematics teachers in this district confirm the practice of providing students with rote procedures in an attempt to build their competence. Teaching Math for Social Justice (TMfSJ) concerns itself with social and political contexts and pedagogy and contributes to the teaching of equity and social justice (McGee & Hostetler, 2014). Teaching for social justice has a goal of teaching with a critical lens to help students develop a sociopolitical consciousness, sense of agency and positive social and cultural identities (Gutstein, 2003). The focus of this study is to build on teachers’ understanding of what they believe are successful teaching practices for culturally diverse students and to create a plan to assist the teachers with integrating social justice into their teaching of mathematics.

Data collected from the interviews of 11 middle school mathematics teachers suggest that there is much room for pedagogical growth. Participants described their understanding of culturally relevant pedagogy (CRP), social justice pedagogy (SJP) and how they could incorporate TMfSJ in their teaching practices. Participants were able to offer their thoughts about
social justice (SJ) teaching inside their classrooms, the mathematics curriculum and its flexibility to incorporate SJ and the content and context in which mathematics is taught. During the interviews, teachers also shared the inner workings of their classroom and what challenges they foresee in implementing SJ practices into their daily curriculum. Most of the challenges teachers experienced led to the implications for further research. Challenges such as the abundance of material that needs to be taught and the thought that social justice would interfere instead of assist with preparation for standardized testing shows that teachers do not have a true understanding of the meaning of teaching for social justice. For many, a focus on standardized test preparation still seems to guide teachers’ decisions about pedagogical practices. Research has shown that the incorporation of social justice thinking into mathematics not only increases student understanding, but also prepares the students better for succeeding with standardized testing (Gutstein, 2006). Teachers were also able to discuss the benefits that TMfSJ would have for their students academically, emotionally and socially if it were built into the curriculum. These teachers agreed that fully integrating social justice into the curriculum would aid in student growth. However, for many teachers, the main tenets of social justice theory with an emphasize on issues of equity and access were not seen as related to mathematics. Only one participant conceptualized the importance of making math accessible to all students, and experiences in the classroom that might advantage some students, while creating barriers for other students.

**Summary of Findings**

The first research question asks how middle school math teachers conceptualize social justice. The results of this study provided evidence that teachers have a difficult time conceptualizing social justice especially in terms of teaching mathematics. Social justice
pedagogy has essential goals including access, participation and equity. Aside from the three teachers that stated the importance of access to mathematics for their students many of the teachers did not relate these goals to their teaching practices. Most teachers needed to be given the definition of CRP and SJP before being able to discuss their thoughts on it. A majority of the teachers never heard of TMfSJ or CRP. Without a deeper understanding of social justice and knowledge of related pedagogies, it is difficult to conceive of how social justice practices might be implemented in a mathematics classroom. The goal of the study was to help teachers to realize this possibility.

**Cultural Relevancy Connection and Care**

During the interview, teachers were informed of the three key domains of Culturally Relevant Pedagogy: students must achieve academic success, develop or maintain cultural competence, and develop sociopolitical consciousness (Ladson-Billings, 1995, 2014) by the researcher. Prior to the researcher defining CRP, teachers seemed to be unaware of what CRP means, and therefore are less likely to include strategies in their teaching practices. After CRP was defined, a few teachers were able to list some lessons they used that could be considered culturally relevant. However, according to Ladson-Billings (2014) these actions the teachers implemented may not represent the intent of CRP. Some ideas teachers listed of being culturally relevant included using students’ names and interests in word problems, utilizing themes from different cultures in presentations and applying real world applications to lessons. This is the beginning stage of Ladson-Billing’s (1995) idea of cultural competence which is defined as “the ability to help students appreciate and celebrate their cultures of origin while gaining knowledge of and fluency in at least one other culture” (Ladson-Billings, 2014, p. 75). Utilizing themes and concepts from other cultures allows students the ability to acknowledge that not only is their own
culture important but so are others’ cultures. While some of the concepts teachers listed are extemporaneous, they do show that teachers are appreciating cultures of different students. Although teachers felt they were connected to their students, they had not developed the skills to transform their connectedness to their teaching practices. The participants expressed passion and care in talking about their students but were unsure as to how these connections directly applied to their teaching practices. Culturally responsive teachers build community within the classroom and engage students in the learning process through a caring attitude (Howard, 2001).

However, most teachers were able to acknowledge that they did not have much experience consciously incorporating culturally relevant lessons or teaching with relevance in mind. These teachers felt like they were supporting all learners regardless of their backgrounds, but did not actively seek out ways to incorporate all students in their class. Teachers like Jackson, Derek and Miranda stated that they try to ensure mathematics is accessible to all of their students through their teaching practices. They make connections from their students’ lived experiences to the curriculum in order to allow students the opportunity to see themselves within the mathematics lessons. Based on participant interviews, several themes emerged from the data content versus context, flexibility versus inflexibility, inclusion versus exclusion.

Content versus context. These teachers did not understand the difference between teaching social justice content and the context of which it could be utilized. Participants were more concerned with the content they needed to teach, in a certain time-frame and did not acknowledge the context in which it could be taught. Ladson-Billings (1994) described part of CRP as treating students like they are competent which will likely result in students demonstrating competence. Participants made it clear that they felt they held all students to high expectations in the classroom but provided them only with the tools to pass standardized testing
and did not prepare their students “for meaningful work and dynamic participation in democracy (Ladson-Billings, 1994, p.77). According to Gutstein (2012) students who develop mathematical power not only become more confident in their mathematics skills but will also be able to demonstrate their mathematical reasoning and problem-solving strategies. Students should learn that mathematics is a valuable tool to make sense of the world and things that are important to them. The idea of “reading and writing the world with mathematics” (Gutstein, 2006, pg.3) allows students to investigate and discuss injustices in the world around them through mathematical literacy. Culturally responsive teachers enable students to think critically both about their world and about the injustices involved in their world (Bartell, 2011). While critical thinking in the mathematics classes of these teachers is explored, students are not empowered to construct knowledge from their own world. Teachers need to rethink the context of their teaching practices which further research and professional development can assist them with. Students of all backgrounds have the right to equitable education.

Moreover, significant differences are seen in performance on state and national mathematics tests between different groups of students, often recognized in ethnic group and income level (Flores, 2007). Lower socio-economic, African American and Hispanic students are typically labeled as low achievers academically, especially in the area of mathematics. Teachers in this study mentioned that the students they see in the lower-level math classes align with researchers’ notion that a disproportionate of these minority students are being placed in lower-level mathematics courses (Oakes, 1985). Participants explained how students in this district are tracked into different level classes which provides them with different learning opportunities. Participants in this study made this claim and described it as one of the biggest inequities they are aware of. Flores (2007) posits that students in these minority groups do not have the same
opportunities for learning as others. For example, students who are in the lower SES class have less access to resources, especially technological resources. Chordsville Township is extremely diverse and while equity is not visible for all students, the teachers described many ways in which they attempt to make their classroom equitable for all their learners. Specifically, teachers like Callie and Amelia made statements explaining how they encouraged all students, “no matter what their culture or background is, it’s just important to support them.” While they strive to make their classes equitable for all learners, they also mentioned the difficulty of incorporating equity within the lessons into their courses since math in their minds does not relate.

**Teaching Math for Social Justice Practices**

Additionally, teachers were given the working definition of TMfSJ, the role of mathematics in preparing active and engaged citizens in a democratic society; using mathematics to understand, question and effect change in our world (Gutstein, 2003). A major goal of TMfSJ is to use mathematics to explore critical and often controversial issues through a mathematics lens (Gutstein, 2006). Out of all participants, only one was able to clearly and confidently articulate how he used social justice ideas in his teaching, and how he taught with equity in mind. This teacher seemed to teach with equity in mind based on his thoughts, feelings and descriptions of what went on inside his classroom. He discussed the accessibility of mathematics in relation to all students. He gave examples of how he makes sure students know how they the curriculum connects to the students by making connections to things that they know. An example Derek gave was utilizing practices and methods that are taught in other countries that students may be familiar with and connecting them to the practices learned in the United States. Derek talked about a method that was Caribbean practice that was able to connect to his lesson of teaching order of operations. He talked about the language that was utilized in order for students
to make connections. He tried to ensure that his students had access to vocabulary that would connect with their world and the world he was trying to teach them.

Another teacher described using images and backgrounds in her presentation slides when she provided notes or activities to the students that related to different cultures and holidays but did not teach students to understand, question and effect change through mathematics. She simply provided an opportunity for students to recognize other cultures and traditions but did not apply that context to her teaching practice. Overall, teachers were unaware that social justice could relate to mathematics and therefore did not know they could incorporate it successfully into their lessons. Participants stated that they would not be uncomfortable teaching about controversial issues involved in social justice teaching, they just do not know how to relate the issues in their mathematics classes. Most teachers felt that mathematics was a neutral subject and did not have a place for controversial or social issues in their classes.

*Flexibility versus inflexibility.* Povey (2002) describes the importance of flexibility in the teaching and learning that happens in the classroom. In discussing successful practices, Povey (2002) notes, “Flexibility and responsiveness to the students are valued and there in an openness to negotiation,” (p.194). Teachers in this study felt they were trapped by the need to follow a textbook curriculum for the duration of the current school year. Ensign (2003) posits that textbooks provide less interest and motivation when the mathematics is not authentic to the students. Teachers interviewed described the rigor and rigidity of the current curriculum lacks the opportunity for open-ended real world applications.

The lack of flexibility within the mathematics curriculum in addition to the lack of flexibility in conceptualizing social justice learning opportunities were stated as challenges to incorporating new pedagogies. Most of the teachers stated that they were not uncomfortable
with the topics that came with social justice they just did not believe that it belonged in a subject like mathematics. They believed that with the limited time and the large curriculum, social justice would be too difficult to add to the curriculum. However, some stated that if it was fully integrated into the curriculum it would be much easier and more likely to be incorporated. Teachers are inexperienced when it comes to social justice teaching in the area of mathematics. They did not have knowledge on how to incorporate this into their mathematics courses, yet some were willing to learn more about it. The open-mindedness of these teachers show that an opening is there for the incorporation of TMfSJ in their classes.

The second research question asks about middle school mathematics teachers’ perception on integrating SJ into the math curriculum. Many of the teachers felt that SJP was much more relevant in other classes such as English or Social Studies. Gutstein and Peterson (2005) posit that “civic courage” termed by Henry Giroux “should be part of all educational settings, including mathematics classrooms” (p. 4). Researchers also found that students would have resist the concept of learning about social justice in their mathematics courses. Harper (2009) recognized that students would ask questions such as “Where’s the math?” and “Why are we talking about race in math class?” (p. 286). Similarly, participants felt that mathematics was not the place for discussing social justice issues and if students heard about this topic in their math class they would be confused. Most teachers made the same statements that students are not used to seeing these topics outside of certain classes. Brantlinger (2013) found that his students had passive and active resistance to the incorporation of SJ in his high school math course. Students made statements such as “this is not what we’re here for” and “you should teach history if you want to discuss politics” (p. 1067). These are the same expectations of resistance participants in this study anticipate facing with their students.
However, like some researchers, a few of the participants did mention that it was something they would like to see in their classes. They would like students to become aware of social justice concepts in all subject areas not just History and English. Some of the participants believed that if it was fully integrated into the curriculum, it would be possible to be taught in mathematics. Through the interviews with teachers, it was discovered that most participants were willing to learn more about SJ and attempt to implement it if they had more information. The lack of knowledge and experience was the key component in not implementing lessons around social justice topics.

**Challenges with Social Justice Teaching**

One of the major barriers to implementing lessons related to SJ was the fact that teachers had never heard of or experienced such ideas prior to this interview. Some of the teachers were really excited to learn more and asked for suggestions for lessons they could implement. They felt that they would need the support of their supervisors in their district in order to integrate TMfSJ fully into their curriculum. This speaks to the motivation and willingness to incorporate new ideas and strategies into their teaching practices. The consensus among teachers was that social justice needs to be completely integrated into the curriculum in order to be successful. Two teachers, April and Derek were very clear about this need. April stated directly, “You have to work a little bit more to figure it out and how to best integrate it in so it doesn’t just look like you’re throwing it in to throw it in.” Derek stated, “It needs to be included into the curriculum not just an add on after the fact.” Most of the teachers believe that it is possible to incorporate they just do not know how. The willingness of teachers to attempt social justice teaching shows that this is something that could be incorporated given the opportunity. Leonard et al. (2010) noted that “to be effective, the approaches [CRP & SJ] require teachers to carefully reflect on,
attend to, and pedagogically plan for the nuances and complexities inherent in concepts such as culture and social justice (p. 261). Teachers in this study seemed willing to utilize these approaches and seemed ready to plan for the complexities that would encompass teaching socially just concepts.

However, the lack of knowledge and experience of utilizing SJP and CRP in the classroom provide many challenges. For one, teachers cannot teach content or context to which they do not have knowledge or experience. One of the biggest challenges that teachers talked about was time. When talking about time this was inclusive of planning time and implementing time, since they have so little of both. They explained that there is a very large curriculum that needs to be taught in such a small amount of time that they rarely have time to incorporate anything that does not directly fit in with the curriculum they are given. In addition, their planning time often consists of other duties and requirements that leaves little room for designing creative lessons that they could all incorporate. After discussing what TMfSJ is, teachers seemed overwhelmed with the idea of planning lessons that could be so deep and take more than one class period. Some mentioned that if they were able to have time to work with their colleagues to plan creative and practical lessons, they would like to try it. They stated that it sounded like a great concept, but it just might not be feasible in their classroom at this point in time. With support and opportunities provided by the district, this however, could become possible in the future.

**Implications**

It is evident that for the participants in this study, TMfSJ was not a clearly defined concept that they were able to integrate into their lessons. Ladson-Billings (2014) explained that teachers have good intentions and those that embrace CRP search for cultural examples
throughout their teaching practices. Some of the participants in this study described evidence of cultural awareness included in their teaching practice. As Ladson-Billings (2014) found in her classroom observations, “they rarely pushed students to consider critical perspectives on policies and practices that may have direct impact on their lives and communities” (p. 78). While participants needed to be given the definition of CRP and TMfSJ, they were overwhelmed by the theories. For many participants, there was a strong belief that math was not the place for such concepts. Although the district is beginning to implement lessons for teachers on CRP, the teachers need time to internalize it and determine how to apply it in their classrooms. Introducing CRP is just a starting point for creating lasting change in the learning and teaching in Chordsville Township. Some participants stated that the professional development needs to provide more practical applications of how to utilize such concepts specifically in the mathematics classroom. Teachers also stated the need for resources in addition to models of how this could be used in their practice of teaching. As discussed, time is a huge factor in learning to incorporate new practices into a curriculum that is already full. Previous researchers have also found that time constraints are real and teachers need resources available to alleviate these time constraints on the planning process (Brantlinger, 2013; Gregson, 2013). Planning time and resources are very limited in Chordsville township according to most teachers in the study. Requiring the use of a textbook limits the resources teachers are allowed to utilize in their classroom. Teachers are hoping that the requirement of implementing the textbook curriculum with fidelity is a temporary process that the district is going through. By providing teachers with resources leading to TMfSJ, it could help them see the ability to incorporate it and change the belief that teaching mathematics is not the place for SJ.
As the theme of *content versus context* emerged amongst participants, it was noted that teachers solely focused on the content when thinking about social justice teaching in their classroom. Nolan (2009) explicitly noted that social justice is part of both the content and context of the mathematics classroom. “Social justice is about what is unsaid, as well as said; about what is absent as well as present” (Nolan, 2009, p. 212). While some teachers mentioned the use of real world mathematics and cultural inserts, others acknowledged the absence of social justice discourse in their teaching. Participants such as April and Sofia strongly felt they brought the culture and lifestyle of their students into the classroom with certain concepts that aligned to practical applications. However, teachers made note to include the fact that politically taboo topics were not discussed at all in their classrooms. Moreover, teachers did acknowledge the social injustice that played a role in Chordsville Township by tracking students into different courses in addition to the lack of discussion focused on social justice issues within their mathematics classrooms. Another theme that emerged from the data, *inclusion versus exclusion*, was also noted by researchers (Appelbaum & Davila, 2007; Klein, 1998; Nolan, 2009) as an important factor in social justice teaching. Teachers in this study stated that teaching with social justice in mind was not “normalized” with their colleagues but is something that should become more popular.

One important idea to convey to teachers is that SJP gives students an opportunity to become part of the solution to injustice, both in their present as a child or teenager and as an adult in their future (Gutstein, 2003). Through rigorous teaching, students can become aware of the world in which they live and how they can be part of the change society needs. Injustices are everywhere; Gau (2005) posits that it is important for students to “identify how those issues connect to their lives, and engage them in purposeful action to challenge those inequitable
structures” (p. 7). Teachers can instill in students the notion that they can become change agents in their society. However, teachers in this study felt strongly that students are not old enough or prepared enough to encounter problems dealing with situations beyond their power or control. They diminished the idea that students have the ability to enact change in the world around them and did not see how they had the ability to participate in the challenges that face their society. By providing teachers with professional development, time and resources they would be more apt to incorporate CRP and TMfSJ into their traditional curriculum.

**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 unusual academic year. Remote learning, or learning from home is taking place in many schools across the country due to the global pandemic. Chordsville Township has been in remote learning since March of the past school year and plans to continue through the current school year. Many teachers are stressed and overwhelmed which led to a low number of volunteers for the study. Teachers are adjusting to a new normal and have many different challenges in front of them, according to their statements. Teachers mentioned connecting with students in the virtual world was extremely difficult and led to challenges implementing creative and engaging lessons. While interviewing teachers, it was clear that many of them had difficulty thinking back to prior years of teaching and were more focused on the current world they were living in, with many struggles in front of them. Many references were made to the difficulty of implementation under current circumstances. Participants struggled with giving examples of different teaching practices they have utilized in prior years due to the stress currently placed in front of them.
In addition to the challenges they were already facing, mathematics teachers in the district are piloting two new textbooks which also present struggles for each teacher. Piloting two textbooks at the same time required teachers to have less support from each other while lesson planning due to having different materials than their colleagues teaching the same grade level. Teachers claimed that they were used to being able to plan as a team and have many different ideas to work with in the past. However, they now had to focus on their own books and could not work as a team in planning what and how to implement lessons. Teachers were told by their supervisor to “implement with fidelity” in response to their new textbooks. These teachers were no longer able to utilize projects and activities that they had previously created which some of them said led to more real world applications for their students. While the new textbooks did make connections to culture and the real world, it was limited in what the teachers were actually able to expand on. Teachers stated that sticking to the textbook curriculum in the way in which it was written held them back from the ability to implement current world issues into their teaching. Participants did describe the textbooks as more advanced and possibly more culturally relevant than they have been in the past in addition to having more material that students can relate to but there is not anything in the books on social justice. A prior mandate of the curriculum was to utilize project-based learning in which teachers would have had the opportunity to find socially just topics to include but that is no longer something they can fit into their schedules.

**Recommendations for Future Research**

The National Council of Teachers of Mathematics (NCTM) standards focus on equity and student engagement with mathematics. Social justice teaching provides student with rigorous engagement and connects mathematics to their lives. Teachers are becoming aware of this, but
they do not know how to apply the integration of social justice teaching in the math content area. Professional development for teachers provides them with an opportunity to learn new pedagogies. Chordsville Township has begun to implement a study of CRP for the teachers that will last throughout the current school year. Teachers will develop a better understanding of how to apply CRP into their classroom on a regular basis. The next step in this process would be to implement professional development specifically for the mathematics teachers in Chordsville Township particular to social justice teaching. A common theme amongst participants was the need for specific examples and lessons to be provided in order for teachers to develop a better understanding of TMfSJ.

An action research study, based on the teachers’ knowledge and perspectives could be developed to provide lesson study to train teachers on how to implement a specific aspect of TMfSJ. Lesson study is a widely used practice utilized to train teachers on how to implement a specific aspect of education. Bartell (2013) created a lesson study to help teachers develop social justice mathematics lessons to implement in their classroom. Bartell’s lesson study was composed of in-service teachers who were taking her college course, a professional development opportunity for teachers would be to work together to develop ideas and lessons to implement TMfSJ. Teachers in this study created lessons and implemented them in their classroom and brought the results back to the lesson study group. Similarly, teachers in Chordsville Township could be provided the opportunity to participate in an activity like this to increase their awareness and experience in TMfSJ.

One major question that emerged from the data is, do teachers feel like they can be agents of change. Another question that developed from the data relate to teachers’ cultural competence. Most teachers did not take ownership of their own cultural competence and placed blame on
students, parents, and supervisors, anyone but themselves. They gave excuses as to why they could not include social justice issues in their classroom. Teachers showed that they distanced themselves from responsibility. A key question is how they conceptualize their job as a mathematics teacher. Professional development opportunities could be created to help teachers conceptualize social justice and then discuss how it could be incorporated in mathematics. Future studies might look at where teachers currently are in own cultural awareness and where they need to be.

An exploration of the curriculum that is utilized in Chordsville township is another way to determine the practicality of integrating social justice into the mathematics courses that are taught. Both teachers (April, Derek, Christina) and researchers (Bartell, 2013; Gutstein, 2003; Nolan, 2009) believe in the need to fully incorporate social justice topics into the curriculum in order to be successful at TMfSJ. Revisions to the curriculum would include social justice topics and activities inclusive of the content required by the district. Participants described that teachers in Chordsville Township are part of the curriculum writing team each summer. Each summer the curriculum is looked at and revised based on the necessity of incorporating different topics, changing the order of the lessons or just fine tuning the areas that need to be adjusted. These teachers have the opportunity to incorporate social justice concepts into the curriculum as they rewrite it. Studying what is already written into the current curriculum and exploring the world of TMfSJ, teachers can become more knowledgeable and therefore more likely to use this in their classes. If it is fully incorporated teachers would not only have the ability but become required to include TMfSJ in their classes on a regular basis. Teachers need this opportunity to provide them with the support and recommendations of people who are knowledgeable on the subject. By working with researchers in an action research study, the curriculum writers can find
areas to include social justice topics when working on curriculum revisions. Supporting these teachers is the most important thing the district, especially the supervisors, can do to assist the teachers in entering the world of social justice teaching.

Part of learning to teach and the application of teaching social justice is part of a continuous journey and not a one-time lesson for teachers to utilize. Teachers will face challenges as they attempt to negotiate the world of social justice teaching. For this reason, lesson study and consistent support from both peers and professionals or researchers could assist teachers in becoming successful with TMfSJ. Multiple studies have been completed about lesson study around TMfSJ with all K-12 pre-service and in service teachers. Providing the teachers in Chordsville Township the resources, time and opportunity to participate in a group lesson study amongst their peers would enhance the likelihood of successfully implementing social justice teaching across the entire math department.

**Conclusion**

A thorough review of the literature has shown that there is an inequity in current mathematical practices. Researchers (Frankenstein, 1990; Gonzalez, 2009; Gutstein, 2003, 2006, 2012; Nolan, 2009) have recommended TMfSJ as an opportunity to bridge the equity gap in student learning and active engagement. Students would be able to engage in a variety of practices that would give them the ability to see critical mathematics from a different lens. Using this theory, along with the research study completed, teachers would benefit from professional development on how to incorporate SJP in their mathematics classrooms in order to become teachers for social justice. Teachers stated they would be willing to participate if they knew more about it and how to implement it leading into the need for professional development. This beneficial professional development would include practical examples for teachers on how
to implement TMfSJ in their classrooms. Knowledge would give them more of an opportunity to provide this type of education to their students.

Providing teachers with knowledge and then time to implement would lead to success for both teachers and students alike. Students would benefit from TMfSJ especially the largely marginalized population that is in this town. As teachers stated, it would make them better citizens and more socially aware of the world around them. It would produce more critical thinkers which is one of the main goals teachers of mathematics strive for today. Students' interest rate in mathematics will increase which will lead to more student success. With professional development that is practical, teachers will be more comfortable teaching around these topics and students would have an increased chance to thrive.
References


Appendix A: Interview Protocol

I am interviewing teachers to explore the middle school math teachers' experience and perspectives at Franklin Middle School about integrating social justice into the mathematics curriculum using culturally relevant teaching.

I am looking for teachers to describe their perspective of what mathematics teaching in Franklin Middle School looks like and/or can look like based on district guidelines and curriculum.

This interview is a look into the teacher’s perspectives of mathematics within the middle schools. The interview should last for about 30-60 minutes. With your permission, I would like to tape-record the interview. Your participation in this study is completely anonymous and all responses are confidential. Your name, identity and place of study will not be recorded. In order to remain anonymous, the name of the school and township have been changed. Your name will not be mentioned. If there are any questions that you would rather not answer please feel free to say you wish to skip the question and move on to the next question. You are free to remove yourself from this study at any point in time.

1. Tell me what it’s like to be a middle school math teacher in Franklin Township.
2. How long have you been teaching?
3. Can you describe what a day in your classroom looks like?
4. What are the different class structures you have throughout your day like?
5. Are there other times in the school day that you communicate or interact with students outside of your classroom?
a. What are those experiences like?

6. Can you give me a particular instance in your classroom where students’ experiences from their world outside of school were encompassed in a mathematics lesson?

7. Can you tell me some of your experiences teaching math to students from different backgrounds and cultures?
   a. Are there different teaching styles you need to adjust for students from different cultural backgrounds?
   b. Are there anything you would like to learn/change about teaching different students?

8. Are you familiar with Culturally Relevant Pedagogy?
   a. What is your understanding of CRP?
   b. Have you incorporated CRP into your classroom?
      i. How?
   c. Are there challenges of incorporating CRP into your classroom?
      i. What are they?

9. There are three key domains of Culturally Relevant Pedagogy: students must achieve academic success, develop or maintain cultural competence, and develop sociopolitical consciousness (Ladson-Billings, 1995, 2014).
   a. How do you determine if ALL students are achieving success and intellectual growth in your classroom?
   b. Cultural competence is defined as “the ability to help students appreciate and celebrate their cultures of origin while gaining knowledge of and fluency in at
least one other culture” (Ladson-Billings, 2014, p. 75). How is your cultural competence shown in your classroom?

c. Sociopolitical consciousness can be defined as “taking the learning from the classroom and using it to solve real world problems.” How is this applied in your classroom?

d. Are there other ways CRP is incorporated into your mathematics class?

e. Is this something you would incorporate in your classroom?

f. Do you notice any challenges that prevent you from using this?

10. Are you familiar with teaching math for social justice?

   a. What is your understanding of TMfSJ?

   b. How do you incorporate TMfSJ into your classroom?

   c. Are there challenges of incorporating TMfSJ into your classroom?

11. Teaching Math for Social Justice (TMfSJ) is the role of mathematics in preparing active and engaged citizens in a democratic society; using mathematics to understand, question and effect change in our world.

   a. How do you feel about this idea?

   b. Do you feel comfortable about teaching around this topic?

       i. Have you used real world situations that are everyday or career related topics?

       ii. When you teach math do you make connections to controversial issues? (cost of war on drugs, government spending, funding for schools, climate change)
iii. When you teach math do you make connections to issues of injustice?
   (animal cruelty, deaths from preventable diseases, racism, classism)

c. Can you tell me if the current mathematics curriculum allows for this?
d. Do you feel the district would support this in your classroom?
e. How would this benefit your students?
f. (Why or why not to any of these?) – ask in between each question as necessary

12. What are the strengths and weaknesses of the current mathematics curriculum?
13. What are common misconceptions students have about the importance of mathematics?
   What are the misconceptions students might have of their abilities in mathematics?
14. How do you as a teacher try to challenge students’ misconceptions of their notion of mathematics?
15. Are there different kinds of student groups at Franklin Middle School at SGS Campus?
   a. If so – do these students have different requirements/needs from a teacher standpoint?
   b. How are you able to reach all students?
16. Is there anything else you would like to tell me?
Appendix B: Board Approval Letter

To: The Board of Education,

I am writing this letter to ask permission to perform a study to complete my dissertation at Chordsville Township Middle School. I am currently teaching 7th and 8th grade title 1 math and am in my 9th year in the district. I am working on my Doctorate degree at Rutgers University and in my 3rd year. For my dissertation I have chosen to study teachers perspectives on integrating social justice and culturally relevant pedagogy into mathematics courses in middle school. The title of the study is “Integrating Social Justice and Culturally Relevant Pedagogy into Mathematics.” My project will consist of interviewing ten(10) to twenty (20) teachers. I will provide each participant with a consent form prior to participation in the study. If the board chooses to grant permission please sign the attached letter and return to me to submit with my IRB (Institutional Review Board) application.

Thank you for your time.

SINCERELY,

ERICA M. BIALICK, M.Ed
Appendix C: Teacher Recruitment Email

Dear teacher of mathematics at FMS,

I am a colleague of yours at FMS and am conducting a study for my dissertation at Rutgers University on integrating social justice into mathematics. Your principal or supervisor thought you might be interested in my study. My goal is to have 15-20 participants from our middle schools participate in one 30-60 minute recorded interview to learn about what is happening in the middle school mathematics classrooms. I would like to hear what you believe you are doing that is successful and what challenges you face when applying culturally relevant pedagogy and social justice pedagogy into mathematics to bridge the gap for these learners. If you would like to provide 30-60 minutes of your time it would be greatly appreciated. I will conduct your interview via zoom, a virtual platform. Please let me know if you are interested by returning an email to me with the information below.

Name: ___________________________
Grade level taught: _________________
School: __________________________

Sincerely,

Ms. Erica Bialick, M.Ed
Appendix D: Consent to Take Part in a Research Study

**TITLE OF STUDY:** Integrating Social Justice into Middle School Mathematics

**Principal Investigator:** Erica Bialick, M.Ed

**STUDY SUMMARY:** This consent form is part of an informed consent process for a research study that will provide information to help you decide whether or not you want to participate. It is your choice whether or not to participate. The purpose of the research is to gauge teachers’ beliefs and attitudes toward these ideas. This research is designed to identify the notion that teachers carry about what is currently happening in the classroom and the possibility for growth or change. Your time in the study will require a 30-60 minute interview. Your alternative to taking part in the research study is not to take part.

The information in this consent form will provide more details about the research study and what will be asked of you if you choose to participate. If you do choose to participate, and questions arise now or during the study, you should feel free to ask them and should expect to be provided with answers you completely understand. Upon all of your questions being answered, and your desire to take part in this research study, you will then be asked to sign this consent form. You are not giving up any of your legal rights by agreeing to take part in this research.

**Who is conducting this research study?**
Erica Bialick is the Principal Investigator of this research study. A Principal Investigator has the overall responsibility for the conduct of the research. However, there are often additional individuals that make up the whole research team.

Erica Bialick may be reached at 908-415-1250 or 1679 Amwell Rd. Somerset NJ, 08876

**Why is this study being done?**
The goal of this study is to see what the teachers’ perspectives are of the current student needs and how the curriculum is reaching those needs. I hope to see what the teachers feel is necessary to assist their students to better adapt to real world mathematics. I will be seeking information on what the teacher is doing, and not doing, to connect with the students. I will be specifically looking for areas where there is room to integrate social justice into the curriculum. Additionally, the goal includes gathering further information and insight into the teachers lived experience with what they feel is happening in their classroom, and their current challenges with their students.

**Who may take part in this study and who may not?**
6th, 7th, and 8th grade math teachers may take place in this study.

**Why have I been asked to take part in this study?**
You have been asked to take part in this study because your supervisor recommended you as a teacher who would be open to trying something new in your practice.

**How long will the study take and how many subjects will take part?**
The study will take place for about 4 weeks with participation from 10-20 teachers.

**What will I be asked to do if I take part in this study?**
You will be asked to participate in one interview.

There are no alternative treatments available. Your alternative is to not take part in this study.

**How will I know if new information is learned that may affect whether I am willing to stay in the study?**
During the course of the study, you will be updated about any new information that may affect your willingness for continued participation. If new information is learned that may affect you after the study, or when your follow-up is completed, you will be contacted.

**Will I be paid to take part in this study?**
You will not be paid to take part in this study.

If you have questions about your rights as a research subject, you can call the IRB Director at: New Brunswick/Piscataway ArtSci IRB (732)235-2866 or the Rutgers Human Subjects Protection Program at (973) 972-1149.
AGREEMENT TO PARTICIPATE

1. Subject consent:

I have read this entire consent form, or it has been read to me, and I believe that I understand what has been discussed. All of my questions about this form and this study have been answered. I agree to take part in this study.

Subject Name:________________________________________________________

Do you (verbally) consent to participation?______________ Date:____________

2. Signature of Investigator/Individual Obtaining Consent:

To the best of my ability, I have explained and discussed all the important details about the study including all of the information contained in this consent form.

Investigator/Person Obtaining Consent (printed name):________________________

Signature:______________________________ Date:________________________
Appendix E: Consent to Recording Addendum

CONSENT TO AUDIO-/VISUAL RECORDING OR PHOTOGRAPHY SUBJECTS ADDENDUM

You have already agreed to take part in a research study entitled: *Integrating Social Justice into Middle School Mathematics* conducted by Erica Bialick, M.Ed. We are asking for your consent to video and audio record the virtual interview as part of the research. You do not have to consent to be video recorded in order to take part in the main research—however, audio recording is mandatory for participation.

The audio recordings will be used for analysis by the research team. The video recordings will be destroyed immediately following the transcription of the interview.

The recordings include the following information used for subject identification: gender, home-school. Pseudonyms will be used in place of your name for anonymity purposes.

The recordings will be stored on a locked drive labeled with your pseudonym to protect your identity, and then destroyed upon completion of the study.

Your signature on this form permits the investigator named above to record you, as previously described, during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason other than what is stated in this consent form without your written permission.

AGREEMENT TO BE RECORDED

Subject Name (Print):____________________________________________________________

Do you (verbally) consent to participation? ________________ Date ________________

Investigator/Person Obtaining Consent Name (Printed):___________________________________

Signature ________________________________________ Date ______________________