

TEACHERS' EXPERIENCES WITH TEACHING FOR SOCIAL JUSTICE IN
TRACKED MIDDLE SCHOOL MATHEMATICS CLASSES

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ABSTRACT

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Stephanie Jean White

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Tracking is a longstanding structure in K-12 mathematics that decades of research has shown to be inequitable. Despite calls to detrack mathematics classes, most U.S. schools retain tracking. Mathematics educators have attempted to implement teaching pedagogies such as Teaching for Social Justice (TSJ) that promote equity in all mathematics classrooms, including tracked classes. This research used the Learning to Teach for Social Justice Belief (LTSJ-B) Scale with middle school mathematics teachers who have taught in tracked classes to measure their levels of commitment to TSJ. This research also employed case study methodology with three teachers and cross-case analysis using TSJ and Critical Race Theory frameworks to describe how teachers who tended to endorse TSJ pedagogy (a) described their enactment of TSJ pedagogy, and (b) their perceptions of how well they could create more equitable learning experiences for students. Data included survey and demographic responses, lesson plans, and interviews. Case study analyses revealed individual teachers' attempts to enact TSJ pedagogy and their perceptions about equity. Although the teachers described varied ways of enacting TSJ pedagogy, they all felt their classes were equitable. Teachers' descriptions of their experiences also revealed some inconsistencies between their survey responses and their reported practices. The results suggest that teachers who tended to endorse TSJ

conceptualized TSJ and equity differently, but collectively, they wanted to empower students. Also, the teachers who described enacting TSJ pedagogy in their everyday practices instead of in isolated lessons enacted TSJ pedagogy more consistently. Findings based on teachers' perceptions suggest that though TSJ pedagogy might foster equity within classes, TSJ pedagogy did not seem to mitigate the inequities between tracked levels. Teachers in this study described perceived barriers to creating equitable learning experiences for students such as time and required mathematics content coverage. This study has implications for mathematics teacher education and research such as a need to consider how TSJ might be used to create equitable teaching across tracks and that all teachers, including those who endorse TSJ pedagogy, might benefit from additional training on TSJ pedagogy.

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CHAPTER 1 INTRODUCTION

This study aims to examine how well teachers' descriptions of Teaching for Social Justice (TSJ) work in tandem with tracked middle school mathematics classes to create more equitable learning environments. In the following sections, I provide the study rationale to establish a need for this research and what this study offers.

Tracking

Longstanding structures in mathematics education persist in denying some students access to learning opportunities while affording others access (Boaler et al., 2000; Ekstrom & Villegas, 1991; Hallinan, 1996; Hughes, 2020). Once viewed for its economic utility (Becker & Perl, 2003), mathematics was only taught to those perceived to need higher level content by school personnel (e.g., teachers, counselors). When honors mathematics courses were created, tracking became part of typical educational structures to create a mathematics elite. Due partially to a lack of resources, then-segregated schools were unable to create honors courses, contributing to racial disparities in access to higher level mathematics. Tracking, defined in this study as systematic, homogeneous, between-class ability grouping, is most often determined by standardized testing and results in labels for students based on perceived abilities (Ellis, 2008; Gutiérrez, 2013). Tracked classes often result in separations on race and socioeconomic status (Boaler, 1997). Some suggest that tracking is an inequitable, racist structure that has maintained a “racial hierarchy of mathematical ability” (Martin, 2009, p. 315), and assumes Black and Latinx¹ students are not as capable in mathematics. Such tracking

¹ I use Black and Latinx throughout although cited works may use other terms such as African American or Hispanic.

may prioritize learning for those granted access and thus pace particular students toward more mathematics opportunities.

According to data from the National Assessment of Educational Progress (NAEP, 2009), tracking in mathematics is prevalent in the United States, with states homogeneously grouping an average of 75% ($SD = 34\%$) of twelfth grade students in mathematics. NAEP data shows that schools largely have not made shifts toward detracking because U.S. schools tracked 73% of eighth grade mathematics students in 1991 (NAEP, 1991) and 74% of eighth grade students in 2015 (NAEP, 2015). In the United States, tracking structures in mathematics remain common, with some states reporting tracking 50% of eighth grade students (i.e., Texas) and others tracking up to 97% of eighth grade students (Florida) (NAEP, 2015).

Recently, the National Council of Teachers of Mathematics (NCTM) recommended detracking mathematics classes across all grade levels in their *Catalyzing Change* series (NCTM, 2018, 2020a, 2020b), citing significant literature and research (e.g., Boaler, 2006, 2011; Loveless, 1998, 1999; Oakes, 2005) on the racist nature of tracking (e.g., Boaler, 1997; Loveless, 1998; Martin, 2003; Oakes, 1990, 2005; Oakes et al., 1997; Oakes & Guiton, 1995). Within tracking, Black and Latinx students are disproportionately placed in lower tracks with less experienced teachers (Argys et al., 1996) and afforded less access to quality instructional practices (Oakes, 1990). Racism, as a sociopolitical construct, is not only evident in school structures but also in experiences students have in their mathematics classrooms. Black and Latinx students co-construct and negotiate their racial and mathematical identities (Martin, 2009), and tracking perpetuates negative identities among these student groups when they are in

lower tracks (Boaler & Greeno, 2000). Lipton and colleagues (2006) posited that with debates over tracking, the powerful elite (in terms of parents and school officials) typically win in retaining the status quo despite researchers identifying flaws in tracking students. Thus, changing tracking structures becomes difficult. Though dismantling a racist structure such as tracking may be complex, “structural arrangements and practices that give rise to racialization processes” (Martin, 2009, p. 324) should be examined.

Another problem that exists with tracking is student immobility between mathematics tracks. NAEP (2015) data shows such immobility when students leave eighth grade. Just 16% of schools move more than 25% of students to higher levels in mathematics in ninth grade. Morton and Riegle-Crumb (2019) suggested that mathematics track immobility created another negative impact on students through sustained racial disparities in opportunities to learn and reproduced inequities. Immobility between tracks becomes most problematic in middle school (Morton & Riegle-Crumb, 2019). The Association for Middle Level Education’s position statement in *The Successful Middle School: This We Believe [TWB]* (Bishop & Harrison, 2021) called for middle level education to be responsive, challenging, empowering, equitable and engaging (p.8). This means that instructional choices should be made to support all learners regardless of where they are developmentally, making tracking inappropriate for middle school students. Berry (2008) also suggested focusing mathematics education research specifically on middle schools. He argued that because middle school content is formative in preparing students for future opportunities in mathematics, we need to be more purposeful in concentrating on the unique issues that face middle school mathematics students.

There are examples of detracking in mathematics with positive student outcomes (e.g., Boaler & Staples, 2008; Burriss et al., 2006; Moses et al., 1989), yet schools and districts retain tracking policies. Prominent scholars such as Oakes, Martin, and Ladson-Billings as well as Tate (1995) published research, and organizations such as NCTM and TODOS: Mathematics for ALL (n.d.) published recommendations, suggesting the negative effects of tracking. Oakes and colleagues (1997) detailed the multipart political nature of detracking as a “highly normative and political endeavor that confronts deeply held cultural beliefs, ideologies, and fiercely protected arrangements of material and political advantage in local communities” (p. 506), and stated schools attempting to detrack may need to make dynamic shifts. Recently, California took a step toward detracking when rewriting their *Mathematics Framework* (California Department of Education, 2021) by formally recommending detracking so that “all students [...] regard mathematics as a subject they can study and in which they belong” (Ch. 7, p. 66). However, the proposal in California has been controversial (e.g., Meckler, 2021) with, for example, parents of high-achieving students opposing detracking because they fear it will lower educational experiences for their children. Although states like California have encouraged detracking, they have not mandated detracking. U.S. policy shifts regarding tracking have not been undertaken. Therefore, it is important to continue studying the effects of tracking so that administrators from more individual schools might consider instituting detracking policies.

In addition to sociopolitical considerations associated with tracking, removing such an established structure is multifaceted because schools may handle tracking differently. To detrack successfully, research by Rubin (2008) advised that schools should

consider not only the tracking structure itself, but classroom teaching practices, teacher and student supports and resources, and changes to belief systems. Given the complexity, schools may focus on just one part of the overall issue—implementing equitable teaching practices in individual classrooms to improve students’ experiences and learning opportunities in mathematics (e.g., Bieda & Staples, 2020; Civil, 2002; Gardee, 2019; Ladson-Billings, 2009). At the classroom level, mathematics teachers may work toward equitable instruction to counteract negative outcomes from tracking. As suggested in Hughes (2020), teachers’ perspectives on and experiences with ability grouping can be complex and play a role in impacting school and student outcomes. Teachers’ perceptions about students may also affect their abilities to enact equitable teaching practices (Yurekli et al., 2020). Teachers can provide insights as to the efficacy of enacting equitable teaching pedagogy within an inequitable structure such as tracking.

Teaching for Social Justice

One way in which teachers might enact more equitable instruction is through Teaching for Social Justice (TSJ) pedagogy. TSJ is a “coherent and intellectual approach to the preparation of teaching that acknowledges the social and political contexts in which teaching, learning, schooling and ideas about justice have been located historically as well as acknowledging the tensions among competing goals” (Cochran-Smith, 2010, p. 447). There are several goals of TSJ: the creation of safe experiences for students, both physical and psychological; recognition of and respect for students; and equitable distribution of resources (Bell, 1997). TSJ is asset-based—viewing students as resources based on their diverse funds of knowledge, including household as well as mathematical- and community-based knowledge (Moll et al., 1992). TSJ moves beyond implementing

certain methods or classroom activities to acknowledging and addressing the social and political contexts of teaching and learning to focus on how teachers consider their roles in and out of school (Cochran-Smith, 2010). Research by Joseph and colleagues (2019) argued that when mathematics teachers reconsider their role and release authority to students to normalize students' success, such a shift is particularly productive for Black girls. TSJ practices, such as discourse, may also help students engage differently in mathematics to see themselves as mathematical authorities (Harper & Kudaisi, 2023). For students who have been held back by tracking, more engaging content might come in the form of contextually-relevant mathematics to help students see themselves within mathematics (Wilson et al., 2019). TSJ challenges racial color-blindness in teaching and places students central to instruction and part of the "solution to injustice" (Gutstein, 2003, p. 39). Personalized learning is inherent in TSJ because it involves commitment to creating learning experiences tailored to students' needs (Ferguson & Ralph, 2001).

As shown through NAEP data, tracking still permeates mathematics education and, thus, works against the goals of TSJ because of the racial inequities tracking creates. Tensions may exist between the goals of TSJ and the focus in schools to prepare students for success defined by grades and standardized testing, which reinforce racial disparities (Ellis & Berry, 2005; Gutiérrez, 2013). Because attempts toward TSJ pedagogy will likely be situated within tracking, the two might work in contradiction. This possible tension presents a need to better understand how equitable teaching initiatives work in tandem with tracking structures. Harper (2019) called for more microlevel research to explore complex inequitable structures such as tracking: "In particular, more research is necessary to help teachers navigate the paradoxical space of schooling that both

perpetuates racism and promises hope for social justice” (p. 305). Classroom-level research with teachers can consider perspectives on the experience of teaching in tracked classes and teachers’ capacities to enact more equitable practices such as those in TSJ pedagogy.

Teacher Beliefs

In this study, beliefs are “psychologically held understandings, premises, or propositions about the world that are thought to be true” (Philipp, 2007, p. 259). Thompson (1992) asserted that teacher beliefs played a role in how teachers enacted instructional practice and suggested that researchers focus on the relationship between teacher beliefs and instructional practice. Teacher beliefs can fall along a spectrum and focus on varying topics. For example, Hughes (2020) concluded that teacher beliefs vary in terms of expectations for students across mathematics levels. Then, he suggested that future research is needed to connect school culture or policy with teacher beliefs and practices to investigate how the two might influence each other. Classroom-level research may reveal nuances in relationships between schools and teachers’ practices and how teachers navigate their beliefs and school policies. In this study, I focused on beliefs about TSJ pedagogy as developed by Enterline and colleagues (2008) as well as Cochran-Smith and colleagues (2009, 2010, 2012). With a significant focus on pre-service and novice teachers, they argued the importance of conceptualizing and studying teacher beliefs about TSJ. To expand such research, others have studied teacher beliefs and TSJ with more experienced teachers. These researchers suggest that teacher beliefs in enacting TSJ pedagogy had positive student outcomes such as for student agency (Gonzalez, 2009), and teacher beliefs may differ based on school demographics and

location (Evans, 2013). In this study, I will focus on teacher beliefs related to TSJ in conjunction with tracking policies to study how in-service teachers with a stronger tendency toward TSJ enact such pedagogy.

What this Study Offers

Decades of acknowledging the negative outcomes of tracking have not led to broad change in tracking policies. Because no two schools are the same, local perspectives are important for considering each school's contexts. Research with middle school teachers who are active in the classroom can inform school officials about how tracking manifests racist disparities within their schools and affects their student populations. Research is also needed about how TSJ can or cannot be used to fruition when situated within tracking. In this research, I examined teachers' descriptions of their experiences in tracked classes and their perspectives on how well they could create equitable learning environments. This study offered insight into teachers' understandings about TSJ in mathematics and its efficacy within tracked classes to potentially improve learning opportunities for Black and Latinx students.

Studies on both teachers' experiences teaching in tracked classes (e.g., Abu El-Haj & Rubin, 2009; Gutiérrez, 1994; Horn, 2006) and teachers' beliefs about and enactment of TSJ (e.g., Cochran-Smith et al., 2012; Evans, 2013; Gonzalez, 2009; Reagan et al., 2016) have been conducted. Bartell and colleagues (2017) called for studies that connect policy, research, and practice (p.16). More recently, researchers have compared tracking versus detracking and teacher beliefs (i.e., Hughes, 2020) and explored relationships between tracking and teaching practices (i.e., Cheng & Dimmock, 2022). This study adds to existing research by considering teachers' perceptions about how tracking and TSJ

pedagogy, one considered a policy and the other a teacher practice, work in tandem. Also, this study measured beliefs about TSJ for in-service middle school classroom teachers who may or may not have had direct training on TSJ ideals and pedagogy to extend the study of TSJ pedagogical enactment beyond pre-service and elementary teachers (e.g., Evans, 2013; Lazar, 2016; Reagan et al., 2016). This study was guided by the following research questions:

Research Questions

- For middle school mathematics teachers who have taught in tracked classes, what are their levels of commitment to Teaching for Social Justice (TSJ) pedagogy?
- For those middle school mathematics teachers who tend to endorse TSJ pedagogy, how do they describe their attempts to enact TSJ pedagogy across tracked classes?
 - What are teachers' perceptions of how well they use TSJ pedagogy to create more equitable learning experiences?

Study Overview

This study was mixed-methods in design and combined survey methods and document analysis with interviews for case study analysis. In-service classroom middle school mathematics teachers responded to surveys to measure their beliefs about teaching for social justice. These teachers all taught in schools with tracking policies in mathematics. The survey was used to select teachers for interviews and lesson plan analyses. Data from the survey, document analysis, and a series of interviews were used to provide insight into teachers' levels of commitment to TSJ in mathematics and teachers' described experiences with enacting TSJ pedagogy.

This dissertation is comprised of five chapters. This chapter detailed the purpose of the study, arguing for its need within the context of related work. Chapter two provides a literature review on tracking and teaching for social justice, which led me to consider this research. Chapter two also includes a discussion of the conceptual and theoretical frameworks that guided my analysis for this study. Chapter three presents the research methods to outline the research design, selection criteria, participants, data sources, and analysis for this study. The final two chapters detail the study's results, implications, and conclusions along with recommendations for future research.

CHAPTER 2 LITERATURE REVIEW

The purpose of this study was to describe teachers' perceptions about how well equitable teaching pedagogy, specifically Teaching for Social Justice (TSJ), can be enacted within tracked mathematics classes to create equitable learning experiences for students. In the sections that follow, I first detail findings from research in K-12 mathematics education around tracking. Although my research focused on the middle school setting, I sought out research related to tracking between classes in mathematics at all levels to present a diverse selection of how tracking has been researched across grade levels. The literature includes research around retaining tracking as well as dismantling tracking. Then, I focus on teacher beliefs about enacting reform pedagogy such as teaching heterogeneous classes and TSJ. I briefly discuss TSJ in the larger context of equitable pedagogy before reviewing literature on what is considered TSJ pedagogy. The Principles and Criteria of TSJ described in the review served as a conceptual framework for my study. The literature review ends with what is known about Critical Race Theory (CRT) and how CRT guided my research. Because CRT applies to many areas of research, my review focuses on CRT in K-12 education research with particular attention to its use in mathematics education research. From this body of research, I also discuss limitations of the research while identifying gaps for which more research is needed. The findings from and gaps in the existing research helped to inform and direct my study and

allowed me to intentionally situate my study in extant literature while advancing the research.

Tracking and Detracking

Tracking has been controversial since the 1980s, while periodically moving to the forefront of equity discussions. Research on tracking can be traced to both opponents and proponents, which led to ‘tracking wars’ (Loveless, 1999) over whether to retain tracking structures. Researchers studied tracking at all levels of K-12 schooling and in various subjects to evaluate its efficacy for different groups of students. Most of the extant literature explored the pitfalls of tracking; there were fewer studies around how well tracking serves students. There was particular focus on tracking in mathematics because it is the most tracked subject in K-12 schools (Loveless, 2013).

How Students are Tracked

Two popular ways of tracking students by ability are ability groups within classes and ability groups between classes (Slavin, 1987; Loveless, 2013). Ability groups within classes often occur in elementary schools where this form of grouping is more common than in middle or high school grades (Loveless, 2013). In elementary grades, teachers may group students by mathematics or reading levels based on students’ performance on standardized assessments. Ability grouping is often understood to take place within classrooms and is decided upon by teachers (Slavin, 1987). Although some researchers use the terminology of “ability grouping” and “tracking” synonymously, tracking refers to ability grouping between classes (Loveless, 2013). Such tracking places students on tracks throughout schooling based on students’ perceived abilities and can take place in

any grade, although tracking is more prominent in middle and high school (Gamoran, 1992; Loveless, 2013).

Tracking policies can be formal or informal and instituted at classroom, school, district, or state levels (Kulik, 1992). Tracking structures are multidimensional, with schools varying in dimensions such as curriculum (e.g., differentiation between tracks) or tracking practices and scope (Domina et al., 2016). Although tracking may appear as a simple sorting structure that places students into low, medium, and high ability groups, school structures, classroom practices, and teacher beliefs can influence the complexity of tracking structures (Rubin, 2008). There are questions regarding the efficacy of detracking due to its complexity because there are aspects of school such as social barriers between diverse student groups that continue to affect and position students even after detracking (Rubin, 2003).

Heterogeneous vs. Homogeneous Classes

Mathematics education literature around tracking does not always use the term “tracking” (e.g., Collins & Gan, 2013; Hoffer, 1992). Instead, literature sometimes refers to sorting students to create heterogeneous or homogeneous groups by perceived student ability. Heterogeneous classes are those that are not tracked by abilities, and homogeneous classes are those that are tracked by abilities between classes. Homogeneous mathematics classes are typical in U.S. schools (Ansalone, 2006). The debate plays out in literature over which situation best serves mathematics students.

Historically, as public high school student populations grew and became more diverse, school officials saw the need to sort students to deliver higher level mathematics content to those students who they perceived needed such knowledge for their careers

(NCTM, 2003). Attention was on the benefits of homogeneous grouping for students deemed to need more mathematics knowledge and simply providing sufficient mathematics content to other students. Educators thought separating out the top mathematics students was the best way to serve those students who tested well or who were planning careers that involved mathematics. Also, the advent of intelligence testing created a means for sorting students based on scores. Tracking students based on test scores became common and was an efficient way of creating what educators felt were homogeneous groups of students in mathematics (Ellis & Berry, 2005; NCTM, 2003). There is some recent research that suggests all students can improve their test scores in homogenous groups (Collins & Gan, 2013).

Most middle and high school teachers have tracked classes in the United States (NAEP, 2015). Proponents of tracking argued that teachers preferred homogeneous groups because planning and delivering instruction was easier with less academic diversity in the classroom (Ansalone & Biafora, 2004; Boaler, 1997; Kulik, 1992; Oakes, 2005). Teachers claimed it was too difficult to teach heterogenous mathematics classes (Loveless 1999, 2013), or they may not have had the teaching abilities to deal with classes of diverse learners (Ansalone & Biafora, 2004). Therefore, by tracking students, the intention is that teachers may be able to better cater instruction between levels if there is less student academic diversity at each level.

There is evidence that supports conclusions that homogeneous grouping, namely tracking, benefits all students, not just students in higher tracks (Figlio & Page, 2002). Student outcomes such as failure rates may change when tracking structures change. When Chicago schools shifted to a detracked structure that provided college preparatory

mathematics for all ninth graders in 1997, failure rates increased among students previously considered to be in the lowest ability groups (Allensworth et al., 2009). Such resulting failure rates could put students at a higher risk for dropping out of school. In a more recent study of student achievement data in Massachusetts spanning from 1991 to 2009, data supported tracking because schools with tracking had more success on state tests for mathematics than detracked schools (Loveless, 2009b). Research suggested tracking may be effective for all students if tracking policies and procedures improve (Hallinan, 1994).

Not all educators, however, agree that homogeneously tracked groups help all students. Homogeneous classes are more common than mixed-ability classes, and educators may view heterogeneous classes as an educational reform. Educators and administrators in metropolitan schools with more racial and socioeconomic diversity tended to be more willing to employ heterogeneous classes by detracking (Loveless, 2009). Detracking alone, though, may not be enough to improve student outcomes in mathematics. Researchers agreed that to improve student outcomes in heterogeneous classes, schools also needed to support teachers with training on teaching mixed-ability classes (e.g., Horn, 2006). Also, schools with a shared vision in favor of heterogeneous grouping among staff, school community, and students might make implementation more successful (e.g., Boaler & Staples, 2008).

Tracking Considerations for High-Track Students

Tracking can produce varying results for high-track students depending on the measured outcome. In elementary classrooms, teachers may be able to teach more content in higher tracks than in lower tracks (Ansalone & Biafora, 2004). Student outcomes such

as conceptual understanding, however, may be negatively impacted by tracking. When students were tracked higher, some educators posited that students tend to be pushed through content quicker than intended, potentially diminishing conceptual understanding (Boaler, 2016).

When focused on test scores, there exists evidence that homogeneous grouping can improve mathematics achievement for students placed in the highest tracks across various grades (Gamoran & Mare, 1989; Kulik & Kulik, 1982). Those who wanted to keep students tracked feared that changes would impede the progress of advanced students (Loveless, 1999, 2013). Some tracking research supports tracking for high-track students by showing the negative effects on these students when tracking was not in place. Achievement declined for some high-track students when educators placed high-track students in heterogeneous classes (Argys et al., 1996). Using an estimation function on data from the National Educational Longitudinal Study of 1988, researchers predicted that high achieving students' achievement would fall if placed in heterogeneous classes (Argys et al., 1996). In that same analysis, estimated achievement for lower performing students would increase in heterogeneous classes. These data represented estimates if students were to be placed in heterogeneous classes and not what actually happened to achievement. Although this estimation suggested the achievement gap between high-track and low-track students may narrow with heterogeneous classes, the analysis also suggested the achievement gap would change by decreasing the achievement of students who were high achieving.

Tracking is Inequitable

There is substantially more research about the inequity of tracking than about the positive impacts of tracking. Research indicated that tracking disproportionately places Black and Latinx students in lower tracked mathematics classrooms (Boaler, 1997; Loveless, 1998; Martin, 2003; Oakes, 2005, 1990). Oakes (2005) argued that “poor and minority students are most likely to be placed at the lowest levels of the schools’ sorting system,” potentially contributing to systemic racism in mathematics education (p. 67). Oakes’ research shed light on the inherent racial inequities in tracked classes and spurred more interest into researching how groups of students are sorted and the access students have to higher level mathematics. Subsequent research supported that Black and Latinx students were less likely than other students to enroll or achieve in algebra in middle school (Faulkner et al., 2014; McCoy, 2005; Morton & Riegle-Crumb, 2019; Paul, 2005), which led to disproportionate access to and enrollment in higher level courses in high school. Black students’ odds of enrolling in eighth grade algebra were statistically significantly lower than the odds for other students (Spielhagen, 2006). In high school, Black students tended to enroll in lower mathematics tracks and were less likely to enroll in mathematics their senior year compared to White students (Hallinan, 1996).

After students are placed in tracks, they often experience immobility between tracks, which can disproportionately affect students in lower tracks. Because disproportionately more Black and Latinx students are placed into lower tracks, they may be more likely to experience immobility between tracks, and racial disparities in opportunities to learn will be sustained through tracking (Ellis, 2008; Morton & Riegle-Crumb, 2019). Studies suggested that for most students, their mathematics placement in

sixth grade can predict the future mathematics they study (Akos et al., 2007; Dauber et al., 1996; Stiff & Johnson, 2011; Stiff et al., 2011). Further, when comparing high schools, those schools with higher immobility between tracks had wider inequality in achievement (mathematics and verbal testing) between tracks than schools with greater mobility, and students with less mobility had lower mathematics scores (Gamoran, 1992).

Inequities may also occur in the instruction students receive in lower track classes because of the deficit views teachers may have about student abilities (Civil, 2002) such as beliefs that some students are inherently lacking. These beliefs could be disproportionately detrimental for Black and Latinx students (Gutiérrez, 2008; Yurekli et al., 2020). Educators tended to have deficit views of students who are in lower tracked mathematics classes, and tracking could perpetuate such deficit views (Civil, 2002). Also, teachers of lower tracked classes tended to more often use rote teaching practices focused on skills practice devoid of relevant context rather than teaching practices to develop conceptual understanding, thus leading to inequitable learning experiences for students (Civil, 2002; Oakes, 1990).

Students in lower tracked mathematics classes also tend to have teachers with less experience and with lower qualifications than students in high-track mathematics classes (e.g., Heubert & Hauser, 1999). Research by Flores (2007) suggested that Black and Latinx students were twice as likely to have teachers with three or fewer years of teaching experience. These groups of students were up to 10 times more likely to have uncertified teachers or teachers outside of their content preparation than students in predominantly White, affluent schools (Darling-Hammond, 2010). Such research

suggested Black and Latinx students have less access to high-quality instruction from qualified teachers with more experience.

As research continues around tracking, new considerations may emerge such as ‘tracking up.’ In an analysis of California educational data from 2003 to 2013 during algebra-for-all reforms, ‘tracking up’ occurred in middle schools where students were doubly advanced by completing both algebra and geometry in the eighth grade (Domina et al., 2016). This new placement strategy took place primarily at the more advantaged schools in the study. The researchers suggested that when the intent became to decrease inequities and to provide opportunities for all student through algebra-for-all, tracking up placements started. The researchers hypothesized from their analyses that tracking up revealed that schools felt pressure to sustain inequities.

Other Effects

Tracking may negatively impact students socioemotionally by perpetuating fixed identities in which students believe their intelligence cannot change (Dweck, 2006). Fixed identities are detrimental for all students, regardless of the mathematics track level (Boaler, 2016), but within tracked systems, there exists a hierarchy that may stereotype groups of low-track students and induce fixed mindsets (Good et al., 2003). Mindsets are a component of students’ overall mathematical identities and how they see themselves as capable doers of mathematics (Boaler & Dweck, 2016). Tracking systems tend to value students in higher tracks and feed their positive mathematical identities while devaluing students in lower tracks (Oakes, 1990). Students benefit from growth mindsets and positive learning identities, but tracking acts as a barrier by reserving positive identities for those students who are labeled as more intelligent (Gutiérrez, 2013).

Successful Heterogeneous Efforts

Over the past few decades of researching the efficacy of tracking, some schools and districts have taken steps to detrack and have successfully implemented heterogeneous ability grouping across classes (Boaler & Staples, 2008; Burris et al., 2006; Conway, 2021; Moses et al., 1989). Examples such as those detailed below illustrate how schools might implement detracking and the possible outcomes that can result from detracking students in math. Research supports that successful detracking involves more than simply shifting students and doing nothing more (Yonezawa et al., 2002). The examples suggest that detracking is more successful with a comprehensive approach to change and attention to multiple student outcomes. Most of the research around successful detracking centered around eliminating racial inequities, but some research measured other outcomes as well.

The Algebra Project provides an example of comprehensive change in which detracking is only one of several changes (Moses et al., 1989). The Algebra Project eliminated ability grouping in Cambridge schools to bring algebra to all students in seventh and eighth grades (Moses et al., 1989) and became a model to use in other middle schools (Silva et al., 1990). The Project also promoted small group and individualized instruction in middle school mathematics classes and sought to increase students' opportunities to access algebra in middle school and prepare them to take higher level mathematics courses. The Project made comprehensive changes in the way students learned mathematics (e.g., not focused on fixed abilities). Prior to implementation, meetings and trainings for staff and community members were conducted to change assumptions about who can learn mathematics and to create a culture beyond the

classroom that would support students' learning. The Project's success and changes to school policy hinged on transforming teachers' (and students') beliefs, placing mathematics literacy as a goal of utmost importance, and acknowledging that tracking was detrimental for students' success. The Project's first cohort of middle schoolers all went on to take mathematics courses at grade level or above (Moses et al., 1989).

The Railside School is another example of a school system that took a comprehensive approach to detracking (Boaler & Staples, 2008). Teachers at Railside detracked classes successfully in terms of test results. Other student outcomes such as persistence were also examined. These teachers employed equitable teaching practices through complex instruction (Cohen, 1994; Cohen & Lotan, 1997) that included multidimensional classrooms, which valued high expectations, effort over ability, and justification. Staff at Railside school worked collaboratively and had strong support from school leadership to use equity-focused curricula and practices. Their multi-faceted and pervasive commitment to detracking contributed to its success (Boaler & Staples, 2008). Students at Railside school not only academically outperformed students from tracked mathematics classes on state assessments, but they reported other benefits such as students having higher self-belief and persistence. Further, many of the gains were made by those students who would have otherwise been placed in lower mathematics tracks (Boaler, 2011).

To look further at the comprehensive way in which schools can detrack, specialists from the Silicon Valley Mathematics Initiative in California focused on the professional development that teachers needed to make detracking successful. They conducted professional development to improve teaching and learning at middle schools

from eight selected districts during the 2005-2006 school year concurrent with a detracking intervention (Boaler & Foster, 2021). Research suggested that teachers benefitted from support when transitioning to detracked classes because teachers received training on teaching for understanding and on formative assessment practices, which most teachers reported helped to create better learning opportunities for their students. Students in detracked classes with teachers who underwent targeted professional development outperformed other students on state tests (Boaler & Foster, 2021).

Schools have also seen success in detracking when they focus primarily on the type of instruction students receive. Instead of primarily focusing on algebra, an “acceleration for all” approach to detracking in middle school could manifest positive outcomes (Burriss et al., 2006; Conway, 2021). When schools provided the highest mathematics level content and instruction to all students, Black and Latinx students in the detracked cohorts went on to complete higher-level courses in contrast to just 69% of a similar group of Black and Latinx students in tracked classes (Burriss et al., 2006). Also, when providing ‘honors’ level instruction to all students, standardized test scores could improve for students previously placed in low-track classes without affecting the scores of those already placed in the high-track classes (Conway, 2021). Consequently, students receiving ‘honors’ level instruction reported they felt teachers had higher learning expectations for students, and these students expressed they had deeper learning experiences through inquiry-based lessons, for example. Shifts to heterogeneous classes may not only increase overall enrollment in higher level mathematics classes in high school but could also increase racial diversity in those classes (San Francisco Public Schools, 2019).

Beyond instruction, when looking at how mathematics departments function, one study was able to describe characteristics of high school mathematics departments who experienced success when transitioning to detracking (Horn, 2006). Like the examples above, departments who detracked successfully attended to the complexity of detracking by also, for example, shifting to block scheduling or focusing on student justification in mathematics task completion. These departments focused on making connections and meaningful mathematical ideas and allowed teachers to have professional discretion on pedagogical decisions. Further, teachers in these departments tended not to confuse intelligence or learning potential with how students handle school tasks such as homework completion. Teachers placed value on student understanding and not simply covering mathematics content. The apparent success of detracking in these departments came not only from heterogeneous grouping but from a blend of shared beliefs and pedagogical choices (Horn, 2006).

Limitations of Extant Research

Detracking is a commonly recommended solution to inequities created by tracking (e.g., Allensworth et al., 2009; Argys et al., 1996, Boaler & Staples, 2008; Burriss et al., 2006; Loveless, 2009), but it is not a solution that has been widely adopted. Research detailed the negative impacts of tracking on students in lower-level mathematics classes and the racialized nature in which tracking separated students. Although there are examples of successful detracking, historical studies that compare tracking with detracking revealed mixed results. Research remained more focused on showing the efficacy of detracking for more equitable learning experiences. However, with tracking remaining common, detracking research has not attended to some teachers'

efforts to teach equitably within tracked structures. It is important that research also looks at the possibility of transforming classrooms in systems with inequitable structures into equitable classrooms (Tutak et al., 2011). Thus, this proposed research incorporated teachers' perspectives on teaching and learning in tracked structures to contribute to existing literature on equity in mathematics education.

Much of the literature around ability grouping concentrated on student outcomes, and many studies relied on standardized tests as the measure for student outcomes (e.g., Slavin, 1987, 1990). Research centered on standardized tests scores was limited because it lacked comparison groups or did not measure other educational outcomes such as students' confidence in math/beliefs about their own abilities (Coleman, 2016). Some question research results that suggested benefits of ability grouping because evidence on student outcomes did not always control for other factors such as teacher quality or teacher beliefs, and because the research tended to be outdated (e.g., Braddock & Slavin, 1993; Gamoran & Mare, 1989; Kulik & Kulik, 1982). Research taking more comprehensive approaches to examining tracking allows for measuring various student outcomes. The literature suggested it may be helpful to learn more about the complex nature of tracking and how it manifests in schools before making changes to tracking structures.

Research on teachers in tracked classes tended to overly rely on descriptive statistics for teachers' experiences and certification (e.g., Flores, 2007) but less frequently described teachers' experiences and pedagogical choices. The field would benefit from research that includes teachers' perspectives on teaching within tracked classrooms to obtain a more holistic perspective of teachers' experiences with teaching students across

tracks. Although tracking research focuses on all levels of K-12 mathematics education, this research focused solely on middle school teachers. Considering tracking outcomes in middle school are particularly important because track placement often begins in middle school (e.g., Stiff et al., 2011). Researchers also connect middle school tracking outcomes with high school outcomes (e.g., Akos et al., 2007; Dauber et al., 1996). Thus, focus on middle school teachers' experiences is important to examine tracking from its inception.

Tracking research can benefit from more current studies that incorporate previously researched ideas to capture the complexity of dynamics in schools. Older studies can inform current tracking decisions but cannot account for what is happening in present-day classrooms. As can be seen from the concept of 'tracking up,' tracking policies may change over time due to various pressures. With persistent inequities and new pedagogical reforms, research is needed to learn more about how tracking currently works in tandem with other current mathematics education reforms.

Conceptual Framework

This study attended to teacher beliefs about enacting reforms such as TSJ and used TSJ as a conceptual framework for teaching. Research related to tracking and the lack of research on teachers' perceptions about teaching equitably in tracked classes guided the selection of these particular concepts in mathematics education. In this section, I present research on teacher beliefs in general and in relation to the core topics of my research: tracking and TSJ. Then, I describe the TSJ Principles and Criteria using a published mathematics lesson as an example of how these ideas can be enacted by teachers. Last, I detail research related to TSJ in mathematics education specifically and introduce the scale that was used in this study to connect teacher beliefs with TSJ.

Teacher Beliefs

Beliefs “might be thought of as lenses that affect one’s view of some aspect of the world or as dispositions toward action” (Philipp, 2007, p. 259). Teachers often form their beliefs about teaching and learning from their own experiences as learners (Lortie, 1975), and teacher beliefs can influence pedagogical choices (Mewborn & Cross, 2007). In this section, I describe research on how teacher beliefs are measured and are related to TSJ and tracking. I present ideas related to mathematics teacher beliefs about teaching mathematics and describe the idea that teachers may hold their beliefs as a system and not just as independent beliefs that work in tandem with other factors. Then, I offer details on teacher beliefs about tracking specifically.

Mathematics teachers hold beliefs about teaching in general and about teaching mathematics in particular, both of which may affect their teaching practices (Thompson, 1982). For example, teachers who tended to believe they should be in complete control of the classroom also tended to focus on student performance (i.e., answer correctness) over student learning, and teachers who tended to believe mathematics abilities were not malleable also focused their teaching on student performance rather than student understanding (Stipek et al., 2001). Research also suggested that the more a middle school teacher perceived that student backgrounds affected how they learned and their abilities to make mathematical connections, the less the teacher may have enacted beneficial teaching practices (Yurekli et al., 2020).

Many teacher beliefs may be grouped together and organized as part of a complex ‘sensible system’ instead of as a set of independent beliefs (Leatham, 2006). In a system, teachers can hold more central beliefs that are more difficult to change than peripheral

beliefs (Pajares, 1992; Philipp, 2007; Rokeach, 1968). Consistent with Leatham (2006), because not all teacher beliefs hold the same weight, teachers' actions may be influenced by certain beliefs more in some contexts than in others. That is, teachers might hold a certain belief, yet act in contradiction to that belief in particular situations. This contradiction may occur when one teacher belief from their system of beliefs outweighs another in that situation.

External influences may impact how teachers' beliefs translate into practice. External influences can affect what teachers do in the classroom (Raygoza, 2020; Raymond, 1997). For example, external factors that may have influence on what teachers choose to do in their classroom are time and testing pressures (Cross Francis, 2015). Among elementary school teachers, their beliefs about students' capabilities and external influences such as students' socioeconomic situations may affect teaching decisions (Sztajn, 2003). For example, they might teach higher-order thinking to students from higher socioeconomic backgrounds and teach basic facts to students from lower socioeconomic backgrounds.

Teachers can have varying beliefs about how tracking interacts with student learning and teaching decisions. Even within high school schools with intentional detracking that placed all students into honors courses, students were re-tracked out of honors courses, in part, due to teachers' underlying beliefs about students' abilities (Conway, 2021). Research suggested that teacher beliefs about students' abilities varied between tracks such that in lower tracked classes, K-12 teachers tended to believe that their students were less capable, and therefore teachers lowered their expectations for those students (Darling-Hammond, 2007; Isenberg et al., 2013; Strutchens et al., 2011).

Related to race, because lower-level mathematics classes disproportionately consist of non-White students, there is evidence that teachers believe Black students are not as academically capable as White students (Oates, 2003; Pollack, 2013).

Teacher beliefs and tracking can become intertwined in other ways. For example, middle school teacher beliefs about why students fail may affect the way teachers view tracking (Silvernail & Capelluti, 1991). That is, teachers who believed their teaching can influence students' success did not see tracking as necessary because they believed their teaching practices contributed to students' success whereas teachers who preferred tracking believed students' success was based on students' abilities. Because teacher beliefs and tracking can influence each other, research recommends that teacher beliefs be addressed before enacting any sort of change such as adjusting tracking structures (Silvernail & Capelluti, 1991).

Most studies of teacher beliefs considered elementary teachers, and those studies at the secondary level often focused on high school teachers (Philipp, 2007). Research at the middle school level would help to create a more contiguous look at teacher beliefs in K-12 education related to tracking and pedagogical decisions. Attending to teacher beliefs is also important for research around TSJ because there is a connection between beliefs and practice, and research suggested teachers should examine their own beliefs (Gonzalez, 2009). The connection between teacher beliefs and practice is complex with many apparent external influences (e.g., Geiger et al., 2023), and researchers investigating this complex connection might benefit from multiple types of data gathered over time (Simon & Tzur, 1999). Research that investigates the complex connections between factors influencing mathematics teacher beliefs and their enacted pedagogies can

add to understanding how specific factors such as tracking impact how teachers enact recommended pedagogy.

Teaching for Social Justice

Researchers tend to describe TSJ as a belief system and approach to teaching with numerous identifiable characteristics. Frankenstein's description of critical mathematics education (1983) and Ladson-Billings' work on culturally responsive teaching (1995) helped to provide a conceptualization of TSJ as a means of taking steps to act upon critical consciousness and contest injustices. TSJ also has been used as a framework for teaching aimed at fostering equity in mathematics education, which occurs when student characteristics such as race or ethnicity no longer predict student outcomes and every student has the individualized support they need to excel (NCTM, 2014). Research supports that TSJ can promote teacher empathy and making genuine connections with students and families to understand more about students' lives, with teachers becoming partners to share students' burdens and push through academic and personal challenges (Maloney & Matthews, 2020). When teachers showcased mathematics as a vehicle for personal growth and resistance against societal injustices, research suggested that teachers made learning more about empowering Black and Latinx students to use mathematics to disrupt inequities (Maloney & Matthews, 2020). With autonomy to infuse TSJ into mathematics content, some believe teachers can acknowledge the injustices that exist and determine how to enact change for the purpose of social justice (Freire et al., 2018). When teachers use the TSJ Principles and Criteria described below to guide their teaching, their classrooms can be transformed into more equitable learning environments (Frankenstein, 1995; Gutstein, 2003; Tate, 1995). In the following sections, I present the

TSJ Principles and Criteria in mathematics education and describe them in practice using a published lesson as an example.

Teaching for Social Justice Principles. In general, TSJ can “challenge school knowledge and structures that reinforce disrespect and oppression of social groups” (Cochran-Smith, 2010, p. 453). TSJ is for all students, not just those who are historically disadvantaged. Through her research to conceptualize TSJ, Cochran-Smith articulated six well-accepted principles for TSJ (Cochran-Smith, 2004, pp. 66-79):

1. Enable significant work with communities of learners.
2. Build on what students bring to school with them (i.e., cultural capital).
3. Teach skills, bridge gaps.
4. Work with individuals, families, and communities.
5. Diversify forms of assessment.
6. Make inequity, power, and activism explicit parts of the curriculum.

Descriptions of the six TSJ Principles are presented in conjunction with an illustration of how the Principles might be evidenced in a lesson plan or lesson. These six TSJ Principles can be a guide to align or create lessons with TSJ, although not all TSJ lessons will have characteristics of all six Principles. TSJ lessons in mathematics are those that have social justice objectives as well as mathematics objectives (e.g., Conway et al., 2022; Berry et al., 2020; Harper & Kudaisi, 2023). I utilized the *Culturally Relevant Income Inequality* (Berry et al., 2020, pp. 127-131) lesson to illustrate the Principles and then the Criteria of TSJ, as well as CRT. In this lesson, students learn about historical information related to income inequality in a variety of ways. Students apply the concept of rate of change to analyze income data by race and respond to

prompts to guide their analysis. Students have discussions and use tables to make sense of the data. During whole group discussion, students pose questions and the teacher facilitates students in making connections between the mathematics and the issues of income inequality. After the whole group discussion, students summarize the concepts and ideas from the lesson. For homework, students reflect on income inequality using mathematics, specifically rate of change, to support their claims. Finally, the lesson provides ideas for teachers to further the lesson into community action. This *Culturally Relevant Income Inequality* lesson exhibits characteristics of all six TSJ Principles, which I describe individually below, though not in numerical order.

The lesson makes inequity, power, and activism explicit (Principle 6) by centering inequity in the lesson and encouraging students to consider ways to be activists to begin fixing wage inequality. Although one could teach rate of change with a generic financial situation such as a person earning income over a given amount of time, TSJ exposes students to meaningful contexts that go beyond superficial appreciation for diversity (Lee, 2005) such as changing student names in a story problem or relating mathematics to music genres. This lesson intentionally situates rate of change in racial inequity to be non-neutral (and non-colorblind) to incorporate consideration of justice in social and political contexts (Cochran-Smith, 2010). This lesson allows students to analyze and draw conclusions about racial inequality in income over time using rate of change. Students will identify an injustice in society as they find that the wage gap by race is not decreasing since desegregation but instead is increasing. Students will also be asked to discuss and share ideas for taking action to address existing inequalities in the wage gap. In TSJ, students are part of the “solution to injustice” (Gutstein, 2003, p. 39).

Teachers employ various forms of assessment throughout the lesson (Principle 5). In this lesson, students are expected to read, write, discuss, use tables, and make calculations. This TSJ lesson does not support giving students repetitive mathematics problems to calculate rates of change. Instead, as is characteristic of TSJ lessons, the lesson exhibits commitment to creating a learning experience tailored to students' needs (Ferguson & Ralph, 2001). Diverse forms of assessment such as those found in this TSJ lesson vary how students might engage in the lesson. The lesson provides feedback forms for students to respond to what they have read to help teachers assess how well students can articulate the contexts of the problem before introducing the mathematics. The lesson's questions are open with "notice" and "wonder" style prompts allowing students to freely interpret what they read and the videos they watch. TSJ lessons aim to create learning experiences in which students to feel recognized and respected for their input and ideas (Bell, 1997). By elevating students' voices in sharing their mathematical ideas, this TSJ lesson also incorporates Principle 2; building on students' background knowledge. In their writing and discussions, students can incorporate their own life experiences into their responses. The lesson provides supplemental documents for students to perform mathematical calculations with the data, record their answers, and interpret their calculations. Discussion portions of the lesson allow for formative assessment of how well students can describe income inequality, interpret the mathematics, and describe wage inequality using the mathematics, and discussions also serve to foster communities of learners in the classroom (Principle 1).

The lesson supports use of mathematical skills and bridging gaps in conceptual understanding (Principle 3) through scaffolded opportunities for students to make

connections between the mathematics (graphing, tables, rate of change) and the context. Students can learn skills related to graphing and using tables to display data while bridging gaps in conceptual understanding. Instead of giving students many situations using rates of change, this TSJ lesson takes a deep-dive into one context. *Culturally Relevant Income Inequality* (2020) is designed to let students explore a relevant context and then use appropriate mathematics skills in that context. The supporting worksheet (p. 131) asks students to read a table, then graph data, and calculate the rate of change. After completing the worksheet, students make meaning of their calculations independently and through discussion. Also, the guiding questions in the lesson, such as “How do the years of data play a part in the average rate of change for each race? How can we find the current rate of change?” (p. 129), connect mathematics skills to deeper conceptual understanding of rate of change in the context.

After students display that they can use data to explain the racial inequality in wages, the lesson includes extension exercises for students to connect with others about this societal problem (Principle 4). TSJ pedagogy includes activating mathematics beyond the classroom to make an impact in the community. The lesson encourages students to take action in a variety of ways such as by sharing what they have learned with family and friends or writing a letter to one of their elected officials. Lessons incorporating TSJ Principles ask students to use the mathematics they have learned as a tool to act rather than simply learning a mathematical concept without purpose.

TSJ challenges processes and structures that recreate inequities by illuminating injustices and asking students to be activists. Teachers who embrace the TSJ Principles will also challenge societal and school beliefs about groups of students. Through TSJ

pedagogy, teachers recognize and acknowledge injustices while still trying to manage the complexities of teaching. This conceptual framework for teaching is not only about teaching content but about advocacy to ensure the best possible outcome for students.

Teaching for Social Justice Criteria. The six TSJ Principles were further developed with focus on equity, respect, and acknowledgement of tensions that exist in education (Cochran-Smith, 2010). In the development of a scale to measure teacher beliefs about TSJ, Cochran-Smith described five Criteria for categorizing TSJ to bring greater clarity to the Principles (Cochran-Smith, 2009, p. 253). Whereas the Principles focus on pedagogical choices within content delivery, these Criteria focus on teacher actions beyond the content. Teachers who teach for social justice engage in:

1. Examining personal values, biases and beliefs.
2. Understanding the contexts of schools.
3. Affirming diversity as an asset.
4. Creating a caring and just classroom environment.
5. Acting for social justice in the form of service or activism beyond the individual level.

In delivering the *Culturally Relevant Income Inequality* (2020) lesson, a teacher might engage in reflection prior to enacting the lesson to address their own thoughts and biases on racial inequities in wages (Criteria 1). The teacher must also have awareness about the school and community contexts within which they will conduct the lesson to gauge how it will be received and supported (Criteria 2). By addressing race in the sample TSJ mathematics lesson, teachers not only acknowledge the injustices the students will examine, they clearly affirm that injustices devalue diversity, which is an

asset (Criteria 3). This affirmation can be seen when teachers ask questions such as “Why is income inequality a problem?” (p. 130) to their students and facilitate discussions around undervaluing diversity. By openly discussing critical topics such as race in a mathematics classroom, teachers can facilitate positive and productive environments where students feel safe sharing their ideas. In the lesson, teachers engage in teaching mathematical content while also situating students to learn in an environment that honors their racial identity and voices as learners (Criteria 4). In such a TSJ lesson, teachers also take on an activist role when they ask students to dissect the racial inequities, and subsequently take action in their communities (Criteria 5).

What does TSJ look like in mathematics classes? TSJ pedagogy in mathematics education rests on: making caring connections with students and families (Principles 1 and 4, Criteria 4), showcasing mathematics as a tool to solve injustices and serve others (Principles 3 and 6, Criteria 5), fostering students’ positive and diverse mathematics identities (Principles 2 and 5, Criteria 3), and reflecting or making sacrifices to tackling challenges when melding social justice into curricula (Principles 5 and 6, Criteria 1 and 2). These Principles and Criteria provided a framework for studying TSJ in mathematics education. For example, in this study, the Principles and Criteria guided how I developed interview questions and served as a lens for examining all teacher response data. As I created protocols and analyzed data, these Principles and Criteria were a reference for what to include in the study and what to look for during analysis.

Teaching for Social Justice and Mathematics. Specific to mathematics education, some researchers proposed that teachers can enact TSJ pedagogy to help students develop positive racial identities and position mathematics in contexts relevant

to their lives (Gutstein, 2003). Using students' backgrounds and cultural capital (Principle 2), mathematics can become a tool for students to be a part of the solution to injustices while developing their sense of agency. Through "reading the world with mathematics" in TSJ lessons examining societal inequities, students can gain mathematical power and feel more capable of doing mathematics (Gutstein, 2003). Students can change their beliefs about mathematics, seeing it as a tool relevant to their lives and futures (Gutstein, 2005; Gutstein & Peterson, 2006). TSJ pedagogy can be enacted through lessons, but also through teaching practices, such as discourse, that share power with students (Gutstein, 2003) or allow students to use their voices to feel their input has value (Bell, 1997; Harper & Kudaisi, 2023).

Enacting TSJ through lessons or pedagogy while teaching mathematics is not always a simple task. Teachers can experience challenges when trying to bring TSJ into the mathematics classroom such as the demand to focus on standardized test preparation (Gregson, 2013). Social and political constraints can also limit teachers' abilities to enact TSJ pedagogy (Burke & Collier, 2017). With pressures from other influence on their teaching, mathematics teachers may have difficulty balancing TSJ goals and mathematics content goals in lessons (Bartell, 2013). When putting lessons into practice, teachers may drift toward the mathematics content more than the TSJ Principles of the lesson (Bartell, 2013). Even with high intentionality in planning, TSJ pedagogy in mathematics may not be enacted as planned because of the tensions teachers feel regarding what parts of the lesson demand more class time. Integrating TSJ Principles into practice may require time and training because some teachers may not fully understand TSJ (Viesca et al., 2013). Even when teachers manage to enact TSJ pedagogy in mathematics classes, they may do

so in varying degrees of enactment due to time constraints, choosing to sacrifice some aspects of the lessons, such as a strong focus on accuracy, to infuse TSJ into mathematics (Harper, 2019). Additional research describing how teachers balance TSJ and content goals within schools may help describe how well teachers can enact TSJ Principles and engage in TSJ within the constraints of their schools.

Learning to Teach for Social Justice Belief Scale

Teachers may not be able to successfully enact TSJ if they do not have the resources to do so (Nieto et al., 2010). Research supports both the need for including TSJ Principles in pre-service mathematics education courses so teachers conceptually understand TSJ and the need for in-service teacher training on how to enact TSJ as part of teaching routines (Burke & Collier, 2018; Leonard et al., 2010; Viesca et al., 2013). Research has been conducted to determine how teachers might learn TSJ and how much they believe in TSJ through the Learning to Teach for Social Justice Belief Scale (LTSJ-B) (Ludlow et al., 2008). Research also suggested the scale can support teachers who are challenging inequities by attempting to “to address the multiple dimensions of multicultural validity” (Chang & Cochran-Smith, 2022). I used the LTSJ-B scale as an instrument in this study and provide more details about the development and use of this scale in the methods section of this dissertation. Briefly, the LTSJ-B scale measures the beliefs and attitudes of educators about TSJ along a continuum while acknowledging that the scale cannot account completely for the complexity of TSJ beliefs. Research using this scale often focuses on pre-service teachers (e.g., Enterline et al., 2008; Garii & Rule, 2009; Lazar, 2016; Lazar & Sharma, 2016; Leonard & Moore, 2014; Reagan et al., 2016). The scale can also be found in research on elementary school teachers (e.g.,

Evans, 2013) and in subjects other than mathematics (e.g., Bazan & Hellman, 2014; Sebastianelli et al., 2021). However, there is a lack of research using the LTSJ-B scale with practicing mathematics teachers. Research on TSJ can benefit from using the LTSJ-B scale with mathematics teachers to better understand their beliefs about TSJ.

Theoretical Framework

Race is at the center of much of the literature on tracking, which showcases the racial disparities it creates and perpetuates. Race is also at the center of the literature on TSJ, in which race is non-neutral. Critical Race Theory (CRT) offers a theoretical framework to keep race at the center of the research. In particular, the CRT framework offers a tool for examining race and the nature of the relationship between TSJ and tracking.

A Question of Priority

Within tracking, Black and Latinx students more often do not fully receive the best practices intended to foster positive mindsets nor practices that improve learning experiences and opportunities for all students. Those opposed to changing tracking structures contend that changes will negatively impact higher tracked students who are mostly White. The debate over tracking appears to rest in the choice over which students take priority, and some schools may view detracking as a “gamble” over which students will benefit (Loveless, 1999, p. 155). This struggle exemplifies the systemic racism and power dynamics that have sustained inequitable school practices such as tracking (Ladson-Billings & Tate, 1995). The following section provides insight into what CRT is as well as how it guided this research.

Critical Race Theory

In this study, I used CRT to examine race in a specific context of society: middle school mathematics education. CRT in education rose out of the application of CRT to society in general, initially for legal studies (Bell, 1976; Crenshaw, 1988). Before being considered as a tool for examining education, the foundation of CRT was such that “racism is a central ideological underpinning of American society” (Crenshaw, 1988, p. 1336).

CRT looks at structural hierarchies in society by acknowledging there is a top and a bottom when considering racial inequities (Carbado, 2011). Race can be described as socially constructed, and CRT can be used to examine how racism, as endemic, interacts with other forces in society (Carbado, 2011). CRT also challenges a meritocratic view of society. CRT has been considered to have four dimensions: (a) its components come in micro and macro forms; (b) these forms are individual and institutional; (c) its elements are both unconscious and conscious; and (d) its impact on both the individuals and groups is cumulative (Davis, 1989; Lawrence, 1987).

The four dimensions of CRT initially related to legal studies but have served as a starting point for CRT in other areas of research. For example, in social sciences, CRT is used to help understand societal issues related to race to make situations related to those issues better (Delgado & Stafancic, 2017). A CRT framework can highlight the saliency of race in our society and in education specifically, even though not all teachers may acknowledge racism as part of their everyday experiences. It is useful to employ CRT to continue to explore known racist issues in education such as tracking (Taylor et al., 2016).

Critical Race Theory Elements. Racism has been a part of schooling in practices and policies (Ladson-Billings & Tate, 1995), and CRT can help analyze the role racism has in K-12 education. Race is one of the intersectional pieces that intertwines with other student characteristics, such as gender, or school characteristics, such as location, to influence students' identity development and teachers' beliefs. Because of pronounced racial disparities in education, particularly in mathematics education, CRT can be used to centralize race during analysis and deconstruct the role that race plays in providing or prohibiting learning opportunities to groups of students. There are many conceptualizations of CRT in education that give structure to its use. One widely-accepted conceptualization outlines five key elements of CRT specific to education and will be used in data analysis for this study (Solorzano & Yosso, 2001, 2002). These elements are: (a) the central role of racism and its intersectionality with other forms of oppression; (b) examination of education as part of a critique of societal inequities; (c) a commitment to social justice to empower underrepresented groups; (d) the centrality of the strengths students have based on lived experiences; and (e) an interdisciplinary analysis perspective. As discussed in the seminal work *Toward a Critical Race Theory in Education*, "oppression becomes rationalized, causing little self-examination by the oppressor" (Ladson-Billings & Tate, 1995, p. 58), thus making CRT a vital tool to analyze and dismantle such inequitable situations in education. In their work, Ladson-Billings and Tate (1995) also implored researchers to showcase authentic voices in education to more accurately describe how students experience oppression in schools. By giving voice to the realities of racism in education, CRT provides an opportunity to interpret racism in education by not ignoring it, questioning the status-quo of inequities

by attending to issues of racism, and illuminating ways to dissolve racist structures or policies by intentionally investigating the role of race in situations.

Critical Race Theory in Mathematics Education. The CRT framework has been used in research in mathematics education to illuminate the complex nature of how race can impact students' learning experiences and outcomes. For example, CRT was used to investigate the unique lived experiences of Black males in relation to their access to higher level mathematics courses (Berry, 2008). Rather than study the multitude of ways by which a Black male student might be more successful in accessing higher level mathematics, CRT kept race at the center of the research throughout data collection to garner more details on the connection between race and Black male students' experiences. Another study focused on Black girls' experiences in mathematics and used CRT to identify pedagogical factors that benefit Black girls' specifically (Joseph et al., 2017). This research suggested that disrupting traditional educational structures, such as tracking, is fundamental to positively impacting Black girls' persistence in mathematics education.

With a CRT framework, researchers can describe teachers' experiences in mathematics education beyond neutral perspectives on teaching and learning. When considering teaching pedagogy, Martin (2009) suggested that without a CRT lens, "it is believed that inequities will be remedied as a residual effect of good teaching and good curriculum" (p. 331). With a non-neutral lens on TSJ, mathematics education research can better attend to the salience of race in teachers' descriptions of their pedagogy and instructional practices by making race explicit and by not ignoring that mathematics is a racialized space (Martin, 2000, 2006; Zavala 2014).

Considering the *Culturally Relevant Income Inequality* (2020) lesson example, race is at the center of the lesson. Teachers enacting this lesson will connect racism to income inequality (CRT A). While facilitating discussions about income inequality over time, teachers using this lesson can guide students to posture reasons for income inequality with education as one factor leading to social inequities (CRT B). This lesson also allows teachers to show a commitment to social justice by selecting a lesson through which students can analyze historical data and empower students to be critical (CRT C). In open discussion related to the lesson's data, teachers can relate the historical income data to current situations that may be affecting students and their families to enrich how students engage with and contribute to the lesson (CRT D). This example lesson is also interdisciplinary because teachers can encourage students to learn more about historical events that may have influenced income inequality (CRT E).

The Current Study

Although there has been a variety of research on tracking, the current study aimed to make current the conversation. Studies that advocated for detracking often showed the ill effects of tracking and many researchers concurred that detracking is complex. Still, tracking is an educational norm for mathematics classes in the United States. In terms of racism in mathematics education, the extant research clearly delineated the ways in which tracking perpetuated racial disparities. However, there are few recent studies to maintain conversations around tracking that are current to today's classrooms and pedagogical recommendations. With TSJ entering education research decades after the tracking debate began, it is necessary to learn more from teachers about how they are enacting TSJ pedagogy as a practice to achieve equitable learning experiences for students in tracked

classrooms. CRT also provides opportunities to explore the relationship between TSJ and tracking in terms of equity by putting race at the center of data collection and analysis. Understanding how TSJ and tracking work in tandem with a focus on race may assist researchers and educators in recognizing whether tracking remains a formative barrier for Black and Latinx students in mathematics education.

CHAPTER 3 METHODOLOGY

The goal of this study was to examine middle school teachers' descriptions of experiences with TSJ pedagogy within tracked mathematics classes to shed light on how well TSJ and tracking might work in tandem. I used case study methodology (Stake, 1995; Yin, 2018) to understand participants' experiences while providing in-depth answers to the research questions within a real-world context (Creswell & Poth, 2018). In this study, the cases were individual teachers bound within their contexts of the classrooms, schools, and district within which they taught and the timeframe of the study. This study was mixed methods in design with a nested arrangement (Yin, 2018, p. 64), which means multiple cases were selected based on criteria after administration of a survey. In this chapter I detail my positionality as well as the context of the research followed by the participant selection process and rationale. Then, I explain the sources of data collection followed by the data analysis process. Last, I discuss the trustworthiness of this research study.

Positionality

My data analysis was guided by theoretical and conceptual frameworks, TSJ and CRT, but I included my positionality because as I conducted this research and interpreted its findings, my positionality also impacted the understandings I developed throughout my research (Rowe, 2014). I position myself as a White, former teacher. In studying topics of race and social justice, my positionality is particularly important.

Considering the racial equity content of this research, identifying as White was relevant. My educational and life experiences and opportunities may not be the same as many Black and Latinx students because I experienced privilege in access and opportunity throughout my schooling. Therefore, my research involved significant personal learning on the perspectives of Black and Latinx students. During my reading and learning processes, I discovered more about my own racial identity and historical, as well as present, power dynamics around issues of race in education. Despite my lack of personal adversity in education being White, my teaching experiences were in metropolitan schools with diverse students. Having witnessed racial disparities in my teaching due to many factors, including tracking, my former-teacher identity influenced the focus of my research. This study developed out of my strong belief, formed from my teaching experiences, that Black and Latinx students do not have equitable learning situations and opportunities in mathematics. As such, our society is not benefiting from their wildly untapped potential—a view that aligns with a critical, Freirean (2018) perspective.

Because of my positionality, I reflected often on my research choices and frequently consulted multiple advisors throughout my research process. Also, specifically when analyzing data, I member-checked my interpretations with participants to make sure my interpretations were accurate. These processes are detailed more in the sections that follow.

Participant Selection

Participants in the study were grade 6–8 mathematics teachers who were actively teaching in racially diverse metropolitan schools with tracking structures in place for

mathematics classes. For this study, “a school is racially diverse when no single racial group accounts for more than 70 percent of the total population and at least 25 percent of students in the school are white” (Schneider et al., 2020). To generate a pool of participants for the interviews and document review, I used an established survey called the Learning to Teach for Social Justice Belief Scale (LTSJ-B; Ludlow et al., 2008, described in more detail later in this chapter) to gather information about teachers’ beliefs. I included demographic questions to aid with participant selection (see Appendix A for the complete survey). Survey participants were recruited through non-probability sampling (Baker et al., 2013). I obtained participants through direct contacts (Appendix B) and through social media to reach a broad geographic audience. Table 1 details participant demographics for 14 survey participants. A fifteenth participant chose not to respond to multiple demographic items but did complete the LTSJ-B scale portion of the survey. Because there is no defined framework for such non-probability sampling to help determine an appropriate sample size (Baker et al., 2013), I did not set a limit on the number of survey participants, but I set a goal to reach 50 participants based on the sample size used in the development of the LTSJ-B scale (Enterline et al., 2008). There were 42 total survey respondents; 15 completed the necessary LTSJ-B scale portion of the survey.

Table 1*Participant Demographics*

	<i>n</i>	<i>M</i>	Percent
Years of Experience	14	12 (<i>SD</i> = 8.7)	
Gender	14		
Male			14%
Female			79%
Prefer not to say			7%
Race	14		
Black/African American			7%
White			86%
Prefer not to say			7%

From the teachers who completed the survey, I selected three teachers for further participation. This number of cases helped allow for some variation between the cases to better ensure that cases provided information-rich data for the study. In neither of the seminal works by Stake (1995) or Yin (2018) are there recommendations for the specific number of cases needed for case study research. Instead, their general recommendations are for the use of typical cases that will inform answers to the research questions. The focus of case studies is in-depth examination of ideas that emerge from a small number of phenomena (Bogdan & Biklin, 2006). Therefore, I selected three participants for document review and interviews following similar mathematics education studies using case study and cross-case analysis (e.g., Lim et al., 2013; Rubin, 2008).

Three teachers who indicated willingness to participate in interviews and submit reflections for document review were selected from the larger pool of survey respondents. It is important to note that none of the teachers who identified as Black/African American agreed to participate in the interviews, and there were no participants who identified as Latinx. I ranked survey participants by their overall LTSJ-B scale results, placing them on

a continuum as intended by the scale. A raw scale score above 4 suggests a stronger level of commitment to teaching for social justice (Enterline et al., 2008). I selected three interview participants from the pool of survey participants who agreed to continue with interviews and whose raw scores fell above 3, suggesting the teachers exhibited tendencies toward higher levels of commitment to TSJ, were potentially familiar with the tenets of TSJ, and were likely to endorse or attempt TSJ pedagogy. Teachers were also selected for document review and interviews with consideration for demographic diversity (i.e., gender, race) and teaching experience to have variation in representation in the final sample of teachers. In terms of teaching experience, I selected teachers with varying years of experience and experience teaching mathematics in different track levels. Variation in relation to important criteria provided opportunities to describe a range of case participants who experienced different conditions and offered varying perspectives (Creswell & Poth, 2018; Guest et al., 2013; Yin, 2018). Table 2 describes characteristics of these participants.

Table 2

Additional Descriptive Data for Case Study Participants

	Case 1 ^a	Case 2	Case 3
Years of Experience	19	30	10
Gender Identity	Female	Female	Female
Race	White	White	White
U.S. Geographic Region	Northeast	South Central	Midwest
Reported Student Demographics by Percent			
White	-	40	30
Black/African American	-	5	30
American Indian or Alaska Native	-	2	0
Asian	-	2	30
Hispanic or Latinx	-	51	10

^a Case 1 did not self-report student demographics but her school website reports student enrollment that is 38% students of color.

Data Collection

I collected data during summer 2023 and during the fall semester of the 2023–2024 school year. The first level of data in this study resulted in quantitative data from administering a survey to teachers to collect descriptive demographic information and measure their commitments to TSJ pedagogy. School and district information provided descriptive data as well. The case study portion of this study also used self-report documents and interviews with select participants to collect additional qualitative data on teachers' experiences. The documents submitted by participants provided self-reported accounts of experiences related to the research questions in terms of how teachers describe their attempts to enact TSJ pedagogy across tracked classes. Interviews allowed for collection of textual data related to participants' perceptions of how well they can use TSJ pedagogy to create more equitable learning experiences. Table 3 details each of these data sources in the order in which they were collected and the artifacts that were collected.

Table 3*Description of Data Sources*

Data Source	Data
Survey	<ol style="list-style-type: none"> 1) Teacher demographics 2) Teaching experience 3) LTSJ-B Scale
Document Collection	<ol style="list-style-type: none"> 1) Self-report of TSJ lesson
School and District Data	<ol style="list-style-type: none"> 1) Student demographic data 2) School enrollment data 3) Geographic Data
Interviews	<ol style="list-style-type: none"> 1) Teachers' descriptions and understandings of TSJ 2) Teachers' perceptions about equity 3) Teachers' experiences with TSJ in tracked classes

Survey

The quantitative data from the survey allowed for an overall look at the teaching experiences and beliefs of all survey participants. First, survey participants consented to participate prior to starting the survey. Participants who did not consent were directed to the end of the survey. Participants were not required to respond to survey items to progress through the survey. Demographic data about the teachers helped to understand the teachers' contexts of personal and professional experiences and ensure variation when selecting interview participants. In addition to demographic data, the survey provided data on the participants' experience teaching in tracked middle school mathematics classes. The survey question defined tracking as a systemic process by which students are placed in mathematics levels based on perceived ability and asked participants to state whether or not their school had such tracking processes. The teachers were also asked to state which level or levels they taught: Below grade level or At grade level or Above

grade level. This data supported exploration of the research questions by identifying teachers who taught in tracked classes. The second part of the survey, comprised of the LTSJ-B scale, informed the first research question by creating quantitative data that could be used to describe teachers' levels of commitment to TSJ pedagogy and provided valuable data from which to select participants for the case studies.

The LTSJ-B scale was developed from a set of surveys to measure longitudinal change and resulted from a Rasch measurement model that had high validity and reliability. The LTSJ-B scale is computed using a 12-item Likert survey with five positively worded and seven negatively worded items. The scale is a continuum that shows a teacher's commitment to TSJ through which a higher score suggests a higher commitment to TSJ. The scales were initially created to be administered five times to cohorts ranging from entry to an education program to three years into a teaching career. However, researchers have used the LTSJ-B scales independently to measure teachers' commitment to TSJ (Evans, 2013; Jong et al., 2023; Lazar, 2016; Reagan et al., 2015). For my study, I used the exit survey (Cronbach's $\alpha = .74$) developed by Enterline and colleagues (2008) to measure teachers' beliefs about TSJ upon graduation because participants in this study were all college graduates with varying years of teaching experience (see Appendix A for the survey).

The LTSJ-B scale was rigorously tested for reliability and validity by its developers (Ludlow et al., 2008). In terms of its development, the factor structures for this scale were tested using principal axis factoring with varimax rotation. Researchers found that the items loaded on two factors (Ludlow et al., 2008). The positively worded items loaded onto one factor, with the negatively worded items loading on the other

factor, but the factors were correlated ($r = .15$). Therefore, the survey was tested again with all positively worded items to determine if the scale truly had two factors or one common factor. When the scale was administered without rotation and with positively worded items, it revealed one common Learning to Teach for Social Justice-Beliefs factor with two distinguishable clusters that both addressed aspects of the factor. Also, developers of the LTSJ-B scale computed coefficients of congruence (CC) to check that the factor loadings were similar across administrations of the survey. The values met the threshold of .90 ($CC = .95$ and $.97$). Survey results solicited participants' beliefs about TSJ and placed participants on a continuum ranging from less likely to more likely to endorse TSJ pedagogy. Enterline and colleagues stated that the exit survey is a "reasonable baseline measure" of learning to teach for social justice (2008). Data from the LTSJ-B scale portion of the survey informed the answer to this study's first research question by measuring teachers' levels of commitment to TSJ and creating a continuum through which a sample could be chosen for further participation in this study.

School and District Data

School and district data were collected for the participants who were selected for document review and interviews. Demographic data were publicly available through district websites and other online resources for some participants. When the information was available, I collected and examined middle school students' racial demographic data for the participants' schools to verify teacher reported data. Demographic data for students were particularly important for this study given the CRT framework and the equity focus of the sub-question of the second research question. Demographic data also confirmed the diversity of the school in terms of how diversity was defined in this study.

Geographic data were also used to determine if participants' schools were near a metropolitan area.

Self-Report Reflection Documents

After conducting the survey and selecting three participants for interviews, I gave participants an open-response writing prompt and asked for additional details about the lesson that was the focus of the prompt (Appendix C). The writing portion of the prompt was:

Select and describe a lesson plan you enacted that you feel exemplifies teaching for social justice as you understand it.

Describe (1) the mathematical learning objectives of the selected lesson and (2) the social justice learning objectives of the lesson.

Reflect on the positive and negative academic student outcomes of this lesson.

Provide support with examples for how you determined these outcomes.

Reflect on other positive and negative student outcomes of this lesson. Provide support with examples for how you determined these outcomes.

Along with the prompt, teachers were instructed to submit the actual lesson plan if available. I also asked teachers to include details such as questions they asked the class, the tasks they assigned to students, the teaching strategies they employed, and the assessments they used. Considering that the prompts focused on what took place for a specific lesson, the data from the document review elicited information about how well their TSJ lesson addressed the six TSJ Principles described in Chapter 2. Prompt response data also addressed the second research question related to the teachers' attempts to enact TSJ pedagogy in their tracked classes. Participants were given a range of 400-600 words

in order provide expectations for their response and help ensure they provided ample detail.

Interviews

Interviews are one of the most important components of a case study (Yin, 2004, p. 118). Fitting the case study approach, interviews helped describe the “how” questions regarding tracking and TSJ. The second research question and its sub-question for this study were both “how” questions and therefore, the focus of the interviews was to target teachers’ views on those specific questions. I conducted two semi-structured, 60-minute interviews with each participant following interview protocols (see Appendices D & E). Each participant’s interviews occurred several weeks apart, similar to other qualitative studies (e.g., Webel et al., 2022; Nyachae, 2018). If after two interviews I developed more questions or needed clarification from the participants, I planned to add a third interview; however, I did not need additional interviews for this study. This flexible approach to data collection is acceptable for case study research (Stake, 1995). The interviews were recorded and transcribed verbatim. The interview protocols (Appendices D & E) included open-ended questions, and the interviews were iterative and co-constructed. I revised interview questions based on each interviewees’ responses and asked follow-up questions for clarification as needed. I designed interview questions that did not privilege any of the frameworks. Throughout the interviews, I was conscious to remain neutral when asking questions. The interview questions also featured references back to the participants’ survey responses to help stimulate recall on how they responded to specific questions (Calderhead, 1981). Responses from the first interviews helped to mold the questions asked in the second interviews. The second interviews were

conducted with the same participants to follow up on details from the first interviews and to extend the descriptions of their experiences and the depth of descriptions. I developed additional questions for the second interviews to further examine their responses from the first interviews related to emergent ideas and to further explore the research questions. From the first interview to the second, I reflected on my research choices because participants were not initiating responses related to race. I reflected on ways to adjust protocol questions to open opportunities for participants to talk about race. For example, if a participant did not speak about race, I continued with a follow-up question to solicit for additional factors that might impact teaching and learning that they had not already discussed or for additional descriptions about which students might benefit from teaching practices they discussed. Additionally, I employed member checking (Creswell & Poth, 2018) on interpretations during the second interviews, when necessary, to gain feedback regarding my interpretations from the interviewees to gain clarification and validate my interpretations.

Data from the interviews helped in answering the second research question. The questions in the protocols were formed to elicit details from teachers related to how teachers enacted TSJ in their tracked classes (i.e., alignment with the TSJ criteria). The protocols also focused on the theoretical framework of CRT for the study. Questions called upon teachers to describe equity in their TSJ classroom experiences to solicit data related to inequities or potential benefits of TSJ for certain student populations while keeping CRT in focus. Interviews provided insight into the nuances of teachers' experiences with TSJ beyond what the LTSJ-B scale and document review provided. The data from the interviews along with the other data collected from each of the interviewees

were used for individual case study analyses as well as the cross-case analysis based on the research questions.

Because teachers are constant observers of the classroom and creators of student learning experiences, this research focused on the teachers' perceptions about and reflections on experiences with TSJ pedagogy in tracked classes as it related to equity, particularly with respect to impacts on Black and Latinx students. The interviews provided opportunities for teachers to explain more about their experiences teaching students in tracked classes and enacting TSJ pedagogy to elicit data related to the conceptual and theoretical frameworks. Specifically, the interviews allowed for exploring how well teachers' descriptions of their practices aligned with the TSJ Principles and Criteria and CRT Elements. Because the teachers submitted a written document about TSJ, I included follow-up questions from their responses to the prompt to allow them to further elaborate on or clarify those written responses.

Data Analysis

Data from multiple sources was systemically analyzed using thematic analysis (Glesne, 2016). Data analysis took place throughout the research process and was guided by the research questions (Stake, 1995) and by both the conceptual and theoretical frameworks. TSJ Principles and Criteria served as the conceptual framework for data analysis. While analyzing multiple sources of data, I considered ways in which data aligned, or did not align, with each Principle and Criteria, which I detail in the following discussion.

With a CRT framework, I intentionally considered race when analyzing data (e.g., Delgado, 1995; Martin, 2009; Tate, 1997) guided by the CRT Elements. This framework

allowed opportunities to analyze the intersectional role of race (CRT A) with the teachers' reported experiences teaching in tracked mathematics classes, which may be inequitable in various ways. With consideration of the second CRT element during data analysis, I purposefully operationalized a non-neutral lens to examine how education in mathematics might be a part of perpetuating societal inequities because the teachers' experiences were situated within tracked structures. By using a dual lens, TSJ in tandem with CRT in data analysis, I was able to focus on teachers' descriptions of their efforts pertaining to social justice for Black and Latinx students in mathematics (CRT C). With multiple sources of data that were both qualitative and quantitative—school and district data, survey data, responses to prompts, lesson plans, and interviews—I used a creative, multifaceted approach to analysis rather than relying on traditional methods, which might not have fully encapsulated the teachers' experiences of TSJ and equity (CRT D). These data were also used to triangulate accounts of participants' experiences and take an interdisciplinary analysis perspective (CRT E) to analyze data in multiple ways.

Survey

Survey data provided descriptive statistics about the participants (see Table 1). The descriptive data were used to understand the contexts in which participants taught and their levels of experience and personal backgrounds, which could all influence their perspectives.

The survey also aligned with the conceptual framework for this study. The LTSJ-B scale portion of the survey provided insight into participants' beliefs about TSJ to investigate the first research question and identify participants for the subsequent parts of the study. The LTSJ-B scale portion of the survey assesses:

Perceptions and evaluations concerning the quality and impact of their preparation for classroom teaching, particularly their preparation to teach diverse learners, the effectiveness of the student teaching practicum and other fieldwork experiences, beliefs about teaching for social justice, and understandings of inquiry as a way to pose questions and gather data to make decisions about practice. (Ludlow et al. 2008, p. 323)

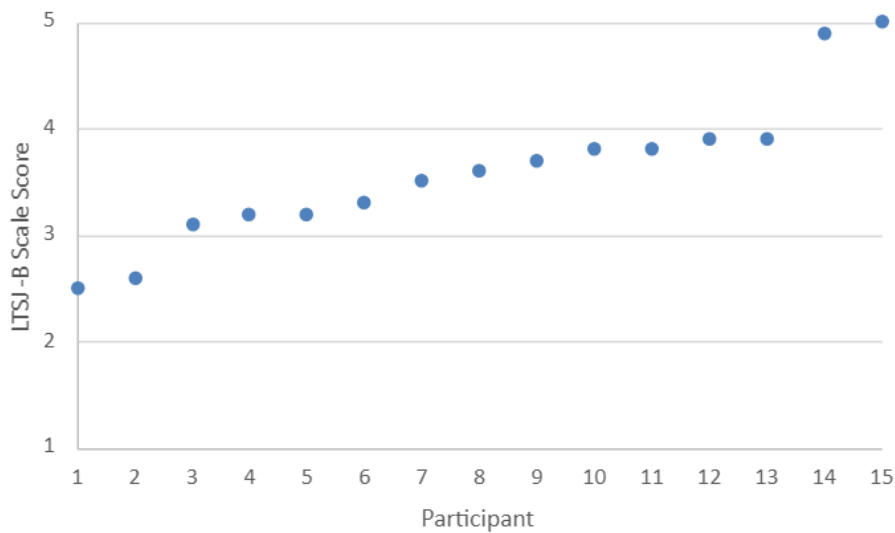
The LTSJ-B scale survey data were analyzed for each of the 12 Likert questions and the total sum value for each participant. Each item can describe an aspect of beliefs about TSJ for the survey participants and allowed for consideration of variability across participants. Descriptive statistics for the responses of the group of survey participants, including mean and median, were calculated using responses to each LTSJ-B survey question to reveal how participants varied along the LTSJ-B scale for each survey question. According to the developers of the LTSJ-B scale, survey respondents who tend to endorse TSJ pedagogy were expected to agree with items 1, 2, 4, 7, and 8 and disagree with items 3, 5, 6, 9, 10, 11, and 12 (see Appendix A). This research included analysis of each item for an overall view of how all participants aligned with the expected results of the LTSJ-B scale survey. For each question, the descriptive statistics revealed how the overall pool of participants felt about each topic related to TSJ (e.g., incorporating diversity, challenging societal inequities) and allowed me to better understand which aspects of TSJ the participants tended to endorse over others.

Following the overall look at the survey responses by item, I calculated an overall mean score for each respondent across all questions. To do this calculation, I reverse scored the negatively worded items. Then, I placed the means of the survey respondents

along a continuum from lowest tendency to endorse TSJ pedagogy to highest tendency (Figure 1). By graphically displaying the respondents, I was able to see the distribution of scores for the teachers from the study and describe their overall tendency to endorse TSJ pedagogy.

Figure 1

Participant LTSJ-B Scale Continuum



I compared those respondents who agreed to additional participation with those whose score fell above a LTSJ-B scale score of 3 to select three teachers for further participation. Five teachers agreed to participate in the interview portion of the study, and they all scored above 3 on the LTSJ-B scale. For each of these respondents, I analyzed their individual question results and ranked respondents by the frequency with which their responses matched the expected responses for someone who tends to endorse TSJ pedagogy. This analysis allowed me to select teachers for document review and interviews who were more likely to endorse, and potentially enact, TSJ pedagogy. I also used the TSJ Principles and Criteria from the conceptual framework to review each of

these respondents' answers to each question. By paying attention to their individual questions results, I was also able to gain more detailed information about which components of TSJ they endorsed more than others, and how well these respondents might believe in or use the tenets of TSJ to select those with the greatest likelihood to enact TSJ pedagogy.

Document Review

For the documents submitted by the three teachers, I examined the lessons and responses to the prompt to find statements of experiences related to each of the TSJ Principles. I sought evidence from the participants' lessons and responses that their lessons aligned with one or more TSJ Principles because the Principles relate more to teaching pedagogy. For example, I read the responses looking for ways the teacher used students' backgrounds and cultural capital (Principle 2) as could be evidenced through the tasks they selected or descriptions of teaching strategies that were open to students' own ideas or comprised of contexts with which students could relate. More evidence of the TSJ Principles found in teachers' documents are included in Table 4. Concurrently, I reviewed these documents for lack of TSJ Principles. I also examined the responses to seek evidence, or lack of evidence, for equitable outcomes in the lesson they described. I recorded notes on the prompt responses as well as drafted clarification questions for use interviews. Data from the document review was used to inform interview questions and support findings from the interviews and survey.

Table 4

Document Review Evidence of TSJ Principles

TSJ Principle	Examples of Evidence	Interpretation
1. Enable significant work with communities of learners.	“Students shared noticings and wonderings about what different parts of the graph could represent.”	Notice and Wonder is a teaching routine that <i>enables significant work</i> because students can openly contribute their ideas by contributing anything they notice or wonder. This teacher used this routine to open a task related to graphing.
2. Build on what students bring to school with them (i.e., cultural capital).	“We also used the graph to begin our exploration of how we use and rely on energy in our daily lives.”	The teacher selected a graphing topic related to fossil fuels and in her response to the prompt, she described how she enhanced the lesson because she could <i>build on knowledge students bring to school</i> when exploring how students used and relied on energy in their own lives.
3. Teach skills, bridge gaps.	“The mathematics goal of the activity was to analyze a graph, interpret a graph and notice key features of the graph.”	In addition to goals related to students learning about fossil fuel use over time, the teacher’s objectives for the lesson included core mathematics <i>skills</i> students used in class.
4. Work with individuals, families, and communities.	Lack of evidence in document submissions	
5. Diversify forms of assessment.	“By the end of the discussion, anecdotally, the class seemed interested in both the interpretation of the graph and the graph itself.”	The teacher did not mention typical assessments used for this lesson. In this quote, she mentioned measuring anecdotally how well students were interested in the lesson, which she seemed to value as an outcome in this lesson. This evidence slightly aligned to this Principle because she described her observations as a <i>form of assessing</i> students’ interests.

6. Make inequity, power, and activism explicit parts of the curriculum.

“They also shared if their parents went to college and the type of job they have now. Some of them expressed interest in doing better in life and having more money.”

This evidence slightly related to the Principle because the teacher described discussions students had connecting higher education with jobs, which could be related to making *inequity part of the curriculum*. But, this connection was not explicit.

Note. “Examples of Evidence” represent how participants aligned with each tenet of the framework and “Interpretation” is a description of how it aligned with each tenet to show the data analysis process replicated throughout the study. Examples might align with part or all of the tenet.

Interviews

Interviews provided another primary source of data for analysis in this research. During data analysis, I reflected on data consistently throughout the process and used direct interpretation (Stake, 1995). That is, I reflected on interview data during and between interviews to directly interpret from each case without considering other cases. During this analysis, I wrote memos about preliminary patterns with respect to TSJ Principles and Criteria, CRT Elements, and tracking and race more generally as they emerged to deconstruct data and put data together into more meaningful ways. I reviewed videos and read interview transcripts line by line several times for repeated analysis. I organized direct quotes from the interviews with each Principle, Criterion, and Element as evidence in Excel spreadsheets to help answer the second research question and its sub-question (see Figure 2). If evidence did not relate to a TSJ Principle or Criterion or to a CRT Element, I retained it as evidence but color-coded it to revisit for relevance. By labeling interview data according to how the data aligned with each TSJ Principle and/or Criteria as well as each CRT Element, I was able to create frequencies for each of the participants. These frequencies are representative of how often each teacher introduced ideas related to the frameworks in their interviews. Though I analyzed data from document review using the frameworks, I did not include that data in the frequencies because one teacher did not submit a response to the prompt. I examined the data for each teacher to look for patterns, elaborating and expanding on the patterns identified during preliminary analyses, and then drafted themes for each case. I reanalyzed the interview data for relevant quotes, ideas, and unexpected responses from the participants to support the themes using constant comparison (Glaser & Strauss, 1967). I considered the

teachers’ overall LTSJ-B scale score and individual survey question responses to find connections between data in the interviews and participant survey data. Similarly, I reflected on the interviews in tandem with the analysis I completed with the prompt responses. Across these three sources of data, I sought to find connections in ideas and experiences to describe each case more holistically.

Figure 2

Data Organization Example

Line	For those middle school math teachers who tend to endorse TSJ pedagogy, how do they describe their attempts to enact TSJ pedagogy across tracked classes?	TSJ /CRT Principle/Criteria	Line	What are teachers’ perceptions of how well they use TSJ pedagogy to create more equitable learning experiences?	TSJ /CRT Principle/Criteria
38	give positive change to the world around them, right, and that's also my job as a teacher	P6, C1	47-51	I've been working a lot with like the equity based practices for teaching. So there's also what I do to bring more students and give more students access to high quality learning, regardless of me teaching them how to go out into the world like I can be that person who makes the world a better place by giving more students equitable access to the mathematics that I'm teaching	P3, C1
39-41	when I can hit both my core content, my academic content, and the content that's like go off and be a good person and do good things for the world in a single lesson that feels like a math for social justice kind of thing	P6	118-121	very well-resourced Independent School with a lot of freedom to do this kind of work and encouragement to do this kind of work and training to do this kind of work. Umm, so I recognize the privilege that being able to teach in these, sort of like what are you know what feel like really like rich ways, um it is a privilege for me so.	CRT B

As indicated, my data analysis was guided by the TSJ and CRT frameworks described in Chapter 2 as I looked for the five TSJ Criteria and six TSJ Principles and CRT Elements while deconstructing the data. Examples of evidence from interview responses and examples of interpretations of evidence for each Principle are displayed in Table 5, Criterion in Table 6, and Element in Table 7. As detailed with italics in these tables, each piece of evidence may have aligned with portions of each tenet of the frameworks, not necessarily all of each tenet, to be counted as evidence for that tenet. The interviews featured a heavier focus on equity to address the second research question. For example, in teachers’ responses, I focused on race in terms of positive and

negative outcomes that teachers reported for different groups of students as part of considering whether teachers used race as a factor impacting the outcomes of enacting TSJ pedagogy (CRT A). In the second interviews, I followed up on factors that might influence their decisions to enact TSJ pedagogy and asked specific questions about how their teaching might address inequities (CRT B). When examining interview data from these questions, I centered race in my analysis by looking at how teachers spoke about race in relation to their use of TSJ pedagogy in tracked classes and sought evidence for alignment with the five CRT Elements (Table 7). There was evidence of all CRT Elements with the exception of the fifth element because the teachers did not speak related to interdisciplinary analysis perspectives. Also, I sought to make sense of the interview data by not only identifying evidence consistent with patterns but also identifying exceptions to the patterns. There were instances when teachers spoke about ideas related to the research questions, such as barriers to TSJ, that did not align with any of the framework tenets. I recorded evidence, and counterevidence, from each interview in relation to the TSJ Principles and Criteria as well as the CRT Elements. I recorded frequencies for each participant related to how often they aligned with TSJ Principles and Criteria as well as the CRT Elements during their interviews to learn more about how their perceptions related to these frameworks.

Table 5

Interview Evidence of TSJ Principles

TSJ Principles	Examples of Evidence	Interpretation
1) Enable significant work with communities of learners.	“We just give kids so many more opportunities to learn things and so many different paths to be able to do that, that they can find success.”	Prior, the teacher stated that algorithms and memorization were ineffective. She described enabling <i>significant work</i> by allowing for different paths students could use to engage in learning concepts.
2) Build on what students bring to school with them (i.e., cultural capital).	“It's the ones that I do strike a personal interest, they, they relate to it in some way.”	The teacher described <i>building on what students bring to school</i> with lessons that have personal interest to students. She was describing that these types of lessons were more engaging when the content related to their lives because students had personal interest in the usefulness of the mathematics.
3) Teach skills, bridge gaps.	“It's really building those skills of asking questions and asking for help so that we're not on both ends of that spectrum of they're either 100% on it or 100% have no idea what's going on.”	The teacher provided examples of <i>skills</i> she felt students needed support with: asking questions and asking for help. She perceived that these skills would help close the learning <i>gap</i> between students. She described a spectrum of student abilities in her classes and that when students employed these skills, she could start to close the gap between students who grasped the content and those who struggled.
4) Work with individuals, families, and communities.	“There's also that it takes a village kind of attitude in the classroom.”	The teacher was describing her deep connections to her <i>community</i> and its members. In this portion of her interview, she detailed multiple ways she connected to the community and students' families. She explained how she engaged <i>families</i> to help her students be more successful. She suggested she and her

		students had the attitude that what happened in the classroom extended to the community and family connections.
5) Diversify forms of assessment.	“I do a lot of formative assessments.”	Prior to this statement, the teacher said she did not like standardized summative assessments. She described using different types of formative assessments in addition to the summative assessments her school used, which suggested alignment with <i>diversifying forms of assessment</i> .
6) Make inequity, power, and activism explicit parts of the curriculum.	“Validating to them that their ideas are, umm, worthy of adult attention.”	The teacher described an instance when students worked on a mathematics presentation related to the budgetary planning of a school event, which required various calculations. The teacher explained how she asked students to research, develop, and present calculations to adults at the school instead of developing and presenting plans herself. The teacher shared <i>power</i> with students when she released the task to students and gave students opportunities to see that their work was just as worthy of attention from adults as the teacher’s work.

Note. “Examples of Evidence” represent how participants aligned with each tenet of the framework and “Interpretation” is a description of how it aligned with each tenet to show the data analysis process replicated throughout the study. Examples might align with part or all of the tenet.

Table 6

Interview Evidence of TSJ Criteria

TSJ Criteria	Examples of Evidence	Interpretation
1) Examining personal values, biases and beliefs.	“Let's help these kids and make them better and do what we have to do to make them better. And that involves fixing ourselves.”	The teacher was describing working with colleagues and she stated she wished more of them would have growth mindsets (beliefs) related to their teaching. When she spoke about “fixing ourselves” to help kids, she was describing how she felt teachers might <i>examine their own beliefs</i> about teaching and learning and make changes for the benefit of students.
2) Understanding the contexts of schools.	“You can have a kid that works really hard, but if they've got a lot going on in their life, then that's (working hard in class) not necessarily going to be the number one priority.”	The teacher was discussing whether student success depended on how hard they worked, and describing the complexity of student success. She recognized <i>contexts</i> that might affect student learning such as who her students were outside of the classroom. She was referring to another portion of her interview when she described a middle school student having a job and how that situation might impact their learning.
3) Affirming diversity as an asset.	“The way you understand mathematical ideas might be different than the way I understand mathematical ideas, and that we are all better having heard other people's thinking.”	The teacher was specifically answering a question about how she showed students she valued diversity. In this quote, she was speaking about conversations she had with students at the beginning of each school year. The goal of these conversations was for students to see they might understand mathematical ideas differently and that they are all better when they hear how other people think mathematically, which suggested she <i>affirmed diversity as an asset</i> .

- | | | |
|--|---|---|
| 4) Creating a caring and just classroom environment. | “We used some of our class time just to express feelings.” | This teacher was describing a time when her students experienced trauma because of violence in their community. Prior to making this statement, the teacher said her students were having difficulty processing mathematics at that time. In this quote, she said she chose to use class instructional time for students to express feelings, which suggested she wanted to <i>create a caring learning environment</i> instead of leading instruction when her students were dealing with trauma. |
| 5) Acting for social justice in the form of service or activism beyond the individual level. | “If a set of kids, subset of kids, or child or children are not having their needs met by the school, it is up to the teacher to make noise about it (to school administration).” | The teacher was elaborating on a survey item to which she agreed part of the role of teachers was to challenge school arrangements that maintain social inequities. Prior to this quote, she expressed how teachers might advocate for students when they see inequities. In this quote, she described instances when teachers may need to make noise <i>beyond an individual level</i> (not pertaining to themselves) to ensure all students have their needs met. This quote suggested she aligned with <i>acting for social justice</i> for students to school administration. (She was not necessarily speaking about service to social justice beyond the school). |

Note. “Examples of evidence” represent how participants aligned with each tenet of the framework and “interpretation” is a description of how it aligned with each tenet to show the data analysis process replicated throughout the study. Examples might align with part or all of the tenet.

Table 7

Interview Evidence of CRT Elements

CRT Element	Examples of Evidence	Interpretation
A) The central role of racism and its intersectionality with other forms of oppression	“It's like, there are students who benefit from the traditional structures of mathematics and they're the same students who have always benefited.”	In this portion of the interview, the teacher was speaking about which types of students she felt benefited from TSJ lessons. In this portion, the teacher referenced traditional structures in mathematics synonymously with traditional mathematics lessons. She said traditional forms of mathematics education benefited the same people (White people) across time, which suggested she felt other groups of students (non-White people) did not benefit or were <i>oppressed</i> by traditional education. She later clarified those who benefited were “students who look like me,” which suggested alignment to the <i>centrality of racism</i> in education because she was referring to identifying as White.
B) Examination of education as part of a critique of societal inequities	“If we want to like break that cycle, there are opportunities to do things that benefit more students, all students, not just the ones who have benefited previously.”	This quote came from the same context of the teacher’s interview as discussed above. The teacher spoke about <i>education</i> when she referred to opportunities to do things (in mathematics education) that might benefit not only those students who have previously benefitted (White students) but all students, which suggested that she was able to <i>examine</i> how <i>education</i> might create or diminish <i>inequities</i> .
C) A commitment to social justice to empower underrepresented groups	“You have always been this smart. It's just figuring out what works for you and how you can be successful.”	During this portion of the interview, the teacher was referring to students traditionally <i>underrepresented</i> in mathematics. This quote was an example she provided of what she might say to these students when students question why they have not been able to find success in mathematics. Her sample statement

aligned with *empowering* those students to recognize their inherent strengths. When she spoke about finding what works for each student, she broadly aligned with social justice teaching in terms of working with individual students to foster their success.

D) The centrality of the strength's students have based on lived experiences

“First off, one of the things, like the, beginning of the year, I try to spend a lot of time hearing, like asking questions that get students to tell me their stories.”

This teacher was discussing how she incorporated students' backgrounds into her teaching. This quote suggested she invested time early in the school year prompting students to talk while she listened to them, which suggested she recognized students have their own *lived experiences* to share. Following this quote, she described that these stories helped inform how she taught mathematics, which suggested that she *centralized students' strengths* because she used what she perceived to be their *strengths* to make pedagogical decisions.

E) An interdisciplinary analysis perspective.

Lack of evidence

Note. “Examples of Evidence” represent how participants aligned with each tenet of the framework and “Interpretation” is a

description of how it aligned with each tenet to show the data analysis process replicated throughout the study. Examples might align with part or all of the tenet.

I followed the same data analysis procedure for the second interviews as the first interviews to examine data for further supporting, or refuting, evidence, or new ways to categorize the data. I reexamined the initial themes to integrate my research notes, quotes, and ideas from the second interviews and again look for disconfirming evidence. I used constant comparison (Glaser & Strauss, 1967) by repeatedly reading the interview transcripts and rewatching the video-recorded interviews to find similarities and differences and refine the emerging themes. I tested research theories about themes with another mathematics education researcher to confirm that evidence supported the themes. Portraits of cases and single-case reports were compiled for each of the participants.

Single-cases Reports

A single-case report consisted of participant demographic and experience data, their school and district data, a LTSJ-B scale value, and analysis of their documents and interviews. After completing the interviews, I considered themes that emerged for each participant with their responses to the prompt and survey results to compile data based on themes and form single case reports. I also reviewed the demographic and school data to consider contextual factors that might affect each case specifically. The single-case reports resulted from the triangulation of interpretations from all data sources. I connected my analysis of each participants' interview responses with their survey and prompt responses to gain a holistic portrait of each case. I finalized the analysis for each case into single-case portraits related to how well the participants were able to enact lessons with TSJ Principles and aligned with TSJ Criteria in their tracked classes, with consideration of CRT Elements to examine how the teachers understood their lessons to be equitable.

Cross-case Analysis

I used direct interpretation from single-case reports for thematic aggregation in cross-case analysis (Stake, 1995). First, I looked for common language and evidence from the document and interview analyses to explicate cross-case themes that were invariant across cases. After a theme was identified in a single case, I returned to the data from the other cases to determine the depth of the theme's presence throughout all cases while also looking for counterevidence. Along with the LTSJ-B scale values, I reviewed cases demographic and descriptive data to consider possible similarities or differences across cases and possible connections these data may have to the cross-case themes. I organized evidence from each case based on the themes and identified illustrative quotes from the self-report documents and interviews that represented the overall responses (Erickson, 1986; Rubin & Rubin, 1995). This research underwent a continuous peer review process with an academic supervisor through which they provided feedback on my document analysis, interview protocols, analysis, and themes. They examined my processes to verify if my document analyses and interview descriptions matched the concluded themes, and they recommended changes when warranted.

Trustworthiness and Reliability

Case study methods are commonly employed in mathematics education research (e.g., Felton- Koestler, 2019; Sztajn, 2003) and in research related to tracking (e.g., Staples, 2008; Webel et al., 2022; Yonezawa et al., 2002) and TSJ (e.g., Gregson, 2013; Leonard & Moore, 2014). Therefore, case study is an established and trusted method for this study. For each of the cases in this study, there were multiple sources of data considered, which enhanced the construct validity of the study through triangulation (Yin,

2018; Stake, 1995). The data and emergent themes were discussed in consultation with another mathematics education researcher. Constant comparison methods enhanced the internal validity of this study throughout the data analysis process by building themes with patterns (Yin, 2018). The external validity of this study was bolstered by replicating the same process for each case throughout the research design and using study protocols in data collection (Yin, 2018).

The LTSJ-B scale is a sound, reliable instrument, but the developers acknowledge it does not encompass all of the complexities of TSJ (Enterline et al., 2008). Therefore, I incorporated more data sources in this study to help illuminate additional aspects of TSJ and particularly its role in creating equitable learning experiences within a tracked system. As with all case studies, the results are not intended to be generalized to all middle school mathematics teachers who teach in metropolitan areas to diverse students in tracked systems. Given this study used a non-probability sampling method to secure survey respondents, it is not possible to calculate a sampling error for the survey or to describe how representative this study's sample is of the general population (Dillman et al., 2014).

CHAPTER 4 RESULTS

The purpose of this study was to examine how well Teaching for Social Justice (TSJ) works in tandem with tracked middle school mathematics to create more equitable learning environments. I used a survey to measure teachers' levels of commitment to TSJ and used case study methodology to investigate how teachers described enactments of TSJ pedagogy in their classrooms and their perspectives on how well they could create more equitable learning environments for their students. The research questions were:

- For middle school math teachers who have taught in tracked classes, what are their levels of commitment to TSJ pedagogy?
- For those middle school math teachers who tend to endorse TSJ pedagogy, how do they describe their attempts to enact TSJ pedagogy across tracked classes?
 - What are teachers' perceptions of how well they use TSJ pedagogy to create more equitable learning experiences?

In this chapter, I present results from the survey followed by cases of three middle school mathematics teachers. Each teacher's case includes background information and results from the survey and interviews. I organize the results by each individual case before providing cross-case results.

Survey

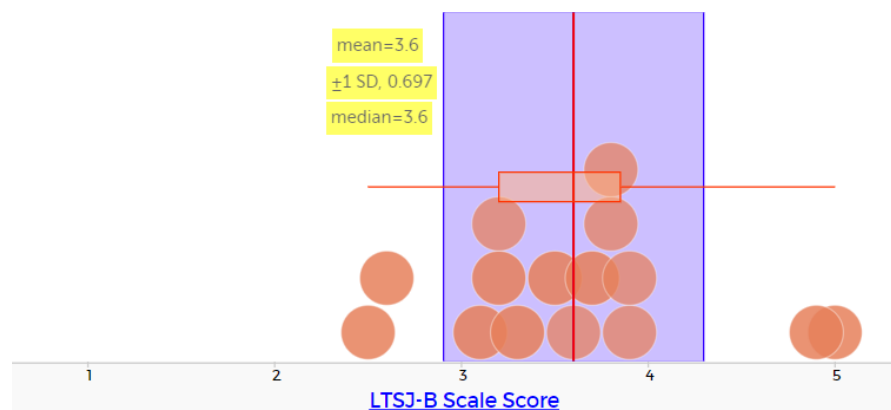
I used the Learning to Teach for Social Justice Belief Scale (LTSJ-B) as part of a larger survey for middle school mathematics teachers that also included demographic questions (Appendix A). There were 20 teachers who completed most of the demographics portion of the survey. There were four male teachers who took the survey, 14 female teachers, one teacher who preferred not to provide their gender identification, and one nonresponse. In terms of race, two teachers responded being Black, 16 responded being White, and one preferred not to provide their racial identification. There was one nonresponse. The average years of teaching experience for survey respondents was 10.9 years ($n = 20$, $SD = 8.25$), with a range from one to 30 years of experience. Of the 20 respondents, 18 teachers reported having tracked mathematics classes and 17 of these teachers reported teaching middle school mathematics.

There were 15 teachers who completed the entire survey, all of whom taught in tracked middle school mathematics classrooms. The following results are for these 15 respondents. The LTSJ-B scale has 12 items with Likert-scale responses from 1 to 5. The overall LTSJ-B scale score for each teacher can range from 1 to 5 and is calculated using the mean of their responses to the 12 items. Figure 2 shows the distribution of the overall LTSJ-B scale scores for the 15 respondents. Individual respondent scores are represented with dots; the mean and median are represented with a vertical line; and the variability in scores is represented through a boxplot from which the range and interquartile range can be estimated. The overall mean LTSJ-B scale score across respondents was 3.6 ($SD = 0.70$). The low variability suggests a high level of respondent agreement on responses for this data. Eleven teachers scored above 3 but below 4, which suggests they tended to

endorse TSJ pedagogy. Generally, the mean scores and median responses for each teacher were similar with little variation except for two teachers at each extreme. Two teachers scored above 4 to indicate high endorsement of TSJ pedagogy. For these teachers, their median responses to individual survey items were 3 or above. Two teachers scored below 3, which was indicative of teachers who tended not to endorse TSJ pedagogy. For those two teachers, their median responses to individual survey items were 2 or lower.

Figure 3

Distribution of Overall LTSJ-B scale scores

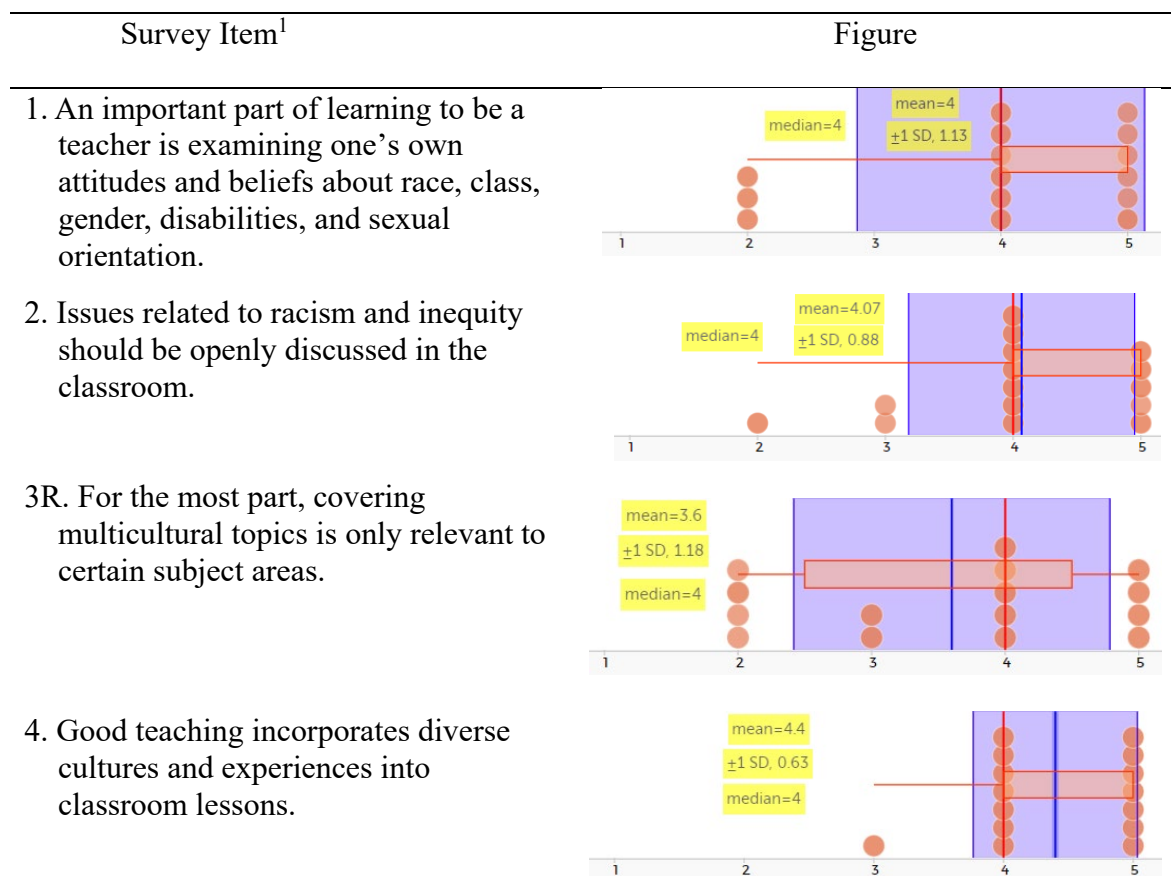


Considering the responses to individual LTSJ-B scale survey items, for 10 items, the mean LTSJ-B scale scores followed expectations for teachers who tend to endorse TSJ pedagogy and fell at or above 3 (Enterline et al., 2008). This is reasonable given that 13 of the 15 respondents tended to endorse TSJ pedagogy to some degree. There were two items (Items 11 and 12) for which the mean responses for all teachers fell below 3, which does not align with those who tend to endorse TSJ pedagogy. This result is not unexpected, though, because scale developers found that Items 11 and 12 were the most difficult to endorse (Enterline et al., 2008). Item 11 focuses on students’ hard work, and scale developers expect teachers who tend to endorse TSJ to score above 3 and not agree that hard work leads to direct success in school (Enterline et al., 2008). Question 12 is

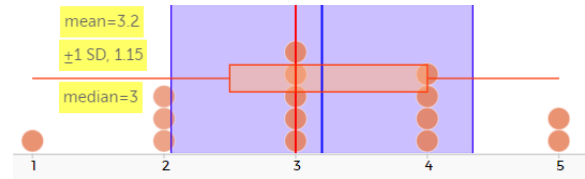
about a teachers' purpose in preparing students to lead the lives they are likely to lead, and in terms of aligning with TSJ, a teacher would at least be uncertain (score of 3 or above) that students' paths are set and would tend to not agree with the assumption that students' paths are set (Enterline et al., 2008). The two teachers whose LTSJ-B scale scores fell below 3 both responded to items 11 and 12 with 1 or 2. The most common response for both items 11 and 12 was 2, scores at or above the median for both items were not high enough to raise the mean above 3. For both items 11 and 12, there was only one respondent who responded with a 5, which kept the overall means lower. Table 8 provides response distributions and descriptive statistics by LTSJ-B scale statement.

Table 8

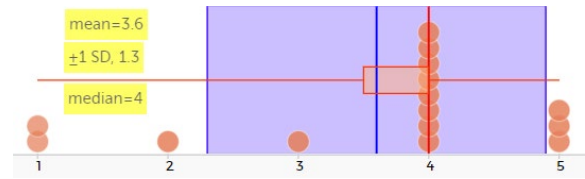
LTSJ-B Scale Responses: Descriptive Statistics (n = 15)



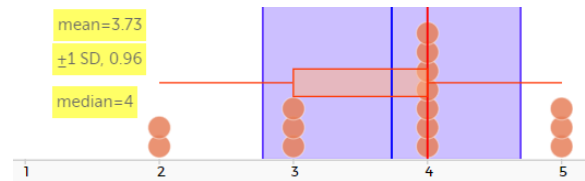
5R. The most important goal in working with immigrant children and English language is that they assimilate into American society.



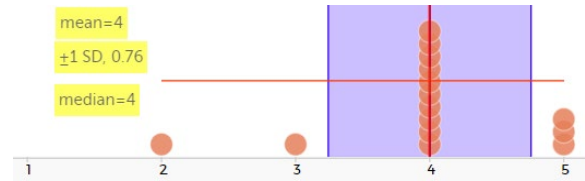
6R. It's reasonable for teachers to have lower classroom expectations for students who don't speak English as their first language.



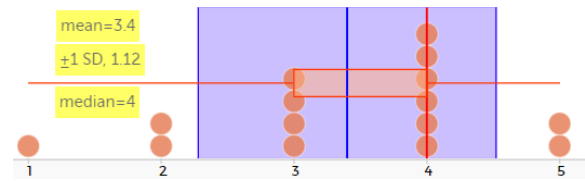
7. Part of the responsibilities of the teacher is to challenge school arrangements that maintain societal inequities.



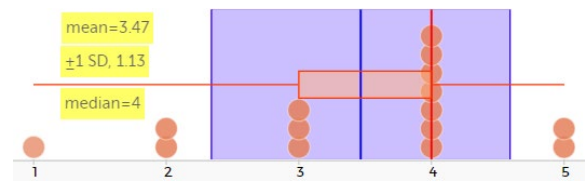
8. Teachers should teach students to think critically about government positions and actions.



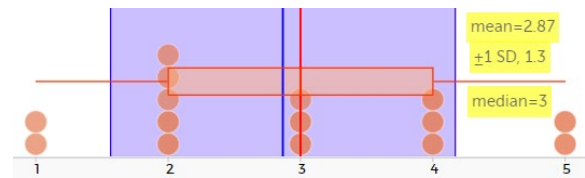
9R. Economically disadvantaged students have more to gain in schools because they bring less into the classroom.



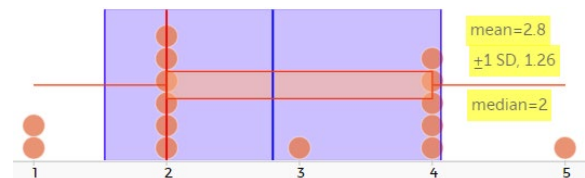
10R. Although teachers have to appreciate diversity, it's not their job to change society.



11R. Whether students succeed in school depends primarily on how hard they work.



12R. Realistically, the job of a teacher is to prepare students for the lives they are likely to lead.



¹ Item numbers listed with an R depict items that were reverse scored.

Summary

Most of the teachers who participated in the entire survey—73%—tended to endorse TSJ pedagogy and tended to agree with other respondents on the LTSJ-B survey items. Two teachers—13%—highly endorsed TSJ pedagogy. Teachers in this study tended not to agree with the last two items, suggesting that even though most tended to endorse or endorsed TSJ, their commitment to TSJ was not strong enough to endorse the most difficult items, except for one teacher. However, there were survey items that revealed TSJ topics with which most teachers in this study strongly agreed such as incorporating diverse cultures and experiences into lessons, openly discussing racism and inequity in the classroom, and examining their own beliefs to indicate commitment to some important aspects of TSJ.

Cases

Three teachers participated in interviews and responded to a written prompt to offer further insights into this research. These teachers scored 3 or higher on the LTSJ-B survey and reported teaching tracked middle school mathematics classes. For each of the cases, I present results from document analysis and two interviews as well as relevant survey and demographic information. Throughout each case, I reference the TSJ Principles, TSJ Criteria, and Critical Race Theory (CRT) Elements, which I labeled in the evidence according to with which, if any, of these three framework ideals the evidence aligned (e.g., TSJ Principle 1, Criteria 3, CRT D). The interview questions were open and allowed teachers to speak across all aspects of the frameworks. At times, they spoke about ideas relevant to the research questions but did not align with any aspects of the frameworks and in those instances, no framework tenets were labeled. Most evidence

cited in the case descriptions came from the interviews. When quotes are taken from the responses to the prompt, this data source was specified.

Case 1: Betsy

Overview

On the LTSJ-B scale, Betsy had an overall mean score of 5 ($SD = 0$), meaning her beliefs aligned with highly endorsing TSJ pedagogy. Betsy identified as being White and taught for 19 years at the time of data collection. She had recently completed a master's degree in teaching mathematics. At the time of the study, she taught two sections of sixth grade middle school mathematics and served as a mathematics specialist at a small K-12 independent school in the northeastern United States. Betsy taught other subjects and other grade levels in the past. She reported currently teaching tracked mathematics classes and categorized her classes as at or below grade level. Per her school's website, 38% of the students are students of color, and Betsy reported that her classes are representative of the school's student demographics. She indicated that she would "go to bat for" racial equity in mathematics classes if she was in a situation where she felt tracked classes did not reflect the racial diversity of her school. Betsy stated in her interviews that the school administration gave her "a lot of freedom" in her teaching and professional growth. She described her teaching situation as "very well-resourced." However, despite her seemingly strong endorsement of TSJ pedagogy, she identified barriers that made it difficult for her to enact TSJ lessons.

Betsy submitted a TSJ lesson plan focused on analyzing a slow reveal graph about the growth of fossil fuel use over time to address environmental justice (Laib, 2019). When she used this lesson, Betsy facilitated student discussion as she incrementally

revealed aspects of a graph. The lesson included images of a graph, and with each reveal, more information was added to the image such as axis labels and color codes. The mathematics objectives for students related to analyzing and interpreting the graph. In terms of social justice, the objectives were for students to think about historical events that caused changes in fossil fuel use and to consider how students use energy in their own lives.

Betsy appeared to be assertive in taking action to create equitable learning environments and was motivated to learn more about how to do so. She described herself as someone willing to take on a challenge such as TSJ because she believed in herself. Betsy talked about a hypothetical situation in which educators would not even attempt to make mathematics meaningful to students because it was just not as easy to do as with other subjects. She then said she would be the type of person to step in and say “maybe I can do it because I am special and unique.” Betsy also seemed motivated to learn about TSJ as part of making mathematics more meaningful to students. Over school breaks, Betsy read books about teaching and in one of the interviews, she picked up and showed an example of a book she enjoyed: *Rethinking Mathematics: Teaching Social Justice by the Numbers* (Gutstein & Peterson, 2006).

Framework Alignment. When Betsy spoke about her teaching, she described experiences aligned with various aspects of the TSJ and CRT frameworks but to different degrees. The exception was when Betsy spoke about barriers to enacting TSJ lessons, which infrequently aligned with the research frameworks. In terms of TSJ pedagogy, she emphasized some Principles and Criteria more than others. Betsy spoke most often related to TSJ Principle 6 (see Table 9), citing ways she made power or inequity part of

her classroom culture. For example, she described wanting to be able to share power with students during lessons instead of being the one doing most of the talking: “everybody (student) has a voice, everybody's included, and everyone is saying something that's important.” In terms of equity, Betsy described wanting to create learning experience that incorporate equity into the mathematics so much that the “equity piece is part of what I'm actually assessing besides just like, have you met the content standards?” Conversely, she spoke the least related to TSJ Principle 4 (see Table 9). As for the TSJ Criteria, Betsy frequently described creating a caring and just environment in her classroom, TSJ Criteria 4 (see Table 10). For example, when discussing how she decided to use TSJ lessons in her classes, she expressed wanting to make sure to show care for the students first when she said: “I'm not going to do harm, right, to the kids who are most vulnerable within my care.” However, her focus remained heavily on what occurred in her own classroom and less on service to social justice beyond the classroom, which was the least frequent TSJ Criteria labeled on her data.

Table 9

Frequencies for TSJ Principles: Betsy

TSJ Principle	<i>Frequency</i>
1. Enable significant work with communities of learners.	20
2. Build on what students bring to school with them (i.e., cultural capital).	15
3. Teach skills, bridge gaps.	13
4. Work with individuals, families, and communities.	5
5. Diversify forms of assessment.	8
6. Make inequity, power, and activism explicit parts of the curriculum.	24

Table 10*Frequencies for TSJ Criteria: Betsy*

TSJ Criteria	Frequency
1. Examining personal values, biases and beliefs.	17
2. Understanding the contexts of schools.	15
3. Affirming diversity as an asset.	12
4. Creating a caring and just classroom environment.	25
5. Acting for social justice in the form of service or activism beyond the individual level.	5

Looking at the CRT Elements, Betsy most frequently connected with the examination of education as part of a critique of societal inequities, the second CRT element (see Table 11). When she said, for example, students had a “whitewashed view of like who the mathematicians are” she was discussing efforts she made to portray diverse mathematicians and accurate history. This statement showcased her critique on what students were learning and how it molded who students think become mathematicians, which suggested she recognized that education can perpetuate inequitable societal perceptions about who can be a mathematician. Alternately, Betsy did not speak about topics that related to an interdisciplinary analysis perspective, the fifth CRT Element.

Table 11*Frequencies for CRT Elements: Betsy*

CRT Elements	Frequency
A. The central role of racism and its intersectionality with other forms of oppression	16
B. Examination of education as part of a critique of societal inequities	35
C. A commitment to social justice to empower underrepresented groups	10
D. The centrality of the strengths students have based on lived experiences	14
E. An interdisciplinary analysis perspective	0

Enacting Teaching for Social Justice

Visions for Enacting TSJ. To better conceptualize how Betsy enacted TSJ pedagogy, I asked her to describe her understanding of TSJ. She conveyed that TSJ lessons were those that allowed her to not only teach mathematics content but to also empower each student to “be a good person and do good things for the world,” which was “her job as a teacher.” When asked to describe how she knew when a lesson was a TSJ lesson, she led with the concepts of equity and access while still connecting those ideas to making the world better, which seemed to be her description of building activism into curriculum (Principle 6). Through TSJ, in addition to helping her students make a positive impact on the world, Betsy might make an impact, too: “I can be that person who makes the world a better place by giving more students equitable access to the mathematics that I’m teaching.” The slow reveal graph lesson provided an example of how Betsy could make the world better, which was how she described giving more students equitable access to bridge gaps (Principle 3). During that lesson, she said she

used open-ended questions such as asking “what do you notice and what do you wonder?” to encourage all students to think critically about fossil fuel consumption. In her mathematics classes, Betsy stated wanting students to “do things that matter” and “real work (connected to their lives),” so she prioritized helping students see that their ideas and what they could do mattered.

Betsy appeared to believe that TSJ had a place in mathematics classes. This belief was evident in her slow reveal graph lesson for which Betsy reported mathematics learning objectives such as analyzing and interpreting graphs and social justice objectives such as considering how fossil fuel use changed over time and historic events that may have caused the change. Betsy observed positive mathematical outcomes from this lesson in terms of the students’ interest in the graphs and their abilities to interpret graphs. She said students were able to build skills (Principle 3) to make inferences about graphs to achieve social justice outcomes such as connecting moments in history with changes in the graph as they progressed through the lesson.

Betsy appeared to have strong beliefs that TSJ pedagogy should be normalized in mathematics classrooms. She expressed wanting TSJ pedagogy to “be more integrated” into the content standards for what she was teaching. This belief seemed to compel her to enact practices that partially aligned with TSJ even though she reported not enacting any full TSJ lessons recently. When asked about how often she enacts TSJ lessons, her response was “not enough.” Betsy made clear, however, that she wanted to normalize the use of TSJ lessons when she said: “I don't want this, the social justice lessons to be like what we do on Friday afternoon because they're fun and engaging. It's like every lesson should be infused with these lines so that it is just, normal.” She said that TSJ pedagogy

“needs to be in all of, all of the, it needs to be part of the whole thing” when describing lessons. Her statements showed a commitment to social justice (CRT C).

Practices. Betsy’s attempts at enacting TSJ pedagogy could primarily be seen through her attempts at enacting equitable teaching practices and not through enacting entire lessons that would be considered TSJ lessons. In addition to providing a TSJ lesson she used in her teaching, Betsy described enacting practices she felt represented TSJ pedagogy. These practices, however, could be well-matched with the TSJ Principles and Criteria, as suggested by the counts for each displayed in Tables 9 and 10. The teaching practices that Betsy described enacting were voice, sharing power with students, student to student conversations, and flexibility.

Betsy appeared to value students’ voices in ways such that students felt appreciated, learned from each other, and gained confidence. Betsy described voice as not only students’ actual communication but also their ideas. Betsy expressed that students should not simply be “sponges” that receive her knowledge, but instead “everybody has a voice, everybody’s included, and everyone is saying something that’s important.” While teaching, she explained that she tried to “spend a lot of time hearing, like asking questions that get students to tell me their stories,” which suggested she valued students’ lived experiences in what they shared about their lives (CRT D). Betsy gave a general example of a class period in which she provided students ample time to work and develop ideas on white boards before offering them opportunities to share and build upon each other’s ideas. She fostered opportunities for students to share from their perspectives to build on what students already knew (Principle 2) and attempted to create a just learning environment (Criteria 4) by allowing time for students ample to prepare before they

shared. Betsy affirmed diversity as an asset (Criteria 3) by making sure everyone's voices were heard and students had enough time to generate ideas and share. Betsy also considered elevating students' voices in the classroom to support student activism. For example, when asked about supporting student activism, Betsy said with apparent conviction that "these are kids who have a voice and have ways to use it." Betsy seemed to view giving students opportunities to share and converse as a way of "validating to them that their ideas are, umm, worthy of adult attention." Her selection to use the words "validating" and "worthy" displayed her intentionality in lifting students' voices to give them confidence as activists whose ideas were important for adults to hear (Principle 6). This example showcased her apparent priority to support students as activists, as shown in her frequent alignment with aspects of TSJ Principle 6.

Betsy appeared to make decisions about how she would teach based on sharing power with her students. She stated knowing equity practices in mathematics education such as sharing power because of her professional learning. At the time of the interview, Betsy was taking a course, and in that course, she learned about "the equity-based practices and that idea of positioning students as experts in the room." She explained that she worked toward being patient to allow students time to speak before she inserts herself. She stated strongly that "everyone gets a chance to share, I am trying not to be the like expert in the room," which meant she wanted to share power with her students and position them as experts (Principle 6). Betsy discussed conducting lessons during which she intentionally talked less than students during mathematical discussions because she knew that when she speaks "I bring a power and a level of like, umm authority to the, to the words that I say." Betsy said her presence "has to be even less than everyone else's.

Like, I have to elevate the other students in the classroom.” Betsy did not say that she tried to do this but that she must do this, which conveyed how strongly she believed in giving power to her students (Principle 6).

Betsy reported fostering student to student conversations in lessons to “create opportunities for every kid to say something.” While discussing her slow reveal graph lesson in the interviews, one of the reasons she felt it was successful was she could “build student to student conversation” and “spark conversation” about the history of fossil fuel use and the current climate crisis. This approach allowed Betsy to enable significant work between students by deepening student conversations about the content (Principle 1). She indicated that her students felt like “their ideas are valued in the space” when she nurtured student discussions. She said lessons that were “discussion based” and “less sort of standard math traditional types of lessons” would allow more students to take part in the activity. In cultivating student to student discussions, Betsy enabled significant work from the learners in her classroom (Principle 1) because discussions provided expanded access and deeper engagement to the content for students.

Betsy appeared to be flexible, particularly with assessments. For example, Betsy reported how she might “open up the projects” so that students have “some decision” on how they connect with the content of the lesson that she needed to assess. Betsy discussed being flexible with how students might engage in assessments because students were “able to meet the standards in a lot of different ways.” She described offering her students different ways of completing assessments when she gave students choice on projects: “the students could either choose to write up some questions or present them orally.” Betsy’s flexibility provided students with opportunities to do significant work

because students could engage with the content in a variety of ways (Principle 1). Betsy's flexibility also allowed students to create different products, which allowed her to assess students in different ways (Principle 5). Betsy also expressed the need for flexibility in TSJ lessons, specifically when assessing student learning objectives. In the slow reveal graph lesson, Betsy said she allowed students to use tools to do computations because that is more like real life. Then, the objectives and assessments were about higher-level thinking skills, such as interpretation. Betsy said:

We don't need to memorize the things that we needed to memorize before in order to just be able to compute, in order to just be able to like come to an answer. It's like, that, you can ask Chat GPT to do anything we needed to do. But like, how do we interpret what we're finding?

Betsy's choice to move away from assessing students solely on correct answers aligned with aspects of TSJ because she was diversifying how she assessed students (Principle 5).

Betsy appeared to believe that when teachers are flexible in planning lessons, they are more equitable. Betsy mentioned being flexible when she discussed different influences on her lesson planning. It seemed that her motivation to be flexible was to provide students what they needed. She said she tried to use students' work to learn what her students are telling her through their work. If she planned too far in advance, she explained she might not be meeting students' needs. Betsy said:

I give myself permission to like, not over plan things, and I think there's a certain level of flexibility that you have, that I have to have if I'm going to really read and respond to what my students are giving me on a day-to-day basis, I can't plan too far ahead because they might not go in that direction and like being OK with that.

Betsy expressed that it was more important to provide students with what they need than to simply move through content on a set pace: “What do you need? What are we going to do? What's the best activity to get us there and alright, we'll do that tomorrow.” Her philosophy for planning appeared to be based on her desire to create a caring, just classroom and to bridge gaps (Principle 3, Criteria 4).

Race. Betsy also expressed ideas related to race in relation to TSJ. When asked about whether issues of race should be openly discussed in the mathematics classroom, Betsy seemingly suggested the importance of discussions around racism: “I think we do children a disservice if we pretend that the world outside (related to racial justice) their classroom is sort of like nonexistent or not connected to the world inside their classroom because it's just false.” Her comments suggested she recognized that schools are situated within societal contexts that cannot be ignored, and that education and racial justice should be connected (Criteria 2, CRT B). Betsy said that she had training on having discussions about race in her classroom and because of that training, she examined her own beliefs about her abilities as “mediumly confident” to facilitate these discussions (Criteria 1), although she did not report examples of having discussions about race. She acknowledged that she was nervous about facilitating race discussions prior to training but that the training helped her gain confidence. Betsy’s training and beliefs aligned with aspects of TSJ Principles and Criteria in her willingness to examine school contexts and infuse issues related to race outside of the classroom into her mathematics lessons.

Making Connections. Betsy described wanting to highlight connections between mathematics and social studies to pique student interest. Through the slow reveal graph lesson Betsy submitted, she showed how she might connect history with mathematics.

Betsy described a good teacher as a storyteller who engages students by connecting content with history to help students find what is interesting in the mathematics. Betsy expressed that mathematics teaching was not only about the content but about how it was presented and that mathematics could be taught “very boringly.” Regarding slow reveal graphs, in her interview she said “a good teacher, a good presenter sharing this and like, helping students expose the patterns and the, the connections to history, that, that's the engaging part.” She wanted students to discover patterns in the historical data and she used a slow reveal style lesson to teach analytical skills (Principle 3). Betsy also made efforts to educate herself to present accurate history. She gave an example about Pascal’s triangle. Betsy said that she read deeper about Pascal’s triangle to find it was developed by a Chinese mathematician but “Pascal was the White man who did it, and so he got his name on it.” Betsy described that when she wanted to infuse history into her mathematics lessons, she wanted to present a “broader history” and to counteract the idea that mathematicians were all White men. If she instead took a color-blind approach, systemic racism would persist (CRT A). She gave another example of connecting history to mathematics when she presented mathematicians of the week to her classes and focused primarily on “non-White-male mathematicians” to show her students she valued diversity (Criteria 3).

Betsy also appeared to want to connect the content from her mathematics classes with what is going on at her school. At the time of the study, she taught at a small independent school and she reported knowing what was going on throughout the school academically and socially. She collaborated with other teachers regarding what they were teaching and expressed that students have had a heightened level of interest in

mathematics class when “we take this content [mathematics], which is important to know in the context of what we were doing [other subjects]” (Criteria 2). Her slow reveal graph lesson used data as “sort of a bridge between the social studies and math worlds.” She said one of the reasons the slow reveal graph was successful was that it allowed students to see that mathematics can be used to make connections about what was going on in our world. She stated wanting students to feel empowered to have an “active role in their world” and that “math is a way that we can understand what is going on around us,” which suggested she recognized schools are situated within contexts (Criteria 2). Betsy also spoke about a festival centered on an ancient civilization that took place annually at her school and described her efforts to connect what she was teaching about integers to that ancient civilization. Betsy seemed to understand the contexts of schools and wanted students to make these connections as well (Criteria 2).

Professional Learning to Enact TSJ. Betsy reported taking advantage of many opportunities for her own professional learning to better learn how to enact TSJ pedagogy. When asked about the slow reveal graph lesson, Betsy attributed some positive outcomes from the lesson to her school being “willing to put resources into me doing professional development to be able to learn how to facilitate those kinds of conversations to support that (TSJ).” She elaborated further and said: “I recognize the privilege that being able to teach in these, sort of like, what are you know, what feel like really like rich ways, um it is a privilege for me.” However, she did not think all teachers had the experiences she had because not all teachers had the support she had from administration for TSJ or the professional learning experiences, acknowledging that different schools have different contexts (Criteria 2). With a tone of disappointment,

Betsy said: “I don’t think that’s everyone’s teaching experience.” She stated that she believed the teaching environment she was in at a small independent school allowed her “to do the type of teaching that I think is valuable.” Betsy examined how education teaching experiences and environments played a role in how teachers might be able to enact TSJ pedagogy.

In her own time, Betsy engaged in informal professional learning. She read books on teaching and learning mathematics to improve her teaching and examine her own beliefs. Betsy said she started thinking about TSJ after purchasing and reading the Gutstein and Peterson (2006) book that provides TSJ lesson ideas. She also mentioned reading a book on culturally responsive teaching as an example of one of her efforts to examine how her teaching methods and beliefs might impact how students learn. In particular, she spoke about code-switching. From her reading, Betsy was able to understand her students and adjust her beliefs about how students learn. She discovered that students may have learned one way at home and they may have to code-switch when they come to school to fit the school culture of learning. Betsy said about students: “you like, learn this way at home and are very accustomed to that, and they come to school and there’s like a different type of learning required for you.” Betsy seemed to convey that code-switching was not a student deficit, but a strength (CRT D). By engaging in her own professional learning, Betsy learned more about both her students and TSJ while analyzing her beliefs about teaching and learning (Criteria 1).

TSJ Lessons are Difficult to Enact. Betsy found it difficult to enact dedicated TSJ lessons and spoke about limitations to teaching these types of lessons. When asked how often she enacts TSJ lessons such as the slow reveal graph lesson she said “in my

math, in my current math role, we are we are batting 0 at this point.” Despite Betsy’s efforts toward her professional learning, the autonomy she had at her school, and her high tendency to endorse TSJ pedagogy, she was not able to enact complete TSJ lessons in her most recent year of teaching. In her experience, the barriers to enacting TSJ lessons were assessment, time, a heightened sense of responsibility, the difficulty of talking about race, and her uncertainty that TSJ lessons make an impact beyond the classroom. During these portions of the interviews, her comments aligned less frequently with the framework than when she spoke about ways in which she enacted TSJ pedagogy and fostered equity.

Assessment. When asked about possible negative aspects of TSJ lessons, Betsy said “it’s much harder to do” and mentioned assessment as one of the issues she had with TSJ lessons. She noted that TSJ lessons might not have “the level, the like for lack of a better term, like rigor of assessment.” Even though Betsy had social justice learning objectives for students in her TSJ lesson and social justice goals for her students, the social justice piece of a TSJ lesson was something that Betsy said she did not know how to assess. Betsy also stated she felt pressure as a mathematics teacher to “always be in assessment mode.” Betsy described that in her experience teaching other subjects, those other subjects were broader, allowing for flexibility in content and approach, whereas she felt pressure to assess mathematics as “executing computations, for example.” She seemed to want students to get into “the work of mathematics” with more flexibility in assessment that she felt other subjects have but said that in her experience she found other teachers ask, for example, “but like, what about the Pythagorean theorem?” focusing assessment on computation. This conflict appeared to pose a problem for Betsy

because she felt pressure to use types of assessments that focus on executable mathematics tasks, which affected her decisions about what kinds of lessons to enact.

Time. Betsy expressed that time was a barrier to enacting TSJ lessons. Betsy explained that in her experience, mathematics teachers must move at a certain “pace in order to by the end of the year say that we have like ticked off the boxes in these [content] areas.” She reported that compared to other subjects she has taught, she felt pressured by time more when teaching mathematics. Betsy said she felt “like I’m always up against the clock.” She explained her school calendar and that she has had limited classroom time. When planning lessons, she said “I have to use my time really efficiently.” She confirmed that time was the main factor that influenced her decision-making for planning lessons. Even when asked what she would do with unlimited time, however, she did not specifically mention enacting more TSJ lessons. She said that “being able to move at whatever pace we needed to move through would be great” but that time would always be a problem.

Heightened Sense of Responsibility. Betsy described feeling a sense of responsibility to TSJ but did not always speak about this responsibility in a positive way. When asked about how others have received her attempts at enacting TSJ pedagogy, she described a sort of apathy from parents. She explained that in her experience, parents simply wanted their children to feel good about themselves, so parents were “neutral, if not positive.” Betsy seemed to want parents to buy into her TSJ pedagogy, but she conveyed that she really did not think it was what they cared about. She said about parents: “I wish that I could say that I’m herding everyone to my brand of math, but it’s really like, are you going to meet the needs of my child this year?” With her role as the

only mathematics specialist in her school, Betsy explained that she felt even more responsible for service to TSJ because “there's no other person who's devoted to math in the way that I am at my school” and it was “easy to become isolated” in those efforts.

Race. Betsy was willing to speak openly about race but appeared apprehensive in making race a topic in her lessons. Betsy said that when she conducted lessons such as TSJ lessons that may touch upon race, she said she wanted to “tread very, very thoughtfully.” She seemed conscientious about being careful and intentional in these lessons: “I have to be sure that I am going, not, I'm not going to do harm right to the kids who are most vulnerable within my care” (Criteria 4). Even though her survey responses (Item 2) indicated Betsy felt openly discussing race was important, she questioned her ability to conduct discussions about race during lessons. She said about planning lessons that may center around race, she considered “can I have this conversation?” and she examined her own beliefs to determine if she was confident and skilled enough to do it (Criteria 1). She also engaged in examining her personal values (Criteria 1) because she cared to have “no risk of harming” students (Criteria 4), yet she wanted to be able to have discussions about race with her students. Betsy seemed to understand that if she remained neutral, she ignored that racism is pervasive (CRT A). However, she said that it was easier to select a topic other than race for a TSJ lesson such as environmental justice because “the bar [risk] is much lower than if I was talking about something with race.”

Uncertainty about Impact Beyond her Classroom. Even though TSJ lessons might be difficult to enact, she conveyed that she wanted to include more TSJ lessons in her teaching but seemed unsure she could be successful in achieving her goal to affect change beyond her classroom. She shared a dream she had of developing a curriculum

that combined social studies and mathematics through which she could find topics in social studies that were “meaty” for math at every grade level. But she called it a “pipe dream.” She said her ability to really serve to advance TSJ in mathematics was a matter of her “bandwidth” outside of the classroom, which fluctuated. She acknowledged that it had been nearly a decade since she first picked up the TSJ book that inspired her but she felt like she was just now getting closer to enacting TSJ lessons: “I haven't made more progress in this regard, but I feel like I'm getting closer.” To truly enact TSJ lessons more consistently, Betsy seemingly suggested that she still needed more opportunities to focus on these types of lessons. Betsy reported that she was doing the best she can to teach in ways that aligned with TSJ pedagogy even if her actions “will not solve the bigger problem.” Betsy seemed to have internal conflict over not being able to do more with TSJ lessons in mathematics.

Summary: Enacting Teaching for Social Justice. Betsy showed a willingness to speak openly about TSJ topics such as race, and she had her own conceptualization of what TSJ is in mathematics, namely empowering students and making the world a better place. Betsy described her attempts to enact TSJ pedagogy by describing equitable teaching practices she used that align with aspects of TSJ. The slow reveal graph lesson provided an example of a TSJ lesson Betsy has used in the past, but she seemed generally more focused on the practices she used throughout her teaching than on issues of social justice. Betsy attempted to connect mathematics with other subjects or what happened at her school to make students aware that mathematics connects to the world around them. She invested time to learn more about TSJ or topics that support enacting TSJ pedagogy to suggest a desire for her practice to continue to evolve. However, Betsy's strong

endorsement of TSJ pedagogy, beliefs about TSJ, and her personal time investment in professional learning did not translate fully to engaging in all aspects of TSJ (i.e., enacting TSJ lessons). Betsy described barriers to enacting TSJ pedagogy. Such barriers can impede teachers who endorse TSJ pedagogy, such as Betsy, from implementing TSJ lessons (Gonzalez, 2009).

Equity through Teaching for Social Justice

Pertaining to the second research question, Betsy had opportunities during the interviews to discuss how TSJ pedagogy played a role in the equitability of her tracked mathematics classrooms' learning environments. Betsy described equity as when all students felt valued and have a voice. Betsy recognized that inequities exist in mathematics, spoke about how to address inequities, and discussed connecting to students' backgrounds and races in the classroom. Betsy also expressed doubt about how well she addressed inequities in mathematics teaching and learning.

Recognizing Inequities. Betsy noticed racial disparities in mathematics classes throughout her teaching. She described what seemed to be a hypothetical situation based on her experiences of looking at sets of students and seeing apparent disparities. But she was not able to definitively say that what she observed was racist. Betsy said:

You're looking at these, of 20 kids, and the two African American boys have the lowest academic scores in the class. Like even if that is a coincidence, that's still says something about our community [...] I think it's [racism] there and I know philosophically and like theoretically that it is, it has to be there, but I don't have like, a like direct line in my own experience.

When asked directly whether she felt the students in tracked mathematics classes had the same experiences she said: “No, I don't think so.” Betsy’s primary thought regarding students’ placement in tracked mathematics levels was: “I think everyone [students], everyone suffers.” Betsy did not speak about racial inequities but instead she spoke about academic inequities perpetuated by tracking, which seemed to be connected to race inadvertently during her descriptions (CRT B). She spoke about limitations she saw across all levels of tracking. She gave an example of the accelerated mathematics class at her school and said: “I don't think [it is] serving all of our students equally.” She seemingly attributed some of the inequities she saw in part to “complainy parents” pushing for their students to be placed higher in mathematics instead of properly serving the students, which seemed to be a criticism about how education played a part in societal inequities (CRT B). She also attributed academic inequities to students in her accelerated class feeling “threatened” and less receptive to learning when she taught in ways those students did not feel catered directly to their strengths. Betsy also recognized that students placed in her lower-level mathematics classes who appeared to have higher abilities “were held back in a lot of ways because they could like, they would have benefited from having kids pushing them,” perpetuating inequities through educational structures (CRT B). She expressed that tracking became limiting for the students in her higher-level mathematics courses as well by creating a “false sense of like, confidence.” In her experience, she saw students in higher mathematics classes want more traditional lessons because they had a “rigid tunnel vision” of what mathematics should look like, and she said that these students did not see why they should broaden their horizons and do mathematics in other ways. In what she described as her support class, she said “there

was a lot that was really good about it” but she still saw academic inequities when her “highest students” worked “at the pace of the slowest” and thus did not advance their learning. Betsy also expressed disagreement with how students are placed in mathematics levels. She said her school has used fifth grade test scores and teacher recommendations to place students in mathematics tracks, giving the fifth-grade teachers “enormous amounts of power.” Regarding the test scores, she explained that she felt scores did not reflect students’ true abilities “yet we use that as the determining factor for access to this higher-level class,” which suggested she understood ways education, namely test scores, might contribute to societal inequities (CRT B).

Betsy acknowledged that students may have had inequitable supports outside of school, which she felt could lead to inequities in academic opportunities at school. Betsy said: “To say that it's [student success] just about hard work really takes away like all the other things that children bring to the table,” which suggested she understood the value of students’ cultural capital (Principle 2). When asked about the survey question related to hard work leading to student success, Betsy’s comments aligned with aspects of TSJ ideals. She recognized that her students came from varying backgrounds, which she said was either “privilege” or “baggage,” both of which she expressed impacted student success.

Betsy recognized inequities in lessons by noting that not all lessons worked well for all students. When discussing outcomes of all of her lessons, Betsy said that there were positive and negative outcomes for different students based on the lesson. She described that she strived to make her lessons balance student outcomes to reduce inequities in learning opportunities and outcomes (CRT B). Betsy said:

Ideally, every kid would feel really successful and be really successful in all lessons. But there are some [lessons] that are more tailored to other, some kids [more] than others, and I would want the average to come out as like every kid has the same amount of positive and negative in their year. Umm, I'm not there yet and but I do think that lessons where as a teacher I am attuned to using equity based instructional practices or instructional practices that support, that are like known and we know that they support equitable teaching.

Betsy acknowledged the imperfections of tracking as well as the complexities of students' lives outside of the classroom and teaching practices that may have affected their learning. She also saw the pressures on schools to advance students because of parents pushing for their children to be in higher mathematics classes, which could perpetuate societal inequities because of concepts such as 'tracking up' (Domina et al., 2016) (Criteria 2, CRT B). But she reported being willing to have conversations with colleagues about inequities she saw at school because she felt compelled to do it. She said: "if not me, then who?" which suggested she felt she was taking an activist position (Criteria 5).

Structurally at her school, Betsy said she believed the levels of mathematics classes were racially representative of the school's demographics. However, at her previous school, that was not the case. In her prior teaching experience, Betsy observed racial differences among tracked levels but reported that she and the school were not sure how to fix it. Betsy said that at her previous school the "upper-level math classes did not by any stretch reflect the racial diversity of the school itself" and she thought "we should probably do something about this, but we don't know what to do." Betsy indicated that she did not do anything to change the representativeness in the levels because she left to

teach at the school she was at during the time of the interview. She described internal conflict she had in reconciling why the tracked levels were not racially representative and questioned to herself why no one did anything about it, suggesting she understood that tracking sustained racial inequities (CRT B). Although Betsy described herself as a teacher who would take action against inequities, she did not report taking action in that instance. She said about representation across levels at the school she was teaching at during the study: “we agree that this is something we need to be working towards and like constantly thinking really critically about.” This statement contradicted her prior description that she felt tracked levels were racially representative of her school. Betsy’s experiences at two schools provided examples of how schools or teachers might recognize the inequities of tracking but may not be equipped with solutions to make changes to move toward equity, even if they highly endorsed TSJ pedagogy.

Connecting to Students’ Backgrounds. As TSJ is conceptualized in this research, connecting learning to students’ backgrounds and valuing students’ strengths is more equitable than enacting disconnected lessons (Principle 2, CRT D). Though Betsy did not explicitly say that lessons that connect to students’ lives were more equitable, she described these lessons as “more powerful” and more beneficial because students related to the mathematics they were learning. Betsy described an interesting comparison of students’ lives to a “seven-layer dip” to show how she saw mathematics learning played a role in their lives. She stated that mathematics was not something that was off to the side but instead layered with students’ lives; “mathematics layered on top” as a lens they could use in their lives. Betsy expressed that “traditional lessons [rote and independent work]” only helped “the same students (White students) who have always benefitted,”

students who “look like me, think like me” and that mathematics teachers must do things differently to enable significant work from more students to disrupt systems that sustain inequities (Principle 1, CRT B).

Betsy acknowledged that her students did not all have experiences in mathematics that supported their development of positive mathematics identities. Betsy appeared to be driven to find ways for students to “be their authentic selves,” suggesting she valued what each student could bring to mathematics class (Principle 2). Betsy drew upon “resources, articles, books” to keep ideas at the forefront of her mind and tried to foster a just classroom to break the cycle of students thinking they were “not a math person” (Criteria 4). She described conversations she had with students at the beginning of each year around mathematics identities “and the idea that like, everyone can do math and everyone has access to math,” suggesting she wanted to foster a just classroom environment where everyone felt capable (Criteria 4). Betsy spoke about the goals of these conversations for her students showcasing how she valued diversity: “the way you understand mathematical ideas might be different than the way I understand mathematical ideas, and that we are all better having heard other people's thinking” (Criteria 3). Betsy attempted to help students see that in her classroom, everyone contributed to each other's learning and there was not one way of mathematical thinking (Principle 2).

Doubt about her Impact. As noted in different areas of these results, although Betsy seemed to have strong convictions about mathematics teaching and learning, she also showed some doubt about how well she could truly make an impact in terms of equity. When submitting her TSJ lesson for this research, Betsy qualified her submission by saying that she was not sure if she actually “enacted a lesson that exemplifies teaching

for social justice” but that she tried. When asked about how she showed students she valued diversity, she described elevating students’ voices, for example. However, she ultimately said “I don’t, I, to be perfectly honest, I don’t know if I do, I try.” Though Betsy made efforts to build more equitable situations for her students with teaching practices, beliefs, and training, she did not seem to know if she was doing enough. When asked directly about how well her teaching practices addressed equity within a tracked mathematics structure, Betsy said “it’s better than nothing.” Betsy followed by describing that schools have a system of doing things and that system is not one she can fully influence. She said she can control what happens in her own classroom when “the system falls away” and “it is what it is and we have to live what we have in the classroom.” Betsy spoke about “the big fight” around equity in mathematics to dismantle inequitable structures (CRT B) but that ultimately, she had students in her classroom that needed her to do the best for them at that moment:

It's like those equitable structures that exist in my room, even if it was completely inequitable outside of my classroom, like, those things are still doing good work in that space and helping students move from September to June, which is what I have control over in that environment.

Her apparent feelings of helplessness to change the system contradicted how she described herself as a teacher who would act when she saw inequities as well as her LTSJ-B survey response in which she strongly agreed that part of the role of a teacher was to challenge school arrangements that maintain societal inequities.

Summary: Equity through Teaching for Social Justice. Betsy described many efforts to connect to students’ backgrounds to their learning and to enact practices aligned

with TSJ pedagogy to try to create more equitable learning environments for her students. She reported in detail inequities she observed. When she said that her classes were racially representative of the school but also that she and her colleagues have noted racial disparities between tracks, it was possible the disparities occurred in classes other than hers. Betsy conveyed a desire to talk about and take action to challenge inequities in mathematics, but then stated she only did this in her own classroom. Through her teaching practices, Betsy felt she might balance students' learning experiences and attempted to make her classrooms more equitable. However, systemically, Betsy was not sure if her efforts truly made an impact, and she felt that inherently, students in tracked classes suffered regardless of what she did. Despite her seemingly strong beliefs about TSJ pedagogy, Betsy expressed she did not taken action to try to change the tracking system at her school to be more equitable. However, she appeared determined to employ teaching practices focused specifically on what may benefit every student in her classroom.

Case 2: Abbie

Overview

In contrast with Betsy, whose overall mean score on the LTSJ-B scale suggested high endorsement of TSJ pedagogy, Abbie had an overall mean LTSJ-B scale score of 3.25 ($SD = 1.14$), suggesting that her beliefs slightly align with endorsing TSJ pedagogy (see Table 12). Abbie identified as being White and reported teaching tracked mathematics classes in grades 6 through 8 at what she referred to as a junior high school in south-central United States. She categorized her different classes as being either below grade level or above grade level. At Abbie's school, some students were enrolled in two

math classes, one of which was a support class that was intended to support student learning of content from the first course. At the time of this study, Abbie taught support classes as well as pre-algebra and algebra. Abbie reported that approximately 51% of her students were Hispanic or Latinx, approximately 40% were White, and the remainder of her students were Asian, Black, or Native American (less than 5% each). She also reported that her tracked classes were typically racially representative of the school's student population except for one class that was approximately one-third special education students. Abbie said that class was "more heterogeneous grouped [by perceived math ability]" than her other classes.

Table 12

LTSJ-B Scale: Abbie

Survey Item ¹	<i>Score</i>
1. An important part of learning to be a teacher is examining one's own attitudes and beliefs about race, class, gender, disabilities, and sexual orientation.	2
2. Issues related to racism and inequity should be openly discussed in the classroom.	2
3R. For the most part, covering multicultural topics is only relevant to certain subject areas, such as social studies and literature.	2
4. Good teaching incorporates diverse cultures and experiences into classroom lessons and discussions.	4
5R. The most important goal in working with immigrant children and English language learners is that they assimilate into American society.	4
6R. It's reasonable for teachers to have lower classroom expectations for students who don't speak English as their first language.	5
7. Part of the responsibilities of the teacher is to challenge school arrangements that maintain societal inequities.	4
	2

8. Teachers should teach students to think critically about government positions and actions.	2
9R. Economically disadvantaged students have more to gain in schools because they bring less into the classroom.	4
10R. Although teachers have to appreciate diversity, it's not their job to change society.	4
11R. Whether students succeed in school depends primarily on how hard they work.	4
12R. Realistically, the job of a teacher is to prepare students for the lives they are likely to lead.	

¹ R depicts an item that was reverse scored.

Abbie stated that she taught mathematics for 39 years and lived in the same community as her students. As a result, she taught the parents of many of her students, and she often saw her students at shops, church, games, or track meets. She said “I've been in this town for so long that I've taught most of their parents” and “when their [students'] parents talk to me, they're like talking to an old friend.” She seemed to have a bond with the families in her community and her students as she referred to her students as her “babies,” and she said that when she teaches, she talked to the kids about “their sisters or their brothers or their cousins or even their moms or dads.” Because Abbie lived and worked in the same community for decades, she said many of the “parents know me outside the classroom,” which helped her foster relationships with students and families. She detailed a situation in which a student was not at school after an incident at a pep rally where Abbie saw him crying. She expressed worry for this student. When she saw the student's mother at the local church festival, Abbie was able to inquire and learned that the student broke his glasses and was too upset to come to school because he was embarrassed by his replacement glasses; they were pink and the only ones covered by

insurance. Abbie provided another general example that when a student might have a bad day, she felt comfortable working with families (Principle 4) because “I’ve taught so many of them (parents)” and she will “just go up to them and [I’ll] say hey, you know, he had a really rough day and this is what happened.” She said there existed an “it takes a village kind of attitude in the classroom” in which her students know Abbie can hold them accountable because Abbie works with families when students need support (Principle 4). Abbie reported her relationships outside the classroom have helped her manage her classroom because students know she was connected to their families. She found herself saying to students: “do you want me to talk to your mom? Because you know I will if I don’t see her today.” Statements like these did not appear to be used as threats toward students because Abbie explained she always tried to speak complimentarily to parents about their students. When she saw students in the community with their families, Abbie said students “usually have a smile on their face because they, you know, I like, I try to find a positive something to say to their parents and they’re like, you know, getting praised.” Abbie confirmed that she felt her teaching revolved around the relationships she formed with people in her community (Principle 4).

Abbie did not seem to be familiar with TSJ. She submitted a lesson plan but indicated that she first “asked a couple people what they thought it [TSJ] was.” Abbie also said that she thought about TSJ for a while before she submitted the lesson and finally decided that TSJ is “something that creates like, a level platform so to speak,” suggesting she connected education with societal inequities (CRT B). Throughout the interviews, she had difficulty recalling the terminology of TSJ (e.g., “can’t remember what your big word was in your [prompt], I think, was it diversity?”), suggesting that the

actual topic of TSJ may not come up often in her work of teaching. Although Abbie's LTSJ-B scale score suggested she aligned slightly with endorsing TSJ pedagogy, she may have had limited experiences in learning about TSJ pedagogy.

Abbie submitted what she felt was a TSJ lesson that she used in her support and pre-algebra mathematics classes but not in her algebra class. She referenced a state standard around financial literacy and identified using the lesson for "setting a budget based on earnings." The financial literacy standard exists in her state for grades six through eight and includes topics such as comparing salaries, learning about credit and debit, and balancing a check register. What Abbie submitted as a lesson was comprehensive of the entire standard and could be considered a unit rather than a lesson. For her case, I refer to this financial literacy unit as a lesson because that was how Abbie framed it in her submission and interview. She also called it a budgeting lesson but the lesson covered much more than budgeting (e.g., credit versus debit, mortgages, taxes, interest). Abbie's lesson focused on helping students learn about various jobs and the education required to do those jobs as well as their earning potential and work environments. Abbie stated that students "conclude that higher paying jobs mainly come with college degrees." She reported students had many moments throughout the lesson when they realized how much it cost to run a household and "why their parents wanted them to turn off their lights." Abbie also described keeping the students realistic about future career opportunities and earnings through the lesson. For example, many of her students often expressed wanting to be professional athletes. Abbie said she helped them research athletic careers to learn about odds and probabilities related to getting into such careers. In the interview, Abbie said that she used some form of the budgeting lesson for

almost all her years of teaching and that she learned about it from another teacher. Abbie started using the budgeting lesson repeatedly because she “had such a good response [from students]” and it aligned with state standards. She explained she built a lesson around finances that included vocabulary and skills needed for the state assessment.

Framework Alignment. Abbie spoke about her extensive teaching experience, and her comments most often aligned with aspects of TSJ Principle 3 about teaching skills or bridging gaps (see Table 13). She described an example of an instance when she used eighth-grade materials that moved through a topic quickly. She said she went through that particular lesson as presented in the materials to find that students seemed as though they were “in the twilight zone” with the looks on their faces. Abbie said she explained to her students that “Those [the lesson as presented in the materials] were notes. You're OK. I'm going to go back and I'm going to catch you up to this.” She explained that in that circumstance, she used a similar lesson from the same materials but for seventh grade, which she felt provided a review of skills (Principle 3) needed to support students in the eighth-grade lesson. Abbie provided this situation as an example of how she does not want to be “the freight train that just keeps on moving. I'm going to be the one that says OK, wait a minute. Y'all don't know this stuff yet. Let's go back.” She explained that she tried to “break down the math [into different skills] so that they can get it easily and they can be able to absorb it and do it (Principle 3).” Alternatively, if she conducted a lesson and she assessed that students have met her objectives, then she said students moved on to the next lesson. When discussing her budgeting lesson, Abbie pointed out that she must first ensure students have the skills needed to do the budgeting lesson: “You have to build up the basics before we can get into that, but, and we have to

be able to do percents.” The TSJ Principles that Abbie least aligned with as she spoke about her teaching experiences were Principle 5 related to diversifying forms of assessment and Principle 6 related to making inequity, power, and activism explicit parts of the curriculum (see Table 13).

Abbie’s descriptions about her teaching experiences most frequently aligned with aspects of TSJ Criteria 2 and Criteria 4 and almost never with the other TSJ Criteria (see Table 14). The absence of alignment to the TSJ Criteria related to biases, diversity, and acting for social justice combined with Abbie’s lack of alignment to Principle 6 may be driven by her unfamiliarity with the ideals central to TSJ. Abbie may not have encountered concepts related to TSJ throughout her teaching and professional learning to have opportunities to consider some of these issues and whether they should be included in her instruction. Abbie spoke about the people in her community and the role she had at the school in the context of that community (Criteria 2). She said many of her students were “very poor” and many of them did not think of “shooting for a higher job.” She stated that many of her students have been “grounded by what they’ve seen just in their family instead of raising their eyes” and that she “taught a lot of kids who've been the first generation in their family that have gone to college, and so finishing college is a really big deal.” Abbie said that when “they get out of school, they're going to have to provide for themselves” so she felt teaching her students about financial literacy prepared them for life as well as showcased the importance of going to college. Abbie also most frequently aligned with creating a caring and just classroom environment (Criteria 4). For example, she described a tragic situation in her town that deeply affected her students. She said that she paused instruction and “used some of our class time just, to express

feelings” because sometimes students needed time for those kinds of “big talks.” Abbie was willing to pause mathematics instruction to provide space and time for students because she cared for their overall well-being.

Table 13

Frequencies for TSJ Principles: Abbie

TSJ Principle	<i>Frequency</i>
1. Enable significant work with communities of learners.	16
2. Build on what students bring to school with them (i.e., cultural capital).	14
3. Teach skills, bridge gaps.	26
4. Work with individuals, families, and communities.	12
5. Diversify forms of assessment.	1
6. Make inequity, power, and activism explicit parts of the curriculum.	3

Table 14

Frequencies for TSJ Criteria: Abbie

TSJ Criteria	<i>Frequency</i>
1. Examining personal values, biases and beliefs.	1
2. Understanding the contexts of schools.	20
3. Affirming diversity as an asset.	0
4. Creating a caring and just classroom environment.	21
5. Acting for social justice in the form of service or activism beyond the individual level.	2

Overall, Abbie did not speak often related to the CRT Elements, but when she did, she most often aligned with parts of the fourth CRT Element. Connected to her frequent

comments about relationships with those in her community, she spoke most frequently related to the strengths of students based on their lived experiences (see Table 15). Because Abbie has lived and worked for decades in the same community as her students and their families, she said that she tried to incorporate student’s experiences into her lessons to help them see how mathematics related to their lives. She used comments such as “hey, when your mom went to go get that car” to bridge something that happened in her students’ lives with content, such as percents and interest payments. Abbie seemingly tried to connect what she knew about students to what they were learning in class so that it “hits home.” In terms of the other CRT Elements, Abbie did not speak about discussing racism in her classes or any interdisciplinary analysis perspectives.

Table 15

Frequencies for CRT Elements: Abbie

CRT Elements	<i>Frequency</i>
A. The central role of racism and its intersectionality with other forms of oppression	0
B. Examination of education as part of a critique of societal inequities	7
C. A commitment to social justice to empower underrepresented groups	4
D. The centrality of the strengths students have based on lived experiences	11
E. An interdisciplinary analysis perspective	0

Enacting Teaching for Social Justice

Abbie was the teacher in this research with the most experience out of all who took the survey. This paragraph provides an overview of how Abbie described how she enacted TSJ, and subsequent paragraphs will provide more detail and evidence.

Throughout her experience, Abbie apparently has not had opportunities to learn about TSJ. When discussing how she enacted TSJ pedagogy, what Abbie reported was shaped by her own conception of TSJ being something that created a level platform for students. Her statements related TSJ to equity in terms of lifting students up academically but not to other aspects of TSJ (e.g., power, race, diversity). Abbie felt she was a successful teacher and apparently enacted lessons that she felt were successful in prior years. Abbie referred to her state's standards often as a major influence on what content she taught. When Abbie reported other factors that impacted her decisions on what she taught, she reported that her teaching experience was the main influence. Abbie also conveyed strongly that life connections in mathematics were the most engaging for students, but she only provided the budgeting lesson as an example of a lesson she used that has what she felt was an authentic life connection. Abbie also reported not having discussions about race in her mathematics classes because she did not see how such discussions were connected to what she was teaching. Time constraints also impacted the content she teaches and the types of lessons she enacted.

Standards and Success Driven. Abbie appeared to make decisions about what mathematics content she teaches based on her state's standards for mathematics. Abbie indicated that she and other teachers used some sort of budgeting lesson and "it's not really a choice because it's in the [State standards]. I have to." Abbie said budgeting was included in the mathematics courses at her school because financial literacy was a standard across all middle school grades, but she acknowledged that other teachers might have approached it differently than she did. She reported that her district did not have adopted curricula for the three classes that she taught (supporting classes, pre-algebra,

algebra) so she must “beg, borrow, or steal” lessons for all her classes to find ones that follow the state standards. She said her budgeting lesson was a lesson she used for decades to address skills (Principle 3) in the middle school standards in her non-algebra classes. Her algebra class followed high school standards.

Abbie appeared to be confident in her success as a mathematics teacher and it seemed that sense of success has led her to repeatedly enact the budgeting lesson. Abbie mentioned that her district recently hired a new superintendent who she learned prefers adopting structured curricula. When asked if she would still enact the budgeting lesson if her new superintendent adopted curricula that did not include her budgeting lesson, Abbie conveyed her strength and confidence as a teacher using her algebra students’ test results, though she did not use the budgeting lesson with algebra students. She apparently valued her worth as a teacher through those test results when she stated that her algebra students all passed the state test so she would “dare him [superintendent]” to fire her for enacting the budgeting lesson. Abbie said that even with pulling lessons from multiple sources, her personal experience was the most influential factor in selecting lessons to enact, including the budgeting lesson. She reported that her experience showed her that the budgeting lesson was successful because it would “turn that light bulb on” for students to make the content “stay longer with them.” Abbie mentioned changing minor aspects of the budgeting lesson over time, such as moving from using newspapers as a resource to using the internet, but because she felt the lesson was successful in addressing the financial literacy standard, she continued to use it.

Making Life Connections. Abbie described how lessons that connected to life were more engaging for students. She also seemed to relate TSJ with the budgeting

lesson because she felt it created the best life connection. She said lessons “that I do [that] strike a personal interest” were the ones that have “hooked them [students]” because Abbie could connect the lesson to what students might also know from their lived experiences and could make the content more relevant (Principle 2). Abbie stated that “the one thing that they [students] really are going to use [in life] is going to be their financial skills.” She explained that she felt finance was the best life connection for students because “it's gonna be more practical and I think it'll stay longer with them.” Abbie said that “when we start talking about money, their [students'] ears perk up.” She conducted the budgeting lesson over the course of a couple weeks so students could do more significant work with their budgets and develop “a little bit more personal stake” in what they were learning (Principle 1). Abbie said:

Financial literacy is one of those things in math that it takes what we're doing in the math class and takes it home because the goal pretty much of all people is, you know, they're, after they get out of school, they're going to have to provide for themselves.

Abbie explained that unfortunately, “poverty hits home so much” for her students. She explained that many of her students tended to have lower aspirations for careers because of the poverty they have seen or the careers modeled around them, suggesting she considered the school’s context and how it affected her students (Criteria 2). Yet, students all started the lesson saying they “want to live in this mansion” and have “the hottest race car.” Abbie used the budgeting lesson to show students “what is your real life gonna be like.” Abbie said many of her students have “never even thought about buying a house” but the budgeting lesson provided students opportunities to learn applicable topics such

as interest and house payments. The budgeting lesson revealed to students the realistic cost of buying and maintaining the large homes students wanted.

As part of the lesson, she discussed with her students topics such as “assets” and “things that we owe” and “the money that we bring in.” Abbie’s budgeting lesson enabled significant work (Principle 1) to develop students’ financial literacy by going deeper into topics such as how much money students needed to earn to live the way they wanted to live while still affording to pay for food, bills, and payments on debts. By the end of the lesson, Abbie said she noticed students started to feel empowered by what they were learning when students expressed ideas such as “I wonder if I can start saving for my car now.” Abbie indicated that the lesson was well-received by parents as well because of the connections between mathematics and life. She reported that parents and former students have commented on the budgeting lesson with gratitude because it covered useful life topics such as the difference between credit cards and debit cards.

In reference to how Abbie defined TSJ, Abbie described that higher education will help create a level platform for students in their futures, if students were realistic. Abbie also attempted to show students that the lifestyles they initially described wanting were unrealistic. Abbie said her budgeting lesson was TSJ because she felt the lesson empowered (CRT C) students who might not always feel capable academically to think they could “work themselves up” in a higher income career by being the first in their families to graduate from college. It seemed Abbie’s objectives for students was for students to learn that they needed to go to college to try to obtain high-earning careers and support the lifestyles they wanted or that the careers students expressed interest in were extremely rare to achieve. Abbie stated that she entertained students’ dreams of

being high-earning professional athletes, for example, but in the budgeting lesson students researched how many people become professional athletes and Abbie encouraged students to consider “backup plans [such as college].” Abbie proudly stated that she “popped their little bubble pretty much in a second” by showing students how difficult it was to obtain and sustain the lavish lifestyles her students described. This objective of the lesson did not align with her “disagree” response in the LTSJ-B survey that the job of a teacher is to prepare students for the lives they are likely to lead. It seemed Abbie believed that her budgeting lesson was TSJ because students learned what she envisioned would create a level platform for them—realistic careers that require a college degree—and not necessarily what the students said they wanted for themselves.

Though Abbie appeared to value connecting mathematics learning to students’ life experiences, she did not seem to utilize connections between mathematics and topics beyond finance. She conveyed that life connections and mathematics cannot be forced. Abbie used her fingers to create mocking quotes when she referred to “home connections” in textbooks she used. She said “some of the home connections that they [textbooks] have are so absurd.” At times, she said she pointed out these textbook connections to her students and made statements such as “this one is really stupid because it really doesn't connect.” Instead of students seeking connections between what they are learning and their lives, she said students started looking for “absurd” home connection references in the textbooks as well. She stated she believed “that people who use math every day [in finger quotes]” would use it in their jobs or personal finances. Abbie expressed that all other home connections seem to be forced and did not “relate to their [students] life personally.” Abbie provided additional examples of how she might connect

other mathematics content to students' lives such as the number system and learning to count items when they were preschoolers. She described when she connected a geometry topic to something from her own experience when she built a form to pour concrete and expressed "that one really did connect, but I have a hard time with some of the things [mathematics topics]." Her examples were not related to middle school students' lives. Abbie seemed to try to make connections between what she taught and students' lives but other than with finance, she said making connections was "really a force fit."

Race. On the LTSJ-B survey, Abbie responded "disagree" to issues related to inequity being discussed openly in a classroom. This response was one of her scores that did not align with teachers who tend to endorse TSJ pedagogy. When asked to elaborate on this response, she said "it just, it really just doesn't come up much" and "I'm not really sure why that is." She said her classes have been "pretty much business [mathematics]." Abbie contemplated why racism and inequity might not be brought up in class and said "I think it's mainly because I'm trying to discuss math," inferring that she would not bring up these topics because they are not mathematics. Abbie referred to the example she gave when she opened class discussion related to traumatic community events or "other conversations" that arose in the past but added that these discussions were "not a constant factor." It appeared that Abbie does not seek out opportunities to discuss inequity and racism in her mathematics classes; she said it was "our ELA teachers that do that." Abbie seemed in part to find a disconnect between discussions about race and mathematics, which could result from her unfamiliarity with TSJ.

Time was a Barrier. When deciding to use the budgeting lesson, Abbie's only example of a TSJ lesson, Abbie expressed that time was a limiting factor. Specifically for

algebra, Abbie said “I struggle to cover all the required algebra curriculum and I don't have enough time for it [budgeting lesson].” Abbie did not use the budgeting lesson with her algebra students. Abbie said her algebra students would likely have had a financial literacy lesson in prior years because financial literacy was in the seventh-grade standards. She more regularly enacted the budgeting lesson with students who had multiple mathematics classes because she had more flexibility in deciding what to spend extra time teaching. She explained that for the budgeting lesson to be engaging and for students to internalize the financial literacy content, the lesson must take place over a couple of weeks instead of a single class. Abbie expressed that she did not have this amount of time in her algebra class, so she did not enact the budgeting lesson with those students.

Summary: Enacting Teaching for Social Justice. It appeared Abbie’s budgeting lesson was part of her teaching routine and she enacted it annually with the classes for which it related to the standards. If a lesson did not connect to the standards, it seemed Abbie would not enact it (e.g., her algebra class). Abbie also appeared to view herself as successful, which could deter her from changing her plans from year to year to enact more lessons like the budgeting lesson. When she was not enacting the budgeting lesson, she mentioned some minimal attempts to teach in ways that connected mathematics to life based on what she knew about her students or examples from her own life. However, when life connections in materials seemed disingenuous to Abbie, she opted to not spend class time making those connections but instead found humor in how absurd she felt the examples were. Abbie also reported time as a barrier to enacting lessons such as the budgeting lesson but only in her algebra class, which follows high school standards.

Ultimately, Abbie's sense of success and apparent desire to adhere to the state standards guided her decision-making about what lessons to enact. Abbie did not seek out many opportunities to relate mathematics to race or equity because she did not see how they connect. However, Abbie could make time for discussions beyond content when she felt the discussion was important enough for the students, though seemingly not often.

Abbie had her own conception of TSJ pedagogy because she was not familiar with the idea. She had not infused deep life connections into lessons beyond finance perhaps because she was not aware of how to do it through TSJ or other pedagogies. Abbie was unfamiliar with TSJ and thus did not consider enacting more TSJ lessons. The budgeting lesson was the only lesson Abbie felt was a TSJ lesson and reported using because it made an authentic life connection. Based on her definition of TSJ, the budgeting lesson should level the platform for students, which she connected to her description of equitable teaching that will be discussed in the next section. She appeared to believe TSJ was about both making authentic life connections and leveling the platform. There were instances, though, when Abbie's descriptions went against ideals of TSJ such as limiting students from exploring careers that interested them and trying to direct them to other careers. Abbie felt the budgeting lesson helped students learn the importance of going to college and to her, that was TSJ because it would provide them exposure to more realistic career opportunities through learning finance, a meaningful life connection.

Equity through Teaching for Social Justice

Abbie discussed tracking, the budgeting lesson, and additional teaching experiences to describe how she felt she was able to create an equitable learning

environment for her students. Abbie was apparently critical of tracking in her district when she said “I’m not very fond of the way these children are placed in the GT [gifted and talented] classes.” Abbie explained that in her district, students take a test in early elementary school, and with teacher and parent “observations” about the student, students with certain scores were placed in gifted classes. Abbie said students “pretty much after that, they ride the wave and they stay in that class until they voluntarily get out.” Abbie explained that when students were labeled gifted, even though they might be gifted in only one subject, they were “bundled” as a whole. Seemingly frustrated, she said that students could score low in mathematics on the state test and they would still always remain in the gifted classes. When asked if students ever moved between mathematics levels, Abbie said they did not. Instead, Abbie described how she accommodated students when she would “slow down for the slow ones [go back and review],” but students who she felt met objectives would keep going through content. However, even if a student appeared to need to switch levels, they would not be moved. The existence of this structure also led to labeling of students at her school with many terms such as “GT-ers” or “regulars” for example. Abbie also used the term “fillers” that she said is a term the middle school teachers used to describe students who were in higher-level mathematics classes because staff needed more students to fill the gifted class. These fillers may be students who, for example, were siblings of high-performing GT students or “high achievers” who staff “throw” into the higher-level classes to fill enrollment. She said these fillers were “coasting” with the gifted students even if “they might not really belong.” Abbie’s in-depth critique of and description of how tracking sustained inequities suggested she recognized that educational structures could feed inequities (CRT B).

Abbie has been teaching in an inherently inequitable yet seemingly well-accepted tracking structure for students, which may in part impact her efforts toward creating equitable learning experiences for her students.

Despite her criticism of the tracking system in her district, Abbie did not describe ways she acted to change the policies, which contradicted her survey response that it was part of the role of teachers to challenge school inequitable arrangements (Item 7). Instead, Abbie detailed ways in which she might create more equitable learning environments for her students within the tracking structure. To better situate Abbie in this research, it is important to note how Abbie conceptualized equity. Abbie described equitable learning experiences for students as those with “everyone having what they need to make their learning optimal,” which suggested she wanted a just classroom in terms of students’ academic needs (Criteria 4). She stated that “some kids *need* a lot more. Some kids just need reassurance and I try my best to give both directions.” Abbie seemed to believe that equity occurred when students were not held back as well as when she could remove “stumbling blocks” for students, which suggested she was trying to bridge gaps (Principle3). She stated that she tried to teach in ways that provided students what they needed. Sometimes, Abbie’s thoughts on teaching aligned with her conceptualization of equity but not with how equity is typically conceptualized in educational research.

Realistic Lessons are Equitable. Abbie explained that the budgeting lesson was not only more engaging than abstract and symbolically-focused lessons, but it was more equitable as well. When asked to explain why, she provided a counterexample of a lesson she used for teaching fractions that related to buying fruits and vegetables at the grocery store. The lessons had questions for students such as “If I buy three and a half pounds and

it costs \$1.99 a pound, how much do I spend?” Abbie said that lesson was not “hitting home” because “when they go to the grocery store, they are going to hand their produce to the person checking them out, and they're [the cashier is] going to weigh it, tell them how much it costs, and move on with life.” However, with the budgeting lesson, Abbie felt it was “real life” and the calculations such as withdrawing money and calculating remaining funds were something students could see themselves doing and needing to know in life. She seemed to connect providing students with more realistic mathematics tasks to being more engaging for students, which enhanced their learning. It appeared Abbie thought that in teaching realistic mathematics skills (Principle 3) to students, she was being equitable by teaching skills they needed to know in life.

Different Levels, Different Outcomes. Abbie stated that she felt her students at different mathematics levels had equitable experiences. She said that with homogeneous groups, “we can take the higher ones [students] and not make them muddle through another day of doing the same thing.” She expressed that “heterogeneous grouping is not always the best.” Abbie felt she can teach equitably with homogeneous grouping because for those students who needed it, she did not have to “shove material” while teaching but she could “slow down” to focus on skills (Principle 3) and “make sure that they've got it and then move forward.” Even with students in different levels, Abbie described her teaching as equitable because of her conceptualization of equitable teaching: “In my mind an equitable situation would be to take someone where they are and raise them up.”

When asked if all students experienced the same outcomes from the budgeting lesson, Abbie said: “I'd say most of my students take home something because it does apply to their life.” However, she expanded by providing examples of how students of

different perceived ability levels in mathematics experienced different outcomes on “their level.” Abbie spoke in what appeared to be a matter-of-fact way, reporting on her decades of observations from teaching the budgeting lesson. She said “they aren't all going to make it to the same level just like people that go join the job force are not all gonna be paid the same salary.” Abbie described her “higher kids” being able to grasp all of the “facts and figures and stats” and research multiple careers. She said these students “start thinking about the type of car, the type of house. They get a little bit more out of it” and she elaborated on an array of questions her “higher” students asked that showed how these students went “more in depth” with the budgeting lesson. Abbie stated that her “really low kids” typically “get some of it.” She said most of these students learned that “money controls what you can afford to buy or how you can afford to live.” Her comments revealed a possible inequity in learning outcomes because students were not all learning the same mathematics, which she confirmed when she said: “What I see with it [budgeting lesson] is it takes everybody up some more than others.” She paused at one point to say “I'm not trying to be prejudice.” It seemed Abbie was saying she would not be judgmental about her students when she used the term prejudice. She appeared confident that despite different outcomes, the budgeting lesson was still equitable because she thought “it raises them all up” and “equitable teaching is what my goal is.” When she qualified the equitability of the budgeting lesson with “some [students] more than others,” she contradicted equity as when student labels no longer predict outcomes (NCTM (2014)). Still, it appeared Abbie’s statements aligned with her conceptualization that equitable lessons provided students with what she thought they needed to make their learning optimal.

Teachers as Advocates. Abbie described that when teachers served as advocates for their students, they created more equitable learning experiences for students. Abbie said that teachers must “make noise [advocate]” when they observed students were not having their needs met. Because Abbie conceptualized one aspect of equity with meeting needs, Abbie expressed it was the role of the teacher to go to the principal or department head to advocate for what students needed (Criteria 5). Abbie provided an example of budgetary constraints for purchasing calculators when she knew that some students with exceptionalities must have them for mathematics class. When a situation such as this occurred, Abbie said she would ensure her students get calculators to create a more just classroom and have more equitable learning opportunities (Criteria 4). Abbie explained: “You can't just go by the script that's in the textbook, expect the kids to get it, and move on with life” but that teachers “really have to have your heart in it.” Even when students behaved in a “horrible” way in class, Abbie expressed that teachers “have to want the best for every kid.” She elaborated that teachers “have to step up” to advocate for students to be equitable teachers (Criteria 5). Though Abbie did not overtly refer to TSJ pedagogy to foster equity in her classroom, advocacy was a component of TSJ Abbie seemed to feel was strongly associated with equitable teaching as she defined it.

Summary: Equity through Teaching for Social Justice. Abbie had her own conceptualization of equity that guided her reporting of her teaching experiences. Her perceptions about how well she was able to use TSJ to create more equitable learning experience aligned with her own understanding of TSJ and equity. However, Abbie’s understanding of TSJ and equity did not align with much of the normative definition of these topics in education. Abbie was clear that she felt that the budgeting lesson was

equitable; it lifted students up, was useful, and was realistic. It seemed that she equated TSJ with equity because the budgeting lesson was her singular example of what she believed was TSJ. Abbie did not report using any other lessons like the budgeting lesson or using teaching practices outside of the budgeting lesson that aligned with TSJ pedagogy. Nevertheless, Abbie displayed a strong sense that teachers must be advocates for all students and apparently cared about providing students with the supports she thought they needed to optimize their learning. Although her discussion about student learning experiences in the budgeting lesson can be seen as inequitable due to her assumption that students at different levels achieved different outcomes, Abbie felt strongly that her students had equitable experiences because she met their needs and all students advanced in some way.

Case 3: Laura

Overview

Whereas Abbie was more moderate in her tendency to endorse TSJ, Laura skewed higher in endorsement of TSJ. Laura responded with “agree” (4) to all survey items except the item that related student success with hard work after reverse scoring (see Table 16). Laura had an overall LTSJ-B scale score of 3.83 ($SD = 0.58$). Laura identified as being White and has taught mathematics for 10 years. At the time of the study, she taught at a middle school considered to be a magnet for students who are interested in mathematics, science, and technology and that was part of a large school district in the midwestern United States. Laura said she completed one year at the magnet school after transferring from teaching at another school in the same district. Laura mentioned that she left her previous school because of the “this is the way we've always done it” attitude

and “that's just not OK” with her. She stressed that she wanted to be at a school where staff would adjust policies and take action to “meet the needs of the kids,” and “that may involve doing the hard work.”

Laura reported that her school at the time of the study was approximately 30% each White, Black, and Asian and 10% Latinx; she described the “level of diversity” on her middle school team as “astronomical.” She proudly reported that her school has a “diverse administration,” providing an example that it has a Black male principal who she thought was “the most incredible thing ever.” She acknowledged that students at her school tended to form “cliques,” often based on race but she said “that's [not] necessarily openly discussed.” She also reported that she taught classes at all tracked levels comprised of students considered to be below grade level through above grade level in perceived academic abilities.

Table 16

LTSJ-B Scale: Laura

Survey Item ¹	<i>Score</i>
1. An important part of learning to be a teacher is examining one’s own attitudes and beliefs about race, class, gender, disabilities, and sexual orientation.	4
2. Issues related to racism and inequity should be openly discussed in the classroom.	4
3R. For the most part, covering multicultural topics is only relevant to certain subject areas, such as social studies and literature.	4
4. Good teaching incorporates diverse cultures and experiences into classroom lessons and discussions.	4
5R. The most important goal in working with immigrant children and English language learners is that they assimilate into American society.	4

6R. It's reasonable for teachers to have lower classroom expectations for students who don't speak English as their first language.	4
7. Part of the responsibilities of the teacher is to challenge school arrangements that maintain societal inequities.	4
8. Teachers should teach students to think critically about government positions and actions.	4
9R. Economically disadvantaged students have more to gain in schools because they bring less into the classroom.	4
10R. Although teachers have to appreciate diversity, it's not their job to change society.	2
11R. Whether students succeed in school depends primarily on how hard they work.	4
12R. Realistically, the job of a teacher is to prepare students for the lives they are likely to lead.	4

¹ R depicts an item that was reverse scored.

It appeared Laura was motivated to help her students believe that they were all capable of learning mathematics. She said it was her job as a teacher to get “buy in” from all students, even those who “absolutely hate math.” It seemed Laura considered “buy in” as when students were interested in a lesson and did not “shut down” but instead engaged in the mathematics in some way. She felt that she could make students’ interest “snowball” into the students seeing that they were capable learners. Laura gave examples of statements students said about themselves such as “I’m stupid,” “I can’t do this [mathematics task],” or “people have told me that my whole life, they told me that I’m just gonna end up in jail.” She described seeing students “think very little of themselves,” and as a result, those students stopped trying in class. Laura described how she felt compelled to flip the narrative those students have heard throughout their mathematics learning experiences to disrupt inequitable assumptions that they were less capable (CRT

B), to show students they “can be successful even if you [student] have never been successful a day in your life at math.” Laura described the challenge she faced in “being able to help the kids that you know, want to shut down the most.” She said “perfect, I’m gonna make you [students] love math.”

Part of the “buy in” Laura wanted from students could have come in part from forming positive relationships with students. Laura said she worked on building strong relationships with her students as a key component of being able to help students enjoy learning mathematics. Laura said she has been “well known” for developing strong bonds with students, “especially the ones that people, you know, tend to label the difficult ones.” Laura expressed the importance of showing students that “exactly who they are is wonderful.” She attributed her ability to form positive relationships with students to her “love and compassion for what I do” as well as her “ability to get them [students] to see that math can be enjoyed.” Laura said she got to know students’ interests and even if those interests were “so outside my [her] vibe,” she found ways to engage with those students on topics whether the topic was anime or sports. Laura reported that she had a social media account to build and maintain relationships with students and former students. Through this account, Laura said her students expressed how she made mathematics class enjoyable for them and students happily recounted the “silly little things” she did when they were in class. Laura felt if students looked forward to her class, she was an impactful teacher:

I’m on 10 years, so I’m up over 1,000 kids that have spent, you know, 100-some-odd hours with me. That’s a lot of time, and that’s a lot of people to affect. And I think just when you put that [positivity] out into the universe, it really does make

the world a better place when you can make a kid better, make their day better.

You don't know what they're going through, what they've been through, and if even, if you know, they look forward to your one hour of math class a day. Great.

Then I did my job.

Laura seemed very proud of the apparent long-term impact she had on students' lives and her ability to transform positive relationships into more enjoyable mathematics learning experiences for students.

Laura did not submit a TSJ lesson prior to the interviews. During the first interview, I adjusted the questions to include an opportunity for Laura to share an example of a TSJ lesson. She did not provide an example of a lesson but instead detailed teaching practices she felt exemplified TSJ. I sought clarification as to whether she had a lesson to discuss or practices she used across lessons and Laura continued to speak about practices. Therefore, in Laura's case, there was no single lesson she used to represent what she felt was a TSJ lesson. Laura, instead, conceptualized TSJ entirely as certain teaching practices that will be discussed in detail in the subsequent section.

Framework Alignment. Laura more frequently aligned with aspects of TSJ Principles 1 and 3 (see Table 17) related to enabling significant work of her students and teaching skills and bridging gaps. For example, she conveyed wanting to enable significant work (Principle 1) with "those instructional routines where the students are engaged" such as using "notice and wonder" prompts in her class so she could "build participation." In terms of teaching skills, Laura mentioned teaching those skills (Principle 3) that she felt students needed for success in her class that went beyond learning content. She wanted students "thinking outside the box" as one of the skills

students could use in mathematics but also might need in life. Also, it seemed imported to Laura to work with students on, for example, “building those skills of asking questions” so students could get assistance with content but also as one of the life skills she emphasized with students. She said that for any lesson, she looked to see if she was “getting a lot of that push back and that frustration [from students]” to determine if she needed to consider a different approach to bridge learning gaps and to identify the mathematics skills (Principle 3) students might need to work on more. Laura spoke the least related to TSJ Principle 4 (see Table 17) and working with families and communities.

In terms of the TSJ Criteria, Laura most often spoke in alignment with parts of Criteria 2 and 4 related to the contexts of schools and creating a caring and just learning environment (see Table 18). Laura described that students’ experiences with learning mathematics can be complex and students’ success might depend on “different teachers they've had, the experiences they've had [in learning mathematics],” which showcased her understanding of how the context of schools might impact student learning (Criteria 2). Laura seemed to want to create a caring and just learning environment by encouraging students. Laura explained that she connected constantly with students through conversations to tell students she valued them. Laura said that “they’re [middle schoolers] all weird” so she tried to create a classroom environment where all students could say “you [student] can actually do this” and “get them to actually see it [success] as opposed to just everybody tells me [student], you know, I'm stupid or I can't do this.” Laura worked toward creating a just classroom by making “sure that kids are getting their

individualized needs met” (Criteria 4). Laura aligned least with TSJ Criteria 5 related to acting in service toward social justice.

Table 17

Frequencies for TSJ Principles: Laura

TSJ Principle	Frequency
1. Enable significant work with communities of learners.	27
2. Build on what students bring to school with them (i.e., cultural capital).	8
3. Teach skills, bridge gaps.	22
4. Work with individuals, families, and communities.	5
5. Diversify forms of assessment.	10
6. Make inequity, power, and activism explicit parts of the curriculum.	11

Table 18

Frequencies for TSJ Criteria: Laura

TSJ Criteria	Frequency
1. Examining personal values, biases and beliefs.	6
2. Understanding the contexts of schools.	34
3. Affirming diversity as an asset.	12
4. Creating a caring and just classroom environment.	36
5. Acting for social justice in the form of service or activism beyond the individual level.	3

When Laura spoke about her teaching experiences, she critiqued the ways in which her schools perpetuated inequities, aligning with the second CRT element (see Table 19). Laura examined what she referred to as the “social injustice” of mathematics

because specific to mathematics, she felt “students just shut down before they even walk in the room because they feel like it's above them.” She described that she had “students that are tired and, you know, worked last night, even in middle school” and therefore she had to teach in ways she felt ensured mathematics was approachable to these students instead of passing students along and perpetuating injustices (CRT B). She critiqued the state of education and how it perpetuated societal inequities when she explained that “a lot of kids end up falling through the cracks of they [students] do the bare minimum and they get passed and all of a sudden they have a diploma and they haven't learned very much” (CRT B). Alternatively, she never took an interdisciplinary analysis perspective, the fifth CRT element E (see Table 19).

Table 19

Frequencies for CRT Elements: Laura

CRT Elements	Frequency
A. The central role of racism and its intersectionality with other forms of oppression	6
B. Examination of education as part of a critique of societal inequities	31
C. A commitment to social justice to empower underrepresented groups	20
D. The centrality of the strengths students have based on lived experiences	2
E. An interdisciplinary analysis perspective	0

Enacting Teaching for Social Justice

To see how Laura enacted TSJ pedagogy, it is important to understand how she conceptualized it. She considered TSJ to be preparing each student with skills to become a “functioning adult in the real world at some point” and “kind of leveling that playing

field.” She seemed to ultimately define TSJ as “teaching those [mathematics and non-mathematics] life skills” (Principle 3). She described a TSJ learning outcome for her students to feel empowered to use skills learned in her classes “to do good in the world” beyond students being able to say “I can combine like terms with the best of them” because she felt “that's not gonna do anything for them [students] when they're 25.” Laura apparently equated TSJ pedagogy with teaching students the skills she felt they needed to know for life so they could contribute to our society, not just teaching mathematics content.

Laura mainly focused her enactment of TSJ pedagogy on enacting two practices: using multiple representations and discourse. It seemed that Laura considered discourse to mean student-to-student discussions. She also detailed how she used formative assessment strategies to make decisions about her teaching and that much of her decision-making revolved around making mathematics enjoyable for students.

Practices. Despite not providing an example of a TSJ lesson she used, Laura felt “like every lesson has to be focused on social justice.” At the time of the interview, Laura’s district had just recently adopted a new middle school mathematics curriculum. Laura described using multiple representations and discourse as practices for TSJ that she could enact in every lesson with that curriculum. When asked if mathematics, multiple representations, and discourse all go together she said “yes, one hundred percent.” Within the scope of the new curriculum as well as in previous years, Laura said she enacted these two practices frequently to engage students in mathematics while also addressing her goal of teaching life skills. She confirmed that these two practices are her “two big things” that help her to teach mathematics effectively and to build life skills such as “understanding

how to communicate” or thinking innovatively (Principle 3). Laura stated that these practices led to more student “engagement,” which she identified as a TSJ objective of all her lessons. However, Laura added that she did not “necessarily think that everybody [teachers] does that [used these practices daily]” at her school. When asked why she thought other teachers might not use these practices as often, Laura said it took “extra effort” to do, and she felt other teachers’ goals were purely focused on content. She also indicated that with her school’s newly adopted curriculum, teachers “don't have a lot of deviation that we [they] can do from that in order to meet the district’s requirements,” which might explain why other teachers were hesitant to focus on anything besides mathematics content. Nevertheless, it seemed Laura found ways to infuse these practices she has used for years into how she taught mathematics because she valued teaching life skills.

Using Multiple Representations. One of the ways Laura reported enacting TSJ pedagogy was by using multiple representations. Laura explained that she understands multiple representations as “being able to reach the same conclusion via different paths” when tackling a mathematics task, whether the path involved different solutions, different approaches, or different representations. Laura wanted her students to develop life skills to problem solve creatively. She elaborated on how she wanted her students to learn that “there's no one right way to solve a problem.” Laura mentioned having difficulty “appealing to multiple different types of groups [of students]” and students from “different backgrounds” in her teaching but that by allowing students to approach content in a variety of ways, she felt she was employing TSJ pedagogy. Also, Laura mentioned that her new curriculum included using multiple representations in lessons such as

providing students with multiple methods to solve a problem. She critiqued the curriculum materials for requiring that students know and can use all of the methods. It seemed Laura preferred to use multiple representations by allowing students to develop or choose their own approaches for solving mathematical tasks. By forcing students to do all of the approaches in the materials, Laura felt students were not being allowed to be innovative. She provided examples of some of the different approaches students might take when engaging in a lesson that she felt exemplified using multiple representations: “You can do visual. You can do kinesthetic. You can draw pictures. You can find keywords.” Laura expressed that using multiple representations allowed her to “meet[s] the needs of all those learners” by providing them options as to how they might engage effectively in a lesson or solve a mathematics task. She acknowledged that students have different ways of thinking based on their lived experiences (Principle 2) and seemed to value diverse ways of thinking and learning (Criteria 3) to empower her students to engage in lessons (CRT C).

Discourse or Student-to-student Conversations. Laura also reported enacting TSJ pedagogy through discourse. Laura described discourse mostly as conversation between students in smaller groups or sometimes by her facilitating a whole class discussion. She said that in “forcing them [students] to have these [mathematical] conversations” she was creating a “higher-level response” from students. Laura said that through discourse, students must explain and apply their thinking but they also learned how to disagree with others, a life skill (Principle 3).

To start most lessons, Laura explained that she wanted to “get them [students] talking” because building discourse was “huge” to her. She described using what she felt

were entry-level, approachable mathematics tasks to start so students felt more comfortable engaging in discourse. Laura expressed that by engaging students in discourse, she believed she was also fostering students' mathematical confidence. For example, one of the ways Laura described building student conversations and confidence was through "notice and wonder" mathematical problems. Her instructional goals for students were not for them to find the correct solution necessarily, but to make the problem accessible. She explained students could simply discuss anything about the problem. She said: "It doesn't even have to necessarily be math related, but just to build that level of participation." Laura viewed building participation through discourse as a way to bridge gaps in engagement because "everybody can look at a picture and notice something" (Principle 3). After students started engaging in conversations, Laura said she was also able to teach life skills such as "building their ability to agree and disagree while not being abrasive about it - is a really strong skill for middle school kids to learn." She modeled communications skills with students about how to speak with one another: "I disagree with you but here's why as opposed to just, you know, you're stupid because we don't agree with the same thing" (Principle 3). Laura also mentioned that when students engaged in discourse together, they had to learn how to work with different people, another life skill. She said she told her students often:

It doesn't matter if you work at NASA or you work at McDonald's, you're gonna have to work with people smarter than you, and you're gonna have to work with people that are lower than you, and you're going to have to figure it out.

Eventually, Laura explained, she worked students toward using their conversation skills mathematically. She said this form of discourse was TSJ pedagogy because she thought

students felt more empowered to take the skills they learned to say “I can explain myself [mathematically]” as opposed to “oh, look at me, I got the right answer.” Discourse was a practice that Laura used that was TSJ pedagogy because it made learning accessible to students and taught them life skills that they could also use to engage in the mathematics (Principle 3).

Formative Assessment – Exit Slips. Although Laura did not identify her use of assessments as aligning with TSJ, Laura appeared to align with TSJ pedagogy when she reported her preference for varied assessments (Principle 5). Laura seemed to prefer making instructional decisions based on results from formative assessments rather than summative assessments. She stated she was “not a huge fan” of many of the standardized summative assessments she had to use with the adopted curriculum. But she said: “I do what I’m told because I want to keep my job.” She explained, however, that she preferred formative assessments to inform her decision-making, and she supplemented the curriculum when she felt it was necessary. Laura claimed she used “a lot” of formative assessments but only provided one example. The example she gave for a common formative assessment she used was exit slips. Laura said she used exit slips to help her determine “how the lesson went” in terms of conceptual understanding. She explained that exit slips provided her feedback to see how well students were progressing through the content and she would use that “immediate feedback” to “shape the next day’s lesson.” Her students might “push back” and show frustration because they could not complete the task, which told her there might be gaps in their learning or her pacing was not appropriate. Based on the feedback from students, she said she might move on to the next mathematics topic, go back to a specific topic for more review, reteach a lesson in a

new way, or completely change her approach altogether. Laura’s examples about potential adjustments in planning based on feedback from students showed her attention toward bridging gaps in students’ mathematics skills (Principle 3). However, Laura lamented that she could “only do so much” because if she stretched a lesson over four days that the curriculum intended to be two, she had to move on to the next lesson to try to somewhat keep up with the curriculum pacing. At the end of the year, though, Laura said that she would defend her choice to move at a slower pace than the pacing guide if it meant a better learning experience for her students. She said that it was more important to her that her students knew the mathematics concepts well even if it meant she did not check all the boxes in the pacing guide. Laura questioned what good it would be if “I finished the entire curriculum, but my kids don't know anything?” Laura acknowledged the importance of following the curriculum as a job requirement (Criteria 2) but would change course if it was what she felt was best for her students. Ultimately though, she said “there’s never enough time” to teach all of the content the way that she wanted.

Laura described that she would sometimes “switch it up” on exit slips to gauge how students were faring emotionally. She said that when she asked students to report on how they felt about what they are learning or how they felt in general, she wanted them to know that it was normal to feel “totally off” some days. Laura recognized that students’ well-being might affect their learning. Although not part of how Laura conceptualized TSJ, it seemed Laura used formative assessment results to create a caring learning environment, which aligned with ideals of TSJ (Criteria 4).

Summary: Enacting Teaching for Social Justice. Laura did not explicitly use TSJ lessons but found ways to infuse what she felt was TSJ pedagogy into her daily

lessons across all of her classes through multiple representations and discourse. She seemed to use multiple representation and discourse because she has worked to hone these practices to teach life skills more effectively while also increasing student engagement with the mathematics content, which might be her way of “leveling the playing field.” Laura did not highlight caring in her conceptualization of TSJ but did seem to value caring about her students’ general well-being, which aligned with aspects of TSJ pedagogy.

Equity through Teaching for Social Justice

Laura defined equitable learning experiences as those when students were “getting what they need.” When asked about the equitability of how she enacted TSJ pedagogy, Laura reported she thought the practices she used and that were described in the previous section benefited “the low socioeconomic students” the most. She also felt students could get what they needed academically and personally in her classroom through increased engagement: “it [engagement] really gives them that, like open floor [where] they can feel like they can contribute to the conversation even if they are like, I’m so not a math person.”

Laura reported anecdotal ways in which she measured her equitability and success in teaching. She recounted students making statements such as “I feel like I can do math in your class” and questioning “Why can I do math this year?” after struggling previously. Laura described valuing how her students felt about themselves and how those feelings translated into doing mathematics. Laura told students “You have always been this smart. It’s just figuring out what works for you and how you can be successful,” which suggested she realized the knowledge students bring with them to class and she

cared about ways to help them be successful (Principle 2, Criteria 4). Laura conveyed she felt statements like these from students showed her how her teaching was more equitable and successful than that of her colleagues because she helped give students the confidence they needed to learn mathematics. Laura believed her TSJ pedagogical practices provided more opportunities for students to engage in her classes, which led students to see themselves as more capable. Former students have told her: “I can't believe how much I miss your class” and Laura said that made her feel successful. Laura seemed to rely on student feedback to measure how well her TSJ practices worked to give students the confidence she felt they needed.

Combatting Learned Helplessness. Laura described a barrier to creating more equitable learning environments as “learned helplessness,” which “is something that we [teachers] face every single day.” Laura sighed and rolled her eyes when she spoke about learned helplessness, which apparently made her quite frustrated. She described learned helplessness as when students have learned to believe they cannot do mathematics and have given up on themselves to the point that they do not even try—students who have been “passed along.” She reported that she observed learned helplessness more often with students in the “low socioeconomic group,” students “with behavior issues,” or students with “rough home lives.” Laura said if she spent more time working with her “lower” students who were more likely to exhibit learned helplessness, other students could “get kind of bored.” Laura reported giving extension problems for students who did not appear to be struggling and expressed she felt these extensions were equitable by providing students what she thought they needed. It seemed learned helplessness created a divide in some of her classes. She called multiple representations and discourse her “instructional

routines” that helped to turn on the “light bulb” and seemed to be her attempts to keep all students engaged in significant work (Principle 1). However, Laura was clear that learned helplessness was a pervasive problem that she was constantly battling and could create an inequitable divide in some of her classes. She described teaching students with learned helplessness alongside students who wanted to advance. It seemed that Laura’s use of multiple representations and discourse was her attempt to garner engagement from all students but also to be more equitable to counteract learned helplessness with “light bulb” moments. Because of learned helplessness among some students, though, there was a barrier, making it more difficult for Laura to be able to provide all students what they need.

Tracking and Equity. Laura described a wide range of academic abilities in her classes when she said there were students in her classes with first-grade reading levels but also other student who “could probably get a masters in college at this point because of their level of intelligence.” Laura expressed that she liked tracking: “I’m very blessed with math classes that are separated by ability.” But she also reported inequities for students. Laura reported that her team had the seventh-grade algebra class, which made her team different demographically because it included more Asian students. Laura’s tracked classes were not representative of the school demographics. She said: “in my lower classes, it’s predominantly Black and in my higher classes, it’s predominantly Asian” (CRT A). Laura also reported that she taught differently across tracked levels. Laura said that if teachers instructed “just standardized across the board,” students would not learn as much. Though she used the same TSJ teaching practices of multiple representations and discourse in all levels, Laura described that she taught explicitly to

build confidence in her lower-level mathematics classes. For students in higher-level classes, she focused on content more and pushed students to justify their answers rather than prioritizing building confidence. Laura said that students in her lower-level classes also justified their answers, but that her higher priority in using multiple representations and discourse was to build students' confidence. Laura seemed to set lower content learning expectations for students in her lower mathematics classes, which were predominantly Black, suggesting she perpetuated societal inequities even if unknowingly (CRT B). It appeared that Laura had different priorities in her lower-level classes because she thought she was meeting their needs.

Laura also used multiple representations and discourse to create more positive learning opportunities for students and attempt to undo how education had perpetuated inequitable ideas about who can do mathematics (CRT B). She said that by the time her students reached her in seventh grade, “they've kind of come to their own conclusion in their head. You know, I'm a math person or I'm not a math person.” However, she felt these two TSJ practices she used stripped away those labels by showing students they could engage in learning mathematics and gave students “more tools” to do significant work besides a “standard algorithm” (Principle 1). Laura felt these practices created more equitable learning experiences for students because she could “give kids so many more opportunities to learn things” so that they could “find success even if it's in a small thing.”

Despite observing racial disparities between levels, Laura still considered tracking in mathematics to be equitable because at the various levels from regular to accelerated, students were “getting their individual needs met.” Still, she reported that in some of her

classes, students felt “like I'm teaching beneath them, or I'm teaching above them.” Laura may have preferred tracking, but she made statements indicating that students were not always tracked accurately. Laura described feeling that if her school allowed for movement between tracks throughout the year, tracking would be more equitable. Despite her belief that part of the role of a teacher is to challenge school arrangements that sustain inequities (Item 7), Laura did not report taking action to change tracking policies. She noted that at her school, there was “so much resistance as far as [student] movement [between tracks].” The one major issue of tracking, according to Laura, was that the system was inflexible.

Specifically, this year, I have a White kid in my higher class that needs to be in a lower class and they will not let me move him and he's drowning. He's failing in the higher-level class he would do so much better in a lower class, but those are the bad kids [in finger quotes], is what I get told (CRT A).

Laura did not overtly speak to the racism in her statement. Her example of a White student retained in a higher-level class to avoid “the bad kids,” however, exemplified the inherent racism at her school consistent with existing literature around the racist nature of tracking (Ladson-Billings & Tate, 1995; Oakes, 2005) due to lower-level classes comprised of predominantly Black students (CRT A). However, Laura was apparently confident that in her classes, students had equitable learning experiences when she confirmed: “I think the practices [multiple representations and discourse] address the equitability.” Because Laura was reporting that her classes were equitable while also describing inequitable situations between levels that do not align with the NCTM (2014) conceptualization of equity, I asked her to confirm how well she felt she was able to

create equitable learning experiences between tracks. Laura said: “I would say personally, in my class I, I would stand behind that, that yes, I'm providing an equitable learning experience no matter what class you're [students] in.” It seemed Laura agreed with some aspects of tracking but not its inflexibility, and despite the racism she described with her school’s tracking policies, she still felt she could create equitable learning experiences.

Laura expressed clearly, though, that other teachers were not necessarily creating equitable learning experiences. She said other teachers “shut down with the quote, unquote hard kids” and they “don’t teach to the best of their abilities,” suggesting Laura understood how these teachers were perpetuating inequities (CRT B). Laura provided examples of “exciting lessons” that included “stations” or “scavenger hunts” that other teachers have not done for fear their classes would “get out of control.” In Laura’s classes, though, she said she was comfortable teaching “outside the box” because she had structures in place in her classroom that set boundaries for students.

Race. Laura’s comments about race suggested that she did not intentionally use her TSJ practices to mitigate racial inequities. Laura appeared comfortable speaking about race in the interviews but seemed hesitant to speak about race with students in her classroom. In our interviews she mentioned that she was married to a Black man who experienced racism but said she still did not want to openly discuss racism in her classes, which contradicted her response on her survey indicating that such discussions should take place in the classroom (Item 2). She expressed not openly discussing racism at school because “there's a lot of the political climate that says what's appropriate and what's not and what opinions are valid and what's not.” Even though she used teaching practices she felt were equitable, Laura reported shying away from conversations about

race in her classrooms even when opportunities arose. When asked to provide an example of when issues of racism came up in the classroom and how she reacted, Laura did not speak about teaching mathematics or her TSJ practices but instead provided an example of when there was a fight outside of her classroom. Her students crowded around the door to watch the fight and Laura described that she felt frustrated her students were “building a negative community” by “creating more drama” around the fight. Laura recognized that she could have built a conversation around the situation with her students, but she said that she preferred to “give my opinion on, that they need to sit down and mind their own business and move on as opposed to allowing that to kind of grow into more of a discussion.” Instead of using TSJ pedagogy to explicitly address racism, Laura described how she avoided opportunities to discuss race by giving students a “big old 5-minute-long lecture” about what they should do rather than engaging in ways her students might have examined the situation for themselves. Laura did not appear to want to connect what she described as her equitable teaching practices with racial equity.

Summary: Equity through Teaching for Social Justice. Laura recognized inequities between her tracked classes but did not seem to find them too problematic, perhaps because she felt she taught equitably within each class. She conceptualized equity as meeting students’ individual needs, and her basis for teaching differently between tracks aligned with that conceptualization. But she seemed to lower learning expectations for students in lower tracks by focusing less on the content and more on confidence, a common critique of tracking (Darling-Hammond, 2007; Isenberg et al., 2013; Strutchens et al., 2011). Throughout her discussion around equity, though, Laura clearly identified engagement as her means to provide students what she thought they

needed and to measure equitability. Because she enacted multiple representations and discourse in all classes, she confidently stated that she could increase engagement for all students to combat learned helplessness. The engagement she saw, along with her exit slips, allowed her to measure how well she thought she was able to create equitable learning experiences for students. Laura also recognized how race impacted students' track placement but did not appear to use her TSJ teaching practices to specifically target counteracting racial inequities. She believed that her students still had equitable experiences in her classes.

Cross-Case Results

In this section, I discuss Betsy's, Abbie's, and Laura's cases collectively to answer the research questions from this study. First, I present the teachers' varied conceptualizations of TSJ and equity to better describe how they understood the concepts of this research. Considering their varied conceptualizations, I detail how the teachers described perceived barriers to enacting TSJ pedagogy but how they were able to enact TSJ pedagogy in some ways to answer the second research question. Then I present the teachers' perceptions about how well they used TSJ pedagogy to create more equitable learning experiences for students while teaching in tracked mathematics classes to answer the sub-question to the second research question, paying special attention to racial equity.

Varied Conceptualizations of TSJ and Equity

Betsy, Abbie, and Laura had varying conceptualization of both TSJ and equity that led to differences from the normative definitions of both constructs. Their experiences suggested that they did not use explicit TSJ pedagogy (i.e., Gutstein & Peterson, 2006). Instead, they used TSJ pedagogy in terms of enacting lessons or

practices that partially aligned with TSJ Principles and Criteria that they also perceived to be equitable based on their own conceptualizations of equity.

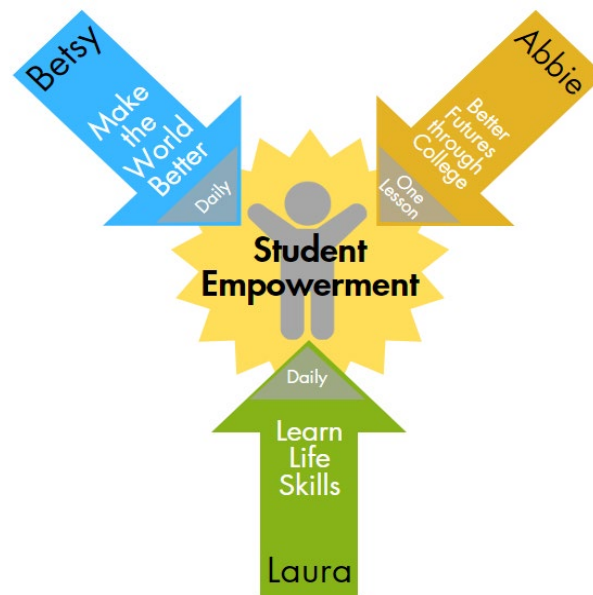
Teaching for Social Justice

Betsy, Abbie, and Laura described experiences that aligned in part to the TSJ Principles and Criteria that guide teachers to create more equitable learning experiences for students (Cochran-Smith, 2004, 2009; Gutstein, 2003). Although none of the teachers expressed encountering the TSJ Principles and Criteria in their experiences or their professional learning, the frequencies with which the teachers' comments aligned with them suggested that the teachers had experiences aligned with certain aspects of TSJ. Betsy, Abbie, and Laura spoke often about TSJ Principles such as bridging academic gaps (Principle 3) and enabling significant work from their students (Principle 1) as well as TSJ Criteria such as creating a caring and just classroom environment (Criteria 4).

Betsy was the teacher with the most knowledge of TSJ pedagogy as a result of her own professional learning and graduate studies. She used more terminology related to the TSJ Principles and Criteria such as sharing power with students, positioning students as experts, and supporting student activism. Abbie and Laura seemed to create their own conceptualization of TSJ pedagogy based on their experiences. The teachers' different ideas about TSJ pedagogy all converge toward empowering students (see Figure 4), in part consistent with literature suggesting that teachers should intentionally empower students through mathematics education (i.e., teaching mathematics for social justice) (Jett et al., 2021).

Figure 4

Teachers' Conceptualizations of TSJ Pedagogy



Empowerment is part of the NCTM's vision of access and equity for all students learning mathematics so that students can “participate meaningfully in learning mathematics” (NCTM, 2014, p. 60), particularly “mathematics for life” (NCTM, 2000, p.4). Betsy, Abbie, and Laura described ways they felt that their students engaged meaningfully in learning mathematics through TSJ pedagogy such that students found what they were learning useful. For example, Betsy felt she empowered students to want to make the world a better place by formulating critical questions about fossil fuel use from historical data trends. Betsy also empowered students by enabling rich mathematical discussions (Principle 1) during which all students had a voice throughout the slow reveal graph lesson. Abbie felt the budgeting lesson provided an authentic life connection between core mathematics concepts (i.e., percents, integers) and mathematics skills (Principle 3) and students' lives in terms of their future careers, which might empower her students to better understand their options for their futures such as higher education.

Laura wanted to teach life skills (Principle 3) throughout her daily lessons by enabling students to disagree or ask questions and encouraging students to engage in empowering mathematics learning for students to feel more confident about learning and to be good citizens in the future.

Though Betsy, Abbie, and Laura conceptualized TSJ in ways that aligned with the NCTM view on student empowerment, Abbie conceptualized TSJ pedagogy in terms of what she considered one budgeting “lesson” instead of pedagogical choices she would make throughout all lessons. NCTM’s inclusion of empowerment as part of access and equity for all students is intended to be applied to pedagogy for all mathematics lessons. Betsy and Laura described TSJ pedagogy as practices teachers could enact in every lesson to engage students in meaningful ways that are connected to their lives. Therefore, Betsy and Laura aligned with normative construct of empowerment through their conceptualizations of TSJ pedagogy.

Betsy, Abbie, and Laura did not seem to conceptualize TSJ in terms of diversifying assessments for their students (Principle 5) or in terms of doing much social justice work beyond the classroom (Criteria 5). With respect to assessment, Laura, for example, spoke about preferring formative assessment over summative assessments and Betsy reported being flexible with assessments. Collectively, though, Betsy, Abbie, and Laura did not express often that diversified assessments were an important component of what they considered to be TSJ pedagogy. In terms of doing social justice work beyond the classroom, Abbie differed slightly from Betsy and Laura because she spoke about relationships she had with families in her community and how important those relationships have been to her teaching. However, Abbie did not indicate that working

with families in her community was part of her pedagogical decision-making or what she considered to be TSJ pedagogy. Also, Betsy, Laura, and Abbie did not speak often about affirming diversity as an asset (Criteria 3) as part of their conceptualization of TSJ. In terms of frequency, Abbie did not speak about diversity as an asset, and Laura and Betsy seemed to value diversity more than Abbie by teaching students how to interact well with diverse peers (Laura) or learning how to enact more culturally responsive teaching methods (Betsy). However, collectively, Betsy, Abbie, and Laura did not frequently report that affirming diversity as an asset was a part of what they considered to be TSJ pedagogy. Thus, although the teachers all expressed beliefs aligned with endorsing TSJ pedagogy, their descriptions of their practices revealed differences in the extent to which they employed TSJ pedagogy.

Equity

Betsy, Abbie, and Laura perceived that they taught equitably. NCTM (2014) defined equity as when student characteristics, such as race, no longer predict student outcomes. All three teachers, however, rarely directly related equity to student characteristics or race when talking about their pedagogical choices. These teachers more frequently spoke about equity-related needs that aligned more to the second portion of how NCTM (2014) defined equity: every student has the individualized support they need to excel. Betsy, Abbie, and Laura all centered their conceptualization of equity on their students' needs. However, each teacher differed on what they thought students needed, which altered how they created more equitable spaces in their classrooms.

When describing equity, both Abbie and Laura spoke about meeting students' needs by what they could give their students, but their ways of giving differed. Abbie

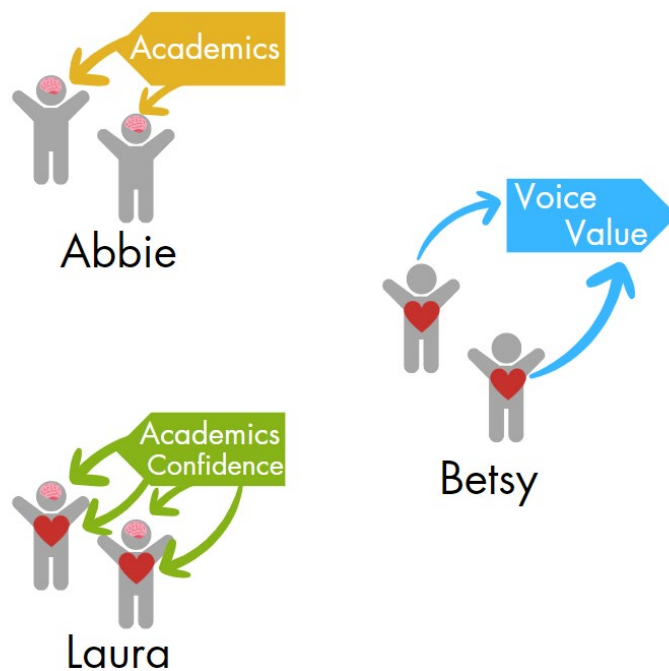
wanted to meet students' academic needs and framed equity mostly in terms of optimizing student learning. Abbie used the budgeting lesson to provide students opportunities to learn about careers and to gain realistic knowledge about financial literacy in ways that interested students. She was explicit in stating that the primary focus of the budgeting lesson was to address the mathematics content in her state standards, so for Abbie, being equitable was making sure students learned the required content they needed. When Laura spoke about equitable teaching, she conveyed that she wanted students to learn mathematics, but she also spoke about giving students what they needed emotionally, specifically in terms of building overall confidence. Abbie made statements contrary to attending to students emotionally when she said she showed students that some of their aspirations were unrealistic (i.e., "I popped their little bubble pretty much in a second"). Laura was motivated to teach useful life and mathematics skills to her students, but she also expressed that she used formative assessment to gauge students' feelings and selected teaching practices that intentionally attended to students' confidence. Abbie and Laura both considered equity as something they could provide for their students. However, in making instructional decisions, Abbie focused heavily on students' academic needs and Laura focused on both academic and emotional needs.

Betsy differed from Abbie and Laura when she conceptualized equity as something she could see coming from her students. Betsy did not want to be the expert giving students mathematical knowledge in her classes. Betsy felt equity occurred in her classroom when students used their voices to express their ideas and learn from each other. Betsy felt students needed to feel like their ideas mattered and that their voices should be heard. Betsy was clear that she wanted mathematical knowledge to come from

her students and not as something she gave to her students. Betsy chose teaching practices that amplified students' voices. Like Laura, Betsy conceptualized equity to include how students felt emotionally. Laura prioritized student confidence, but Betsy prioritized students feeling valued and included. Betsy wanted students to feel valued in how they contributed to and connected with what they were learning, and she chose teaching practices to make all students feel included. To be equitable, Betsy described ways her students could share their ideas and feel like their ideas were worthy. Figure 5 displays similarities and differences between how each teacher conceptualized equity.

Figure 5

Teachers' Conceptualizations of Equity



Perceived Barriers to Enacting TSJ Pedagogy

When discussing how they enacted TSJ pedagogy, these teachers described barriers: standards/curriculum and time. These perceived barriers emerged during the teachers' interviews even though barriers were not part of the interview protocols as a

topic for discussion. Still, all three teachers described what they thought were barriers to enacting TSJ pedagogy as they conceptualized it. Betsy, Abbie, and Laura all reported infrequently or never enacting complete TSJ lessons. Both Abbie and Laura reported barriers imposed by their school systems because they were required to follow specific standards (Abbie) and curriculum (Laura) when planning lessons. All three teachers perceived time to be a barrier, but for Betsy, this barrier was irrespective of standards or curriculum.

Abbie seemed to adhere to teaching content strictly specified in her state standards by enacting lessons aligned with her standards. This strict adherence to standards contributed to her enacting just one complete TSJ lesson because she felt that only one middle school mathematics standard aligned well with making a life connection. Abbie did not enact her budgeting lesson with her algebra students because she felt that she only had enough time for the content included in the high school algebra standards. Abbie did not describe other ways she enacted TSJ pedagogy in her classes beyond her budgeting lesson. Thus, following the state standards restricted Abbie from enacting more TSJ pedagogy because she did not see how other standards connected to TSJ.

Laura tended to follow her district's curriculum, but she supplemented the curriculum when she felt it was necessary. Laura did not use TSJ lessons designed to target specific social justice issues; she infused what she considered to be TSJ practices into the lessons provided by her curriculum. She felt that her curriculum restricted her from enacting complete TSJ lessons because the curriculum did not explicitly include such lessons. However, Laura was able to follow her curriculum by incorporating aspects of TSJ pedagogy into her daily teaching. Laura described that to use multiple

representations and discourse, though, most lessons took more time than allotted in the curriculum pacing guide. Laura said that she had to end some lessons and move on even if her students were not ready. Not only did she perceive her curriculum as a barrier to teaching TSJ lessons, but she perceived time as a barrier to enacting TSJ pedagogy fully through practices because she felt pressure to keep up with the pacing guide.

Betsy, the independent school teacher, seemed to be able to teach at whatever pace she wanted and could select lessons more flexibly than the other teachers. Like Laura, Betsy did not enact complete TSJ lessons in her current school but instead enacted practices she felt aligned with TSJ pedagogy. Even with flexibility in lesson choices, Betsy, who had the highest tendency to endorse TSJ pedagogy, did not recently enact the Gutstein and Peterson (2006) TSJ lessons that she conveyed she wanted to use. One reason was that she did not have enough time. Betsy wanted TSJ lessons to be the norm, but even with more time, she seemed skeptical that she would be able to enact meaningful TSJ lessons regularly. Thus, time may not have been her only barrier. Even though Betsy perceived that time was a barrier to enacting TSJ lessons, she was able to enact what she believed were practices aligned with aspects of TSJ pedagogy. Like Laura, Betsy made daily pedagogical choices that were aligned with some aspects of TSJ pedagogy, such as fostering student to student conversations.

Standards/curriculum and time put pressure on all of the teachers, which created some perceived barriers to enacting TSJ pedagogy. It seemed that the pressures from following the curricula or standards worked in tandem with time to make enacting complete TSJ lessons difficult, and these teachers tended not to use complete TSJ lessons. Abbie enacted one TSJ “lesson” a year, but not with all classes. Betsy and Laura did not

enact TSJ lessons, but they attempted to enact TSJ pedagogy across all lessons with equitable TSJ-aligned practices. This research revealed that perceived barriers to enacting complete TSJ lessons did not necessarily impede teachers from enacting aspects of TSJ pedagogy through practices. Arguably, Betsy and Laura used more TSJ pedagogy than Abbie. Still, all three teachers expressed that time was a barrier to fully enacting TSJ pedagogy in the ways they wanted.

Caring

Betsy, Abbie, and Laura all tended to endorse TSJ pedagogy according to the LTSJ-B scale. In particular, they specifically attended to caring about their students. The idea of caring was not one addressed directly through the LTSJ-B scale, but when the teachers described their experiences, their teaching aligned most frequently with TSJ Criteria 4, creating caring and just learning environments. These teachers seemed to value caring over other TSJ Criteria such as activism for social justice outside of the classroom (Criteria 5), which all teachers infrequently spoke about. Caring seemed to be the way Betsy, Abbie, and Laura felt they could connect with their students, and caring seemed to influence what they enacted in the classroom, but to different degrees.

Betsy showed care when she expressed how she did not want to harm students through her teaching. For example, Betsy chose an environmental justice slow reveal graph lesson because she cared about not doing any harm to students, which she perceived might potentially happen if she selected what she felt was a more delicate topic such as racial justice. Betsy also cared that her students felt valued in how they contributed to lessons, which impacted her pedagogical decisions about the topics of lessons to enact in her classroom. Abbie attended to caring for students through

relationships with her students (e.g., following up with the student who she saw crying). Abbie also expressed caring about her students' futures because many of them did not believe they could go to college, which appeared to in part motivate her to enact the budgeting TSJ lesson annually. How Abbie described caring about students, though, was more about general relationships than pedagogical choices, which may be, in part, why she did not often enact what would be considered TSJ pedagogy. Like Abbie, Laura described ways she formed relationships with students to show them she cared. Laura said she interacted with students to show them she was interested in their lives. Also, Laura wanted her students to not feel helpless in learning mathematics. Instead, she wanted students to believe in themselves, so she enacted practices aligned with aspects of TSJ pedagogy that she felt fostered engagement and built students' confidence. Similar to both Abbie and Betsy, Laura described caring about relationships with her students, but she also described that she enacted TSJ-aligned practices specifically related to caring about building students' confidence.

Each of the teachers repeatedly spoke about ways they cared about their students throughout both interviews. This salient alignment with aspects of TSJ Criteria 4 revealed that some teachers who endorse TSJ pedagogy might align closely with TSJ in terms of caring but not with other criteria such as activism. This alignment seemed to motivate more TSJ pedagogy enactment when teachers connected their caring to how they teach, such as with Betsy and Laura.

Equitability and Tracking

What is Equitable

As previously stated, these teachers' conceptualizations of equity were more closely aligned with providing students with the individualized support students needed to excel rather than how student characteristics predicted success. The teachers all measured equitability based on their own conceptualizations of equity (see Figure 5). Overall, they reported that within tracked mathematics levels, they felt classes were equitable based on their own observations and their conceptualizations of equity.

Abbie's and Laura's descriptions of equity in their classrooms did not align with a view of equity that student characteristics do not predict student outcomes. Abbie and Laura both stated that even though they felt they taught equitably, students at lower levels had different outcomes because they taught differently (Laura) or they have different learning objectives (Abbie). All three teachers perceived that they taught equitably in each class, but they also described persistent inequities between levels. Their attempts to enact TSJ pedagogy did not seem to fully counteract inequities perpetuated by tracking. The teacher's perceptions about how well they used TSJ pedagogy to create more equitable learning experiences for students were situated within tracking. In terms of conceptualizing their perceptions about equity for their students, attention to race was not the primary focus for these teachers.

Thoughts on Tracking

When Betsy, Abbie, and Laura described how they enacted TSJ pedagogy to create equitable learning experiences, they reported feeling that students had equitable learning experiences within each tracked class. The teachers described the TSJ pedagogy

they enacted to be equitable. However, they also described that between levels, their students did not have equitable learning experiences. It seemed the teachers recognized that there were systems that controlled how students were tracked and the inequities those systems created. They spoke about how harmful tracking was to students' identities (Betsy), different academic outcomes based on levels (Abbie), and how tracking perpetuated "math person" and "not a math person" identities (Laura). Despite describing inequities, the teachers did not describe taking action to change tracking policies, which was inconsistent with their expressed beliefs from the survey (Item 7).

These teachers felt as though tracking systems were out of their control to change, and what was in their control was what they enacted each day in their classrooms. Instead of changing tracking systems or policies, these teachers chose to enact TSJ-aligned lessons or practices to try to create what they conceptualized as more equitable experiences for students. This result is not surprising considering all three teachers did not frequently align with TSJ Criteria 5 related to activism beyond the classroom.

All three teachers critiqued the tracking policies at their schools, but Betsy was the only teacher who felt tracking was harmful to all students, even those students in higher level mathematic classes. Betsy clearly felt that by tracking students, "everyone suffers." She expressed concern for students tracked at all levels but particularly for those students "on the edge" who might say "I'm feeling like a math student" but did not get placed in an accelerated class. Betsy believed these students would question their own mathematics abilities because of their track placement. Betsy felt tracking was inequitable but regardless of what teaching pedagogy she enacted, she still felt tracking was harmful. Although Abbie and Laura critiqued tracking as well, they were not as

critical of tracking as Betsy was. Abbie and Laura preferred teaching classes separated by perceived abilities, suggesting they did not see tracking as harmful in the same way that Betsy did. Abbie's and Laura's critiques about tracking stemmed from the district policies of placing students in tracks in elementary school and the lack of flexibility to move students between levels throughout middle school. Abbie and Laura seemed to want tracked classes and perceived their teaching as equitable. Abbie and Laura may have perceived their use of TSJ pedagogy to be equitable because they did not connect the problematic nature of tracking as having an impact on how they conceptualized equity. Abbie and Laura thought that despite tracking, they could still enact practices or lessons to teach equitably as long as students were getting what they needed. Therefore, Abbie and Laura did not seem to consider tracking when they perceived how well they can use TSJ pedagogy to create more equitable learning experiences for students.

Race

When discussing tracking and their perceptions about using TSJ pedagogy to foster equity, Betsy and Laura identified racism between tracked levels, though they did not overtly call what they observed racism. Betsy indicated she would "go to bat" for students if classes were clearly racially inequitable but did not provide an example of taking such action. At the time of the interview, Betsy's classes were very small and not racially skewed. None of these teachers expressed acting in any way to change tracking policies to ensure classes were racially representative of their schools, and none of the teachers seemed to feel they could change the policies that created inequities. This result was unexpected because Betsy, Abbie, and Laura all agreed on their surveys (Item 7) that part of the role of teachers was to challenge school inequities that perpetuate inequities.

Yet, they seemed to accept tracking, suggesting inconsistencies between their beliefs and actions.

Betsy, Abbie, and Laura were not explicit about ways in which TSJ pedagogy created more equitable learning experiences or inequities in terms of race. Betsy and Laura were comfortable talking about race in their interviews and they agreed in the survey (Item 2) that issues of racism and inequity should be openly discussed in the classroom. Race did not come up in Abbie's recounts of her teaching experiences. Abbie did not see a connection between her role as a teacher and discussions or lessons about race in the classroom; which was not surprising given that in her survey responses, she did not agree that issues of inequity and race should be discussed openly in the classroom. She felt topics about race could be incorporated better into other content areas. Even though Betsy and Laura openly discussed race in the interviews, it seemed they avoided topics about race in their classrooms. There seemed to be a disconnect between the beliefs their responses aligned with in the LTSJ-B survey and their actions. Although Laura did not state that she enacted TSJ pedagogy specifically to improve learning experiences for Black or Latinx students, she did, however, identify that TSJ-aligned practices worked best for certain students such as those with behavior issues or from lower socioeconomic backgrounds. She selected TSJ-aligned practices that would build confidence in students in her lower-level classes, who she also said were mostly Black. Still, she enacted TSJ-aligned practices in all levels, so it seemed she did not select those practices specifically to be more racially equitable. Betsy alluded to race by saying that more traditional teaching methods were better for "students who look like me [White]," which led her to enact what she considered TSJ pedagogy to "break the cycle"

so “more students” could benefit. However, Betsy intentionally selected a social justice topic disconnected from racial justice for her TSJ lesson. It was apparent that although Betsy and Laura identified disparities due to tracking, specifically racial disparities for Laura, both teachers seemed to want to avoid infusing content with racial justice topics into their instruction. In their discussions about their efforts to enact TSJ pedagogy, none of the teachers explicitly spoke about how their TSJ pedagogy impacted learning experiences for students of different races. It appeared that in describing their perceptions about how well they used TSJ pedagogy to create more equitable learning experiences, Betsy, Abbie, and Laura did not specifically measure equitability in terms of student characteristics such as race. This result is not surprising because the teachers’ views aligned more with the normative definition of equity in terms of attending to students’ needs instead of in terms of how student characteristics predict student outcomes, and these teachers did not show evidence of analyzing teaching and learning from interdisciplinary analysis perspectives.

Summary of Cross-Case Findings

These teachers all endorsed TSJ pedagogy to some degree but had varied conceptualizations of TSJ centered on student empowerment. Their conceptualizations, however, aligned with the Principles and Criteria of TSJ in some ways. They also conceptualized equity in different ways but in alignment with the normative definition of equity focused on attending to students’ needs. Considering how Betsy, Abbie, and Laura each understood TSJ pedagogy and equity, the cross-case findings suggest they were able to enact TSJ across their tracked classes in different ways. Betsy and Laura described enacting TSJ pedagogy more consistently throughout lessons, whereas the extent of

Abbie's TSJ pedagogy was in enacting one lesson. However, the teachers all reported perceived barriers to TSJ pedagogy. Consistent with Bartell's (2013) and Harper's (2019) findings that pressures may inhibit teachers from enacting TSJ, Betsy, Abbie, and Laura reported perceived barriers such as their curriculum or standards and time. The perceived barriers they described seemed to inhibit them from enacting complete TSJ lessons. For Betsy and Laura, time prevented them from enacting TSJ pedagogy to its fullest even when using TSJ-aligned practices, but they consistently infused some TSJ pedagogy into lessons. All of the teachers also described ways they cared about their students, which seemed to influence their pedagogical choices. Betsy and Laura, who connected caring for students to how well they were teaching, also described enacting TSJ pedagogy more frequently. Betsy, Abbie, and Laura all perceived they could create more equitable learning experiences by enacting TSJ pedagogy. However, they also described inequities, particularly those created by tracking. The teachers criticized aspects of tracking, but they did not collectively focus on race when speaking about inequities or how TSJ pedagogy could specifically create more equitable learning experiences for Black or Latinx students. Although they seemed to accept tracking at their schools, they described ways they worked to make their classrooms more equitable. Because the teachers' conceptualizations of equity did not fully align with the normative definition of equity, however, the equity they perceived in their classes did not appear to alleviate the inequities they observed between tracked levels. These teachers focused mostly on making an impact in individual classrooms rather than systemically. Although the teachers perceived themselves to be able to foster equity, their perceptions of how well they used TSJ pedagogy to create more equitable learning experiences was based on

somewhat narrow conceptualizations of equity that attended to students within levels but not between levels.

CHAPTER 5 SUMMARY AND CONCLUSION

This chapter reviews the intent and findings of this research and how the findings contribute to research as well as implications for future practice and research. This study set out to examine middle school mathematics teachers' tendencies to endorse Teaching for Social Justice (TSJ) and how they described their enactment of TSJ pedagogy. Also, this study examined teachers' perceptions about how well they could use TSJ pedagogy to create more equitable learning environments. The research was guided by the following research questions:

- For middle school mathematics teachers who have taught in tracked classes, what are their levels of commitment to TSJ pedagogy?
- For those middle school mathematics teachers who tend to endorse TSJ pedagogy, how do they describe their attempts to enact TSJ pedagogy across tracked classes?
 - What are teachers' perceptions of how well they use TSJ pedagogy to create more equitable learning experiences?

In this chapter, I review survey results to answer the first research question and themes that emerged using conceptual and theoretical frameworks to analyze lessons used by three teachers and their interviews to answer the second research question. The survey results, case study, and cross-case results provide insight into middle school mathematics teachers' beliefs about and experiences with TSJ and their attempts to create more equitable learning experiences within tracked structures. This chapter also includes

discussion of the study's contributions to mathematics education research, implications for practice and research in mathematics education, and study limitations.

Findings and Contributions

Study findings inform three aspects of mathematics teachers' beliefs, actions, and perceptions: TSJ pedagogy endorsement, teachers' perceptions of TSJ pedagogy enactment, and teachers' perceptions on creating equitable learning experiences for students. Overall, the middle school teachers in this research tended to endorse TSJ pedagogy but had varied conceptualization of TSJ pedagogy, in alignment with TSJ research (e.g., Viesca et al., 2013). These teachers also varied on their conceptualizations of equity. For both constructs, their conceptualizations partially aligned with normative definitions. Despite these variations, results suggest these teachers perceived that their own efforts to enact TSJ pedagogy created more equitable experiences for students within tracked levels, based on their own conceptualizations of TSJ pedagogy and equity. This study contributes to research on how middle school mathematics teachers endorse and enact TSJ pedagogy and how those who tend to endorse TSJ pedagogy perceive that they can use such pedagogy to create more equitable learning experiences for students within tracked structures.

TSJ Pedagogy Endorsement

Survey results suggest that middle school mathematics teachers who have taught students in tracked mathematics classes and who may already be interested in topics such as TSJ or equity may tend to moderately endorse TSJ pedagogy. They may also tend to endorse some aspects of TSJ more than others. The results of the LTSJ-B survey aligned with the results from survey development (Enterline et al., 2008) because the teachers in

this research tended to endorse the items that were easiest to endorse, namely items 1, 2, 4, 7, and 8. Teachers in this study had higher levels of TSJ endorsement related to examining their own beliefs, openly discussing race and inequities in the classroom, incorporating diverse cultures into lessons, challenging inequitable school arrangements, and thinking critically about government. The teachers in this research also were more moderate in their endorsement of items 3, 5, 6, 9, and 10, which were all reverse scored. Scale developers also found these items to have more uncertainty in endorsement. The teachers moderately endorsed items related to the relevance of multicultural topics in mathematics, expectations for English language learners and economically disadvantaged students, and teachers' roles in preparing students for their futures. Teachers in this study had the most difficulty endorsing the beliefs associated with items 11 and 12, which were reverse scored and which scale developers also found to be the most difficult to endorse. Teachers had the most difficulty endorsing items related to hard work not being a direct predictor of student success and the idea that teachers prepare students for their futures, without assumptions about the lives students are likely to lead. This alignment with scale development bolsters the validity of the survey administration in this research.

TSJ Pedagogy Enactment

As framed in this research, TSJ Principles and Criteria provide a guide for pedagogical decisions and delineate ways that teachers can engage in TSJ beyond content instruction. The TSJ Principles and Criteria might be seen in various ways in teaching, as exemplified by the lesson example described in Chapter 2. Results from this study aligns with extant literature (e.g., Bartell, 2013; Gregson, 2013; Harper, 2019) stating that teachers enacted TSJ to varying degrees and in different ways. The three teachers in this

study described enactments of TSJ pedagogy based on different conceptualizations of TSJ pedagogy, which aligns with existing research stating that teachers do not always fully understand TSJ (Viesca et al., 2013). The teachers in this study described that TSJ pedagogy might empower students, aligning with recommendations for middle school learning environments (Bishop & Harrison, 2021). In terms of using TSJ to empower students, Betsy's and Laura's pedagogical descriptions aligned more closely with the normative idea that empowerment takes place throughout teaching rather than in isolated instances, which was apparent in Abbie's pedagogical descriptions. Analysis of teachers' descriptions of enacting TSJ pedagogy also revealed that their teaching tended to align most frequently with Principles 1 and 3 and with Criteria 4—enabling significant work, bridging gaps, and creating a caring and just classroom environment—but did not align consistently across all the TSJ Principles and Criteria. The same analysis suggested that teachers did not frequently describe enacting TSJ related to Principle 6 and Criteria 5 relating to activism in their roles as teachers, despite agreeing in their survey responses that activism in teaching is important (Item 7). Betsy was the only teacher whose descriptions aligned frequently with Principle 6, specifically with aspects related to power and inequity rather than activism.

This study's use of TSJ Principles and Criteria frequencies to analyze teacher interviews focused on enacting TSJ offers a new analytical tool for conducting TSJ research. The LTSJ-B scale measures teachers' beliefs, but the frequencies contextualize how TSJ manifests in teachers' experiences, allowing for better understanding of how beliefs might influence enactment. Previous research included use of TSJ Principles and Criteria as a framework for or as a conceptualization of TSJ (Cochran-Smith, 2004, 2009)

but not as a tool for analysis. Through analysis of frequencies of TSJ Principles and Criteria, this study provides an example of how researchers might connect teacher beliefs measured through the LTSJ-B scale survey with how teachers might enact TSJ pedagogies in accordance with their beliefs.

Another result suggests that middle school mathematics teachers who tend to endorse TSJ pedagogy might enact pedagogy aligned with aspects of TSJ even if they do not enact explicit TSJ lessons (e.g., Berry et al., 2020, Conway et al., 2022). Initially, Abbie, Betsy, and Laura were asked to submit lessons they felt exemplified TSJ lessons. Abbie was the only teacher who submitted a TSJ lesson that she also enacted annually with some of her classes. During the interviews, it became apparent that Betsy and Laura often used TSJ-aligned practices rather than separate TSJ lessons (e.g., student discourse and voice, sharing power with students, multiple representations). Betsy's and Laura's infrequent enactment of TSJ lessons did not indicate that they infrequently enacted TSJ pedagogy. Betsy and Larua seemed to enact more of what they considered to be TSJ pedagogy than Abbie because their practices were implemented across lessons. Enactment of TSJ pedagogy might come in the form of complete lessons (e.g., *Culturally Relevant Income Inequality*) in Chapter 2 (Berry et al., 2020) but can also be seen in everyday lessons through the practices teachers choose to enact. The teachers seemed to enact what they described as TSJ pedagogy within perceived barriers such as standards/curriculum and time, which aligns with research stating that teachers can face challenges to enacting TSJ pedagogy (e.g., Burke & Collier, 2017; Gregson, 2013).

This study adds to the TSJ research in mathematics education that focuses on enacting TSJ pedagogy by investigating how teachers attempt to balance TSJ pedagogy

with teaching mathematics content in their standards or curricula. Resources exist to provide TSJ lessons in mathematics and to support teachers in enacting TSJ lessons (e.g., Berry et al., 2020, Conway et al., 2022; Gutstein, 2003). There has been a need, however, to examine how teachers negotiate bringing TSJ into the classroom while still focusing on content goals for students because teachers tend to experience challenges in implementing TSJ lessons or may gravitate toward content goals over TSJ goals (Bartell, 2013; Gregson, 2013). Research on TSJ lessons tends to focus on teaching practices within the TSJ lesson more than the impact of the lesson itself (e.g., Harper & Kudaisi, 2023). This study adds to research on TSJ by suggesting that TSJ pedagogy may be enacted often even when teachers do not enact TSJ lessons. This study suggests that middle school mathematics teachers who tend to endorse TSJ might more consistently enact TSJ pedagogy when they use TSJ-aligned practices in their everyday lessons. However, this study also revealed that even though these teachers may enact TSJ-practices often, they do not necessarily select social justice topics for everyday lessons.

Equitable Learning Experiences for Students

Although the teachers in this study had different conceptualizations of TSJ pedagogy and equity that did not fully align with the normative definitions of either construct, the teachers all described that they could use TSJ pedagogy to create more equitable learning experiences for students. The teachers seemed to foster equity by piquing student interest or increasing engagement—equity practices aligned with extant research (e.g., Joseph et al., 2019). They described enacting TSJ-aligned lessons or practices to create equitable learning experiences by focusing on their students' needs, as seen in extant literature (e.g., Frankenstein, 1995; Gutstein, 2003). Notably, they did not

foster equity by connecting mathematics to social justice as a tool to solve injustices (Gutstein, 2005; Gutstein & Peterson, 2006), and their descriptions of equity did not always align with how equity was framed in this research (NCTM, 2014) or in other literature (e.g., Berry, 2008, Joseph et al., 2017, Martin, 2009). For example, the teachers did not tend to include student characteristics, such as race, in their conceptualizations of equity and did not always recognize certain situations as inequitable (e.g., student labels or different student expectations).

Because this study investigated the perceptions of teachers who tended to endorse TSJ pedagogy, it was surprising these teachers did not foster equity by selecting social justice topics to teach mathematics content. Specifically, this study provides examples of teachers whose beliefs aligned with TSJ pedagogy, who claimed to enact TSJ pedagogy, and who believed their TSJ pedagogy led to creating more equitable learning experiences for students but who described practices or lessons that only partially aligned with TSJ Principles and Criteria and did not explicitly use social justice topics in their teaching. These teachers also did not include race in their conceptualizations of equity. This study adds to the research of teachers claiming to teach equitably through TSJ but who have not fully enacted TSJ pedagogy (Viesca et al., 2013) by offering insights into how teachers who tended to endorse TSJ pedagogy described their attempts to foster equity despite not using social justice topics in their lessons or incorporating race into their conceptualizations of equity.

A second major finding reveals that although the teachers perceived that they taught equitably, what they described was equity within classes but not between levels. The teachers were confident that they achieved equitability at each level but described

different learning experiences for students at different tracked levels. These teachers reported what has been seen in tracking research even if they did not recognize that what they were reporting was inequitable: different outcomes and expectations or varying teaching practices, student labels, or racial disparities among tracks (e.g., Civil, 2002; Good et al., 2003). Despite the inequities they described or overtly reported, the teachers consistently perceived the experiences of students in their own classes as equitable, in part, because of the TSJ pedagogy they enacted. The teachers' perceptions of teaching equitably in each classroom, or level, did not necessarily mean that students had equitable learning experiences across tracked levels.

This result contributes to tracking research by directly focusing on TSJ and tracking together in middle schools. This research provides current examples of middle school teachers who tended to endorse TSJ and their descriptions of their experiences teaching in tracked mathematics classes. This research also contributes to tracking research with these teachers' perceptions about equity to further illustrate the complex nature of how well equitable teaching practices, such as TSJ, might work in tracked mathematics structures and the inconsistencies that might exist in how teachers conceptualize TSJ and equity. Despite the hope that this research would reveal how TSJ might be used to create equitable teaching across tracks, there remains a need to investigate how to foster equity between persistently inequitable tracks (Tutak et al., 2011), particularly related to racial equity because these teachers did not include race in their conceptualizations of equity.

Last, this study suggests that middle school mathematics teachers who tend to endorse TSJ pedagogy might experience both recognized and unrecognized limitations:

tracking, standards or curriculum, and time. Some of these limitations seemed to inhibit teachers from fully enacting TSJ pedagogy. Tracking at these teachers' schools created typical situations found in tracking literature and research (e.g., Boaler, 1997; Ellis, 2008; Martin, 2009; Morton & Riegle-Crumb, 2019; Oakes, 1990, 2005) in which students had different experiences and were labeled based on their tracks, and students were unable to move flexibly between tracks. Laura also described the racist nature of tracking at her school. Tracking limited these teachers because they did not seem to believe that the inequity between tracks was a problem that they needed to solve because despite identifying problems with tracking, they did not take action to change tracking policies. When the teachers spoke about their content standards or curriculum, they reported feeling pressure both for how to teach and what to teach, which typically did not include social justice topics. This pressure, in turn, also led teachers to describe how they lacked time to cover all content and teach the way they wanted. It seemed that although they perceived they could create more equitable learning experiences for students within levels, they could not completely enact TSJ pedagogy to create equitable learning experiences that transcended tracking and other barriers.

Although this result related to limitations teachers may experience aligns with extant research that explicates the complexity of influences and barriers to enacting teaching practices (Bartell, 2013; Cross Francis, 2015; Harper, 2019) for a variety of teachers (e.g., Ra, 2017), it contributes to mathematics education research by specifically describing barriers for teachers who tended to endorse TSJ pedagogy. These teachers reported multiple constraints on fully enacting TSJ pedagogy to create more equitable experiences for students. Because they tended to endorse TSJ pedagogy, one could argue

they might overcome barriers to enacting TSJ pedagogy because of their beliefs, but the teachers still described limitations to enacting TSJ pedagogy. Therefore, their beliefs did not always translate to their practice (Leatham, 2006).

Additional Contributions

This study makes additional contributions to mathematics education research and practice, including how the LTSJ-B scale might be used to analyze beliefs of practicing middle school teachers and how teachers' voices might be used to better understand teachers' enactments of TSJ pedagogy. The LTSJ-B scale was originally developed to measure pre-service teachers' beliefs and can be used as a baseline for measuring endorsement of TSJ pedagogy (Dickens, 2015; Enterline et al., 2008; Jong et al., 2023; Ra, 2017; Reagan et al., 2016). This study provides an example of the expanded use of the LTSJ-B scale to research practicing middle school teachers' beliefs. Further, the scale was used not only to quantify teachers' beliefs about TSJ pedagogy but also to analyze teachers' responses in conjunction with their reports of practice. Survey responses typically are used to determine an overall score that identifies where teachers fall on a continuum of endorsing TSJ pedagogy (e.g., Evans, 2013). However, in this research, consideration of individual item responses offered specific details about how strongly teachers endorsed aspects of TSJ pedagogy that could not be garnered from overall scores. The survey results were used to inform further investigation into how teachers' beliefs aligned with descriptions of their pedagogical enactment and offered potential limitations there might be on the results of research that relies solely on results from a survey.

Teachers' interviews added textural details to their survey responses. Analysis of teachers' survey responses provided higher evidential value in understanding what might impact pedagogical choices and how teachers' beliefs aligned with their reported practice, which is important because teacher beliefs can impact practice (Enterline et al., 2008; Leatham, 2006). There were items in the LTSJ-B survey that teachers in this study agreed with, such as part of the role of a teacher is challenging school arrangements that perpetuate inequities. However, none of these mathematics teachers described making efforts to change tracking policies at their schools during their interviews. Existing research tends to combine the LTSJ-B scale survey with data sources such as essays (e.g., Reagan et al., 2016) or involve teachers in other subject areas (e.g., Kim, 2017); there is a dearth of research involving interviews with mathematic teachers who have taken the survey. Because of the interdisciplinary analysis perspective (CRT E) taken during data analysis, I was able consider multiple data sources in a variety of ways to make sense of the survey results and interviews to both better understand and report on the teachers' experiences. This study contributes to research by specifically using the LTSJ-B scale survey with middle school mathematics teachers and by showing how teacher interviews add valuable data to better understand survey responses or discover disconnects between beliefs and practices.

Implications of the Study

This study has implications for research and teacher education related to TSJ, equity, and tracking. This research supports use of TSJ pedagogy as an equitable teaching pedagogy. If the teachers enacted what they described as TSJ pedagogy, the practices or "lessons" that they used can support equitable teaching within tracks. However, this study

suggests more work can be done to investigate how TSJ pedagogy manifests between tracked mathematics levels in middle school and to provide professional learning opportunities for middle school mathematics teachers to gain knowledge and practice around TSJ and equity.

Even though teachers in this study perceived that they were able to teach equitably within their tracked classes, they did not seem to notice the inherent inequities that existed across tracks (e.g., Civil, 2002; Ellis, 2008; Morton & Riegler-Crumb, 2019, Oates, 2003). By using a CRT lens, this research suggests the importance of situating educational research within contexts in which it relates to societal inequities. Specifically, when researching equitable teaching pedagogies such as TSJ, researchers might consider separately and explicitly examining how those pedagogies promote equitability within and between tracks. Teachers might be able to improve equitability within classrooms, but when situating equity research within tracking, researchers can investigate if the same improvements can be made across tracks to create overall better experiences for Black and Latinx students.

This study has multiple implications for mathematics teacher education. First, this study suggests that teachers—even those who tend to endorse TSJ pedagogy—may need to develop additional knowledge about TSJ pedagogy or equity because they may not recognize inequitable learning experiences for students or all inequities such as those created by tracking. To further mathematics teachers' knowledge of TSJ, mathematics educators might include TSJ Principles and Criteria in their teacher education curricula and professional learning programs to help teachers better understand and more effectively enact TSJ pedagogy (Cochran-Smith, 2004, 2009). As part of furthering

teachers' knowledge, mathematics educators might use existing social justice lessons to exemplify TSJ pedagogy in mathematics (e.g., Berry et al., 2020; Conway et al., 2022; Gutstein & Peterson, 2006). Middle school mathematics teachers might also benefit from learning ways to infuse TSJ pedagogy into their general planning with practices or lessons so they can both adhere to school requirements for their courses and teach in ways that promote equity (e.g., Felton-Koestler, 2020; Ijebor et al., 2022; Jung & Magiera, 2023; Turk et al., 2023). Second, although the views of the teachers in this study did not completely align with the normative construct of TSJ pedagogy, they centered their conceptualization of TSJ pedagogy on empowerment, which is part of the normative construct of equity (NCTM, 2014). This research suggests that middle school mathematics teachers might benefit from mathematics teacher educators who specifically address how mathematics teachers can learn to empower their students through TSJ-aligned lessons (e.g., Aguirre et al., 2019; Conway et al., 2022; Simic-Muller, 2015) or practices (Leonard et al., 2021) across tracked classes to be create more equitable experiences for students.

This study also has implications for teacher education related to racial justice and teachers as activists. The teachers in this study were all teachers who tended to endorse TSJ pedagogy, and one could argue they would be more likely to relate mathematics to racial justice topics, but the instances in which they enacted TSJ pedagogy with social justice topics were limited. The teachers' surveys also revealed some agreement that issues of race should be discussed in the classroom; however, their interviews revealed that they tended to avoid issues of race. Teachers might benefit from additional learning opportunities for using social justice topics in mathematics lessons (Blanchett, 2006;

Leonard et al., 2009). Teacher educators can help teachers explore and identify social justice topics particularly related to racial injustices that mathematics teachers might use in lessons related to content. The teachers' examples of social justice advocacy were also limited. Mathematics teacher education might include additional professional learning opportunities to aid teachers in better understanding that equity includes more than providing for students' perceived needs. By learning that equity includes creating learning experiences through which student characteristics, such as race, do not predict student outcomes, teachers might better identify inequities perpetuated by tracking (NCTM, 2014). Teacher educators can develop ways teachers might realize that to teach equitably, attending to racial injustices is part of teaching mathematics (Martin, 2019). These teachers agreed that part of the responsibilities of teaching is to challenge school arrangements that perpetuate inequities; however, they did not describe acting to detrack mathematics classes perhaps because of their incomplete conceptualizations of equity. The apparent contradiction between teachers' reported beliefs and actions suggests teacher educators might also facilitate discussions about service and activism (Kokka, 2023) in the teaching profession so that teachers may learn ways to address the racial inequity of tracking. When including the TSJ Principles and Criteria in teacher education curriculum, teacher educators can place emphasis on teachers as activists outside of the classroom to increase instances teachers can practice advocacy and service for social justice.

Limitations of the Study

Aspects of this study limit the generalizability of results, which cannot be generalized to all middle school mathematics teachers. Each of two limitations are discussed in this section: recruitment and case study methodology.

Participants in this study were recruited using a flyer posted on social media and sent in emails. The flyer indicated topics related to this research: TSJ, tracking, and equity, which may have influenced who responded to the survey. Respondents, who most likely were interested in or more familiar with TSJ and the other topics than typical middle school mathematics teachers were thus likely to endorse TSJ pedagogy. The clear identification of the topics that went beyond TSJ, however, might have attracted teachers with characteristics different from those of teachers who tend to endorse TSJ pedagogy to respond to the survey. Also, recruitment took place primarily during the summer months when fewer teachers were actively working and may not have attended to recruitment requests. Therefore, the timing of recruitment may have led to fewer participants, and the demographic diversity of participants was low. Though the participants, and the subsequent cases, varied in experience and geographic location, they identified as mostly White and female. The study might have benefited from diversity in perspectives from male teachers and teachers of Color. For example, Black teachers' own educational experiences tend to be shaped by historical injustices (Joseph et al., 2021), and the perspective of a Black teacher may have uncovered differences in how the teacher understood TSJ pedagogy and equity or enacted TSJ pedagogy based on their experiences.

Case study methodology allows for looking deeply into each case and substantiating meaning from each case and across cases. Results from the three cases can be used to particularize the experiences of middle school mathematics teachers who tended to endorse TSJ pedagogy and who attempted to enact equitable pedagogy in tracked classes, not for generalization. These teachers are not representative of all teachers or necessarily even of teachers who tend to endorse TSJ. From this research, we gain no insights into how teachers who are neutral or who do not endorse TSJ might conceptualize TSJ pedagogy and equity or how they might enact TSJ pedagogy.

Suggestions for Future Research

Research exists to demonstrate the racist and inequitable nature of tracking (e.g., Boaler et al., 2000; Ekstrom & Villegas, 1991; Hallinan, 1996; Hughes, 2020; Oakes, 2005), and many schools still retain tracking structures (NAEP, 2009). Literature also supports that TSJ pedagogy can increase equity in the classroom (e.g., Gutstein, 2003; Maloney & Matthews, 2020; Wilson et al., 2019). It is important to not only investigate beliefs around and efficacy of equitable pedagogy, but explicitly how well that pedagogy can mitigate the detrimental effects of tracking. Teachers in this study attended to equitable learning experiences within tracks but not across tracks. Although TSJ pedagogy might be used to create equitable learning experiences, research is still needed to examine how TSJ pedagogy can also be used to increase equitability across tracks.

The teachers in this study seemed to center their beliefs about TSJ pedagogy on the idea of empowering students. Future research might examine how student empowerment as an aspect of conceptualizing TSJ pedagogy may resonate with teachers; an affective pedagogical goal for TSJ (Kokka, 2022). Researchers can explore a larger,

more diverse set of mathematics teachers to better describe what mathematics teachers believe about TSJ pedagogy to determine if empowerment remains a salient theme. Additional research may provide insight into how teachers conceptualize TSJ pedagogy and how their conceptualizations connect to empowering students. Such research may inform how mathematics teachers make decisions about what they will enact in their classrooms to better understand how beliefs impact teachers' pedagogical choices.

This study also revealed how the combination of TSJ as a conceptual framework and CRT as a theoretical framework can be a powerful analytical tool in mathematics education research, particularly with the use of frequencies for analysis that revealed teachers might align with many aspects of TSJ pedagogy but less frequently to aspects of CRT. Because TSJ is non-neutral in terms of race, when researching with a TSJ framework, CRT can illuminate an essential part of TSJ that may not necessarily be apparent with TSJ Principles and Criteria alone. Future research in mathematics education might better examine TSJ if researchers use CRT Elements during analysis with TSJ Principles and Criteria. For example, with a dual lens and interdisciplinary analysis perspective (CRT E), results revealed that although Betsy's survey results about her beliefs suggested she agreed teachers should dismantle inequitable barriers for students and Betsy described in her interviews practices that aligned frequently with TSJ Principle 6 related to power and inequity, her beliefs did not fully translate into practice and she less frequently related her equitable practices to addressing systemic racism (CRT A). The TSJ Principles and Criteria alone may not have been enough to uncover the lack of attention to race when teachers described their attempts to enact equitable pedagogies and the disconnect between beliefs and actions related to dismantling

inequitable structures. Future research can more closely and purposefully tie race to TSJ when employing TSJ and CRT together.

Conclusion

This research provided insight into how middle school mathematics teachers tended to endorse TSJ pedagogy and contributed to mathematics education research and teacher education in several ways such as by using frequencies to describe how teachers enacted TSJ pedagogy. This study also detailed three middle school mathematics teachers' descriptions of enacting TSJ pedagogy in tracked structures. The findings suggest these teachers have their own conceptualizations of TSJ pedagogy and equity and that they might more consistently enact TSJ pedagogy through practices rather than lessons. Nevertheless, these teachers enacted what they considered to be TSJ pedagogy—centered on empowering students and without connection to social justice topics—and they perceived that TSJ pedagogy helped create equitable learning experiences for students. Results suggest that TSJ pedagogy has the potential to foster equity within tracks, but not necessarily between tracks. Teachers' perceptions about equity illuminated that what they believed to be equitable focused on student needs over how student characteristics predicted student success, which was an incomplete assessment of equity. By including teachers' perceptions about their experiences alongside their survey responses, this study also revealed teachers' perceived barriers to enacting TSJ pedagogy as well as inconsistencies between teachers' beliefs and reported practices, which adds to research around the complex relationship between teacher beliefs and practice. To move closer toward providing equitable learning experiences in mathematics, mathematics educators can provide professional learning opportunities connecting student

empowerment with TSJ pedagogy and supporting teachers' development of more complete understandings of TSJ pedagogy and equity. Education researchers can continue to explore ways TSJ pedagogy might foster equity between tracks, should tracking be retained, and can employ CRT with TSJ to intentionally examine how teacher beliefs about race might influence their enactment of TSJ pedagogy.

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Appendix A

Survey

This questionnaire requests specific information about your experiences in relation to the objective of the study. This survey will take less than 15 minutes to complete. Thank you for your time.

1. Are you currently a mathematics teacher?

Yes or No

2. Which grade band applies to your current teaching role?

K-5 or 6-8 or 9-12

3. How many years of experience do you have teaching mathematics?

4. If tracking is defined as the systemic process by which students are placed in mathematics levels based on perceived ability, does your school use tracking in mathematics?

Yes or No

5. Which best describes the mathematics tracks you teach? (You can select more than one)

Below grade level or At grade level or Above grade level

6. Gender: How do you identify?

Male or Female or Non-binary or Prefer to self-describe or Prefer not to say

7. Race: How do you identify?

American Indian/Alaska Native or Asian or Black/African American or
Latinx/Hispanic or Native Hawaiian/Pacific Islander or White or Other or Prefer
not to say

8. What is the name of the school where you teach?
9. What is the name of the school district in which you teach?
10. Is your school in a metropolitan area (one in which there is core urban area)?
 - a. Which one?
11. Please provide estimated percentages for the racial/ethnic demographics for your school.

White:

Black or African American:

American Indian or Alaska Native:

Asian:

Hispanic or Latinx:

Not Hispanic or Latinx:

12. Would you be willing to participate virtually in two interviews and submit a written reflection about your experiences as a mathematics teacher?

Yes or No

13. (If yes) Please provide your email address and a study team member will contact you regarding an interview and reflection. Your email address will be saved separately from your survey responses and will not be used to identify you in our data set.

This portion of the survey was adapted from LTSJ-B Scale (Enterline et al., 2008).

Respond to the following statements about teaching. ^a

1. An important part of learning to be a teacher is examining one's own attitudes and beliefs about race, class, gender, disabilities, and sexual orientation.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

2. Issues related to racism and inequity should be openly discussed in the classroom.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

3R. For the most part, covering multicultural topics is only relevant to certain subject areas,

such as social studies and literature.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

4. Good teaching incorporates diverse cultures and experiences into classroom lessons and discussions.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

5R. The most important goal in working with immigrant children and English language learners is that they assimilate into American society.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

6R. It's reasonable for teachers to have lower classroom expectations for students who don't speak English as their first language.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

7. Part of the responsibilities of the teacher is to challenge school arrangements that

maintain societal inequities.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

8. Teachers should teach students to think critically about government positions and actions.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

9R. Economically disadvantaged students have more to gain in schools because they bring less into the classroom.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

10R. Although teachers have to appreciate diversity, it's not their job to change society.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

11R. Whether students succeed in school depends primarily on how hard they work.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

12R. Realistically, the job of a teacher is to prepare students for the lives they are likely to lead.

Strongly Disagree = 1, Disagree = 2, Uncertain = 3, Agree = 4, Strongly Agree = 5

^a R: denotes the categories were reverse scored but the R will not appear on participant surveys.

Appendix B

Recruitment Email

I am seeking mathematics teachers who currently teach in grades six through eight in a metropolitan school with tracking (ability grouping) in mathematics. I am looking for volunteers to participate in a study of their perspectives and experiences with tracking in mathematics. I am hoping that you would be willing to share your perspectives on and experiences with teaching in tracked mathematics classes.

If you are interested in participating in this study, click this link [hyperlink to survey] which will have an informed consent form that describes the study in greater detail. Then, you can complete the short survey which should take no more than 10 minutes to complete. The survey will ask you to provide demographic information, some information about your experiences teaching in tracked mathematics classes, and questions about your teaching beliefs.

A subset of teachers who complete the survey will be asked to participate in two additional aspects of the study. First, completion of a reflection based on a prompt along with submission of a sample lesson. Second, two to three virtual interviews that should require a total of approximately two to three hours over the course of the next two to three months. Though there may not be a direct benefit to you for your participation, the information garnered from this study may help inform mathematics education and benefit others.

If you have questions, complaints, or concerns about the research, you should contact Stephanie White at 502-377-1282 or stephanie.white@louisville.edu. If you have questions regarding your rights as a research subject or concerns regarding your privacy, you may call this toll-free number 1-877-852-1167. This is a 24-hour hot line answered by people who do not work at the University of Louisville. Your participation is voluntary and you may decide to stop at any time. You do not have to answer any questions that you do not want to answer.

Appendix C

Document Review Prompt

Please reflect on the following prompts and submit 400-600 words in total. In your response, please include details such as questions you asked your students during this lesson, tasks assigned to students, assessments used, and teaching strategies.

Select and describe a lesson plan you enacted that you feel exemplifies teaching for social justice as you understand it.

Describe (1) the mathematical learning objectives of the selected lesson and (2) the social justice learning objectives of the lesson.

Reflect on the positive and negative academic student outcomes of this lesson.

Provide support for how you determined these outcomes.

Reflect on other positive and negative student outcomes of this lesson. Provide support for how you determined these outcomes.

When submitting your reflection, please include the actual lesson plan if available.

Appendix D

Interview Protocol 1

Prior to the interviews, participants will sign an informed consent document.

This will be the first of two interviews we do and will include some conversations about your experiences as a math teacher. We will start off with me getting some basic information about you and then we will talk about your math teaching experiences. The second interview will be focused on clarifying ideas from this first interview.

Do you have any questions before we begin?

Demographic Information

1. What grade level(s) or math courses are you currently teaching?
2. You said your school has tracking for mathematics classes. Please describe the classes you teach in terms of their perceived ability levels.

Next, I will ask you a set of questions related to Teaching for Social Justice and the reflection and lesson plan (if applicable) you submitted as well as the survey you took.

1. How do you know if a lesson is a TSJ lesson?
2. Describe how you incorporate students' backgrounds into your lessons.
3. How do you support student activism through your math lessons?
4. What types of assessments do you use in your classroom?
5. In the survey, you responded [insert response] regarding issues related to racism and inequity being openly discussed in the classroom. Describe your thoughts related to this response.

6. In your reflection, you mentioned [positive academic outcome] measured by [assessment]. How do you think the lesson brought out this specific outcome?
(Repeat if more than one positive academic outcome.)
7. In your reflection, you also mentioned [other positive outcome] measured by [assessment]. How do you think the lesson brought out this specific outcome?
(Repeat if more than one positive academic outcome.)
8. From the survey, you responded [insert response] to the statement that student success in school depends primarily on how hard they work. Describe your thoughts related to your response.
9. Considering the contexts of your school and classroom, what other factors do you think played a role in positive outcomes from this lesson?
10. In your reflection, you described [negative student outcome]. What aspects of the lesson brought out this outcome?
11. Same as above, what other school or classroom factors do you think played a role in negative outcomes from this lesson?
12. From your experiences teaching lessons like the one you described, do the positive and negative outcomes occur for all students in your classes? Why or why not?
13. Describe how you decide when and with which classes you choose to use lessons like the one you described in your reflection.
14. How often do you use lessons like the one you described in your reflection?
15. Is there anything else you would like to add?

Appendix E

Interview Protocol 2

Note: The second interview will be heavily based on the ideas presented by the participant in the first interview. The below protocol may be edited when the actual interview takes place and is tentative.

In this interview, I would like to talk more about some of what we discussed in our first session. Because some time has passed since the first interview, has anything come to mind regarding tracking that you would like to discuss before we start?

Next, I am going to revisit some of the ideas from the first interview regarding your experience with teaching and the survey you took.

1. In the first interview, you said that all students [did/did not] benefit from lessons like the TSJ lesson you described in your reflection. Can you tell me more about which students benefit from this type of lesson?
2. Previously, you described how you make decisions about planning lessons such as [paraphrase].
 - a. Are there any other influences on your decision-making that you have not mentioned?
 - b. Which factors are the most influential in your decision-making?
3. You mentioned how often you use lessons like the one you submitted: [paraphrase]. Have you used these lessons throughout your teaching? When did you start using these lessons and why?
4. Describe some elements of the TSJ lessons you use that are different than other types of lessons you use.

5. How do you show your students that you value diversity?
6. How would you describe an equitable learning experience for students?
7. Describe how do you feel the TSJ lessons you use create more equitable learning experiences for students compared to other types of lessons?
8. In the survey, you responded [insert response] to the idea that part of the responsibilities of the teacher is to challenge school arrangements that maintain societal inequities. Elaborate on why you chose the response you did.
9. In our last session, you classified your tracked classes as [paraphrase description]. Have you used the TSJ lessons in each of these levels? Why or why not?
10. In your experience teaching, do you think students in [paraphrase description of tracks] have equitable learning experiences? Why or why not.
11. How well do you think TSJ lessons address the equity of tracked classes [paraphrase response from question 8 as needed]?
12. Describe how well your TSJ lessons have been received by others (parents, teachers, school administrators)?
13. How does your service toward social justice extend beyond the classroom?
14. Do you have any other thoughts to add based on our conversation?

CURRICULUM VITA

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EDUCATION

Expected May 2024	University of Louisville <i>Ph.D., Curriculum & Instruction, Mathematics Education, 4.0</i>	Louisville, KY
May 2004	The University of Texas at Dallas <i>Master of Public Affairs, Policy Analysis</i>	Richardson, TX
May 2000	Wake Forest University <i>B.S., Mathematics, Minor: Education</i>	Winston-Salem, NC

PROFESSIONAL LICENSE AND CERTIFICATE

2022-2027	Math teaching certification, grades 5-12, Rank II	Kentucky
2006-2011	Educator, Mathematics 6-12	North Carolina
2000-2006	Classroom Teacher, Secondary Mathematics	Texas

ACADEMIC AND PROFESSIONAL EXPERIENCE

2019-Present	University of Louisville <i>University Fellow & Graduate Assistant Research Assistant & Student Teaching Supervisor External Curriculum Review Team</i>	Louisville, KY
2009-Present	Louisville Family Fun LLC <i>Founder/Owner</i>	Prospect, KY
2016-2017	Guthrie/Mayes Public Relations <i>Account Manager</i>	Louisville, KY
2014-2016	Big Brothers Big Sisters of Kentuckiana <i>Community Engagement Director Community Engagement Manager</i>	Louisville, KY

Marketing and Communications Specialist

- 2005-2007 **Chapel Hill-Carrboro City Schools** Chapel Hill, NC
Teacher
- Taught pre-algebra, algebra, and geometry
- 2004-2005 **Texans Can! Academies** Dallas, TX
Mathematics Instructional Specialist
- Wrote curricula for 10 schools
 - Created and conducted professional development
- 2003-2004 **The Green Center** Richardson, TX
Research Assistant
- 2000-2003 **Lake Highlands High School** Dallas, TX
Teacher
- Taught algebra, geometry, and SAT prep

UNIVERSITY INSTRUCTION

- EDTP 397/597: Mathematics Reasoning in Middle & High School (Co-Instructor)
EDTP 408/423: Middle and High School Mathematics Methods (Internship)

PUBLICATIONS AND PRESENTATIONS

- White. S., (2024, March). *Teaching for Social Justice: How Teachers Describe their Efforts to Foster Equity in Tracked Classes*. Presentation at the Kentucky Center for Mathematics (KCM) 2024 Annual Conference. Lexington, KY.
- White. S., (2024, February). *Teachers' Experiences with Teaching for Social Justice in Tracked Middle School Mathematics Classes*. Poster Presentation at the Spring Research Conference. Louisville, KY.
- White. S., (2023, October). *Teachers' Experiences with Teaching for Social Justice in Tracked Middle School Mathematics Classes*. Presentation at the National Council of Teachers of Mathematics (NCTM) 2023 Research Conference. Washington, D.C.
- Marin, K., **White. S.** (2023). Generation Z goes to math class: How the effective mathematics teaching practices can support a new generation of learners. *School Science and Mathematics*. <https://doi.org/10.1111/ssm.12565>

- Marin, K., **White, S.**, (2023, February). *Student Teacher Interrupted: The Impact of the Covid-19 Pandemic on Pre-Service Teachers*. Presentation at the Association of Mathematics Teacher Educators (AMTE). 2023 Annual Conference. New Orleans, LA. Contributor.
- White, S., (2022, March). *Why Do We Track Students? A Deep Look into Inequities in Ability Grouping and Barriers to De-tracking*. Presentation at the National Council of Teachers of Mathematics (NCTM) 2022 Regional Conference. Indianapolis, IN.
- White, S., (2021, November). *Sharing Power with Students to Increase Agency in Mathematics*. Presentation at Annual Conference for Middle Level Education. Virtual.
- Zbiek, R.M., Peters, S., Galluzzo, B., **White, S.** (2022). Secondary mathematics teachers learning to do and teach mathematical modeling: A trajectory. *Journal of Mathematics Teacher Education*. <https://doi.org/10.1007/s10857-022-09550-7>
- Zbiek, R.M., Peters, S., Galluzzo, B., **White, S.** (2021). Retrospective study of teachers' experiences that contribute to their development as modelers and teachers of modeling. *PME-NA Conference Proceedings*. <http://www.pmena.org/pmenaproceedings/PMENA%2043%202021%20Proceedings.pdf>
- Zbiek, R.M., Peters, S., Galluzzo, B., **White, S.** (2021, October). Retrospective study of teachers' experiences that contribute to their development as modelers and teachers of modeling. Presentation at Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Hybrid.
- White, S.**, Howell, P. (2021). Research summary: Equity in mathematics: Helping every young adolescent access the content. *Research Summaries, Association of Middle Level Education*. <https://www.amle.org/research/equity-in-mathematics-helping-every-young-adolescent-access-the-content/>
- White, S. (2021). Overcoming barriers: De-tracking to teach for social justice. *Middle Grades Review* 7(3), 1-8. <https://scholarworks.uvm.edu/mgreview/vol7/iss3/3/>
- White, S., (2021, November). *Sharing Power with Students to Increase Agency: Why and How*. Presentation at the NCTM 2021 Annual Meeting & Exposition. Virtual.
- Zbiek, R.M., Peters, S., Galluzzo, B., **White, S.** (2021, May). *Retrospective Study of*

Teachers' Experiences that Contribute to Their Development as Modelers and Teachers of Modeling. Presentation at 2021 Pennsylvania Association of Mathematics Teacher Educators (PAMTE) Symposium. Virtual.

White, S., (2021, April). *Deepening students' understanding of slope: From concept to context in pre-algebra and beyond.* Presentation at the NCTM Virtual Annual Meeting. Virtual.

White, S., (2020, March). *3 Ways to increase engagement while decreasing your workload.* Presentation at the Kentucky Center for Mathematics Annual Conference. Lexington, KY.

White, S., Maney, M.A. (2006, October). *Math innovation made easy.* Presentation at the 2006 North Carolina Teachers of Mathematics Annual Conference. Greensboro, NC.

MEMBERSHIPS AND SERVICE

National Council of Teachers of Mathematics (NCTM)

Kentucky Council of Teachers of Mathematics (KCTM)

Kentucky Association of Mathematics Teacher Educators (KAMTE)

2023 **NCTM Math Advocacy Day on Capitol Hill**

2023 **NCTM Research Conference Reviewer**

2022 **ACT Prep Instructor**
Volunteer - North Oldham High School

2021-2022 **Local Planning Committee**
Oldham County Schools

2021-2022 **STEAM Exchange**
Board Member

2021-Present **North Oldham High School PTSA**
Volunteer

2021-2023 **North Oldham Middle School PTSA**
Volunteer

2020-2021 **Educational Justice**

Volunteer Trainer

HONORS AND AWARDS

2023-2024	University of Louisville <i>Dissertation Completion Award (Full scholarship and stipend)</i>
2021-Present	University of Louisville <i>Graduate Assistantship (Full tuition and stipend)</i>
2019-2021	University of Louisville <i>University Fellowship (Full tuition and stipend)</i>
2018	Greater Louisville, Inc. <i>Inc.credible Small Business Awards Finalist</i>
2014	Business First Louisville <i>40 Under 40 Honoree</i>
2014	Commonwealth of Kentucky <i>Kentucky Colonel</i>
2003-2004	The University of Texas at Dallas <i>The Cecil and Ida Green Center Scholarship</i>