

**Researching a Practice of Teaching Elementary Mathematics
Aimed at Disrupting Inequity and Promoting Justice**

by

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Dedication

This dissertation is dedicated to Beau. His love, strength and support made the writing of this document possible. It is also dedicated to my family for teaching me to question authority, love unconditionally, and fight for justice.

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Abstract

What is the work of an elementary teacher attempting to teach mathematics in ways that disrupt pervasive patterns of inequity and promote justice and success for children from historically marginalized groups? What problems or tensions arise at the beginning of the school year in pursuing these goals and seeking to build community in a heterogeneous classroom? This study examines one teacher's work in starting the year as she sets out to disrupt normalized patterns of practice and teach in ways that advance justice. Using the tools of first-person research, this study focuses on how the teacher thinks about these aims and examines the tensions that arise for the teacher as she pursues them. Analysis was conducted through a close examination of the teacher's daily journal, which was supplemented with examination of videos of all mathematics lessons and student work from the first trimester of the school year.

The findings suggest that the work for this teacher coalesced around *centering children*. What I name *centering children* refers to the teacher's intentional moves to understand children's multiple identities, children's thinking, and children's interactions, as she aimed to disrupt historical patterns of inequity, make instructional decisions, and position children from marginalized groups as capable learners and doers of mathematics. This study also takes up the tensions and dilemmas that accompanied

this work for the teacher at the beginning of the school year in a diverse elementary classroom.

The findings of this study provide insight into the nuanced complexities of the decisions that one teacher made, as well as the tensions that the teacher faced when intentionally striving to disrupt systemic patterns of inequity to *center children*. The findings have implications for teachers, teacher educators, mathematics educators, and those who provide professional support for teachers. Through detailed examination of a single case, this study seeks to make explicit how some of the most pressing issues that occur at the beginning of the school year are thought about and approached by a capable, experienced, justice-focused teacher. The findings highlight implications surrounding the dilemmas that other justice-focused teachers are likely to face and suggest supports that are likely to help such teachers.

CHAPTER I: Introduction

When you understand how hard it is to fight for educational justice, you know that there are no shortcuts and no gimmicks; you know this to be true deep in your soul, which brings both frustration and determination. (Bettina Love, 2019)

What Is Typical in Upper Elementary Mathematics Classrooms

This first chapter primarily draws on a depth of personal knowledge I have accumulated from over two decades of working in education. It draws on my knowledge from serving as a teacher, a teacher educator, an instructional coach, a mentor teacher, an educational researcher, an instructor of graduate courses, and an educational consultant. In these roles I have been in conversation with scholars and other great thinkers and read a great deal of literature surrounding what is typical in mathematics classrooms, but here I explain what I have witnessed first-hand by being inside of hundreds of elementary mathematics classrooms and watching thousands of hours of mathematics instruction. I am frequently in classrooms to support teachers as they aim to grow their practice, and this work has often focused on helping teachers learn to see that normalized, taken-for-granted practices often reproduce harmful patterns of oppression for children. Because of the nature of my work with teachers, I am often in a position that allows me to see the kinds of things that teachers routinely take for granted.

Many of these taken-for-granted practices that I routinely observe have been a part of my own teaching in the past. These practices are normalized and stem from managing complexities in classrooms and balancing many demands simultaneously. They have reasoning behind them such as efficient use of time, creating stability and control, or protecting children from discomfort. Even so, these well-intentioned practices often reproduce harmful patterns of oppression for children. My study will explore alternative practices that are oriented toward justice and empowerment of children and their learning. But before I explore justice-oriented practices, I explain typical patterns of injustice pervasive in elementary mathematics classrooms.

What is it that I *typically* see in upper elementary mathematics classrooms? Black, Latinx, Indigenous, low SES, female, gender-nonconforming, and English language learners are infrequently listened to, or are completely silenced, even in some of the classrooms of the most well-intentioned teachers. Seldom do these children get to do the teaching or control the discourse. They are often ignored and positioned as less capable members of the mathematics community. Little attention is paid to what they know and can do, yet their deficits are routinely perseverated on. Value is not often placed on their thoughts, ideas, or questions, and their brilliance is routinely unnoticed or disregarded.

In general, the greater the number of marginalization markers a child has the higher their chance of receiving this normative treatment, as school structures were designed to position children with multiple marginalization markers as “less than.” But “less than” whom? Less than a white, male, English speaking, gender-conforming, middle to upper class child, whom the structures of the school were deliberately

designed to benefit (Martin, 2015; Muhammad, 2020). Determining a child's likely level of oppression at school is not as simple as the number of marginalization markers a child has; it is more complex than this. The confluence of a child's identities forms something distinct that can make oppressive treatment more likely within school structures. School structures cause this unjust treatment to be patterned and normative in mathematics classrooms, but intentional disruption of these normalized patterns can offer a path to teach in ways that advance justice. To advance justice, mathematics education must be explicitly designed to benefit children from historically marginalized groups, and teachers are on the front line of implementing this change. The interplay among the teacher, the content, and the children must shift in order to disrupt this unjust status quo.

An additional conclusion I have reached from my extensive work in mathematics classrooms is that these oppressive patterns are so normalized and pervasive that teachers continuously reinforce them unless they actively work to disrupt them. This is much like the distinction between being anti-racist and not racist (Kendi, 2016). Kendi (2016) argues that to be anti-racist, one must take deliberate action to interrupt racism. I build on this claim to argue that to be justice-focused a teacher must take deliberate action to disrupt inequity. A person who claims they are not racist but takes no disruptive action is like a teacher who claims they are for justice but takes no disruptive action; their lack of disruptive action only perpetuates prevalent patterns of racism and oppression. These patterns are systemic components of school structures, as school structures were designed to privilege certain children, thereby marginalizing other children. It is not enough for educators to simply believe in an ideal. Educators must

take playful, deliberate, repeated action explicitly focused on achieving that ideal.

Without this, racist and oppressive school structures remain intact, and children will continue to experience injustice and harm. What does this harm and inequity typically look like in mathematics classrooms?

Opening Up Injustices in Elementary Mathematics Classrooms

In elementary mathematics classrooms, these injustices can take can many forms. When a child who self-identifies as Latinx and an English language learner refuses to speak in front of the class, many teachers I have worked with would not press the child to speak, reasoning this would protect the child from potential embarrassment. When a child who self-identifies as Black and Indigenous shares his invented mathematical strategy, many teachers would deem it as not valuable or relevant enough to open up further with the class. When another child decides on their own to build a mathematical model to solve a problem, many teachers I have worked with would direct the child to solve the problem on paper instead. When children begin to debate each other in a mathematical discussion, many teachers would “take back control” of the discussion and simply *show* the children what to do in order to solve the problem. When children are asked to share details about themselves in the classroom, many teachers I have worked with would steer children away from discussing particular aspects of identity, such as racial identity. When a child who self-identifies as Latinx and homeless shares an important mathematical insight with her small group and they push her to the margins by completely ignoring her, many teachers would simply say something vague like, “Make sure you are listening to all group members.”

When a classroom of children each work on a mathematics task alone and in complete silence, many teachers would praise the children for their “hard work.” When children view their teacher as the only expert and mathematical authority in the room, many teachers embrace this, telling children how to solve problems, validating children’s answers, and controlling the mathematical discourse. When a teacher is handed a mathematics curriculum and is told by school leadership to teach it “as written,” many teachers would follow that curriculum as written, not attending to the lack of focus on children’s thinking, questions, and understandings. When a child who self-identifies as Black expresses that he wants to experiment in front of the class with solving a problem in a way that breaks a mathematical rule, many teachers I have worked with would deny this request simply replying that the mathematical rule must be followed.

Taken in isolation, each of these normalized teacher responses may not seem particularly impactful. However, the *compounded* effects of these normalized, taken-for-granted teacher responses can be damaging to all children, but they are particularly damaging to children who are Black, Latinx, Indigenous, of low socioeconomic status, female, gender-nonconforming or English language learners. This is because children from these groups are routinely and repetitively pushed to the margins. They are seldom viewed or positioned as powerful members of the mathematics classroom community, capable of teaching or controlling the discourse. Rather, these children are routinely ignored or are completely silenced. Seldom is what they know and can do valued and leveraged. Worth is not frequently placed on their thoughts, ideas, or questions, and their brilliance often goes unnoticed or is disregarded. At the same time,

it is normative that school structures support deficit views of these children, further ignoring their capacities as knowers and doers of mathematics, and reducing or removing their voice and power in the classroom.

In this study I sought to explore the thinking and tensions I encountered as the teacher during the first trimester of the school year as I attempted to disrupt inequity and promote justice for children from historically marginalized groups in my heterogeneous fifth-grade mathematics classroom. My central aim as the teacher was to intentionally disrupt harmful patterns of inequity that are pervasive in schools. Rather than teaching with traditional practices that would reinforce systemic patterns of inequity, I sought to teach in ways that could instead offer children from historically marginalized groups justice in their mathematics classroom. In particular, I intentionally focused on children's multiple identities as I made instructional decisions.

Because the teacher is still getting to know the children during the beginning of the school year, it is likely to be a period in which specific dilemmas arise for a teacher aiming to ground instruction in response to children's identities. This makes the beginning of the year a strategic period to study. Further, although a teacher cannot learn everything about children's identities at the beginning of the year, much of the school year hinges upon how this work begins. This is an additional reason why I intentionally selected the first trimester of the school year to study. In fact, the beginning of the school year is so impactful that a body of literature exists with a specific focus on providing advice and information for classroom teachers on how to begin the school year (Bergman, 2010; DeBruyn, 2017; Responsive Classroom, 2015; Wong & Wong, 1998). Although the authors of this work use different language, many of these

pieces share a number of common themes. These common themes include establishing rules and routines, developing lesson and curriculum mastery, physical classroom set up and organization, and getting to know students' academic records and interests (Bergman, 2010; DeBruyn, 2017; Responsive Classroom, 2015; Wong & Wong, 1998). This body of literature has helped me consider the practices and struggles that are uniquely tied to starting the year in an elementary classroom. Thus, a third reason that I focused on the beginning of the school year was to uncover new themes, or nuances surrounding existing themes, to enhance this body of literature for practicing teachers and teacher educators.

My study is centered on whole group classroom discourse because this is where diversity creates the most complexities for the teacher. Although a group of “diverse” children is sometimes used as a euphemism for Black children or children of color, in this study I define a diverse group of children as different in terms of race, ethnicity, culture, socioeconomic status, language, gender identity, country of origin, neighborhood of residence, and city of residence. This is an important distinction to make because in societal institutions children are often marginalized¹ based on a combination of these factors. Attending to any one of these factors in isolation presents an incomplete picture.

Teaching a Heterogeneous Classroom of Children

I am not only interested in problems of practice at the beginning of the school year to support historically marginalized children. I am also interested in the teaching of a heterogeneous classroom that departs from typical notions of diversity as

¹ Marginalization is when a group is systemically viewed as insignificant, unimportant, or peripheral based on social relations, history, and the activity of power structures.

“predominantly Black” or “predominantly Latinx.” Teaching a heterogeneous classroom of children is complex work, even for a competent mathematics teacher. Successfully addressing the needs of a diverse group of children is one of the most pressing challenges currently facing public education (Aceves & Orosco, 2014). Over half of the students in the United States are children of color or speak home languages other than English, and this proportion is increasing each year (U.S. Department of Education, 2014). This steady increase has created great concern in the educational community because, “research shows that a student’s race, ethnicity, cultural background, and other variables can significantly influence achievement (Harry & Klinger, 2006; Orosco & Klinger, 2010; Skiba et al., 2011)” (Aceves & Orosco, 2014). One of the difficulties associated with teaching a heterogeneous group of children is that the majority of the teacher population in the U.S. remains overwhelmingly white and monolingual (U.S. Department of Education, 2013). This so called “demographic divide” between white teachers and their students of color often negatively impacts teachers’ abilities to select the most effective instructional practices and tasks for all of their students. But the problems are much deeper than this.

As with many societal institutions, public education was primarily designed to privilege only a subset of children (Martin, 2015; Muhammad, 2020). It is challenging for a teacher to attempt to redesign mathematics education to explicitly benefit children from historically marginalized groups when the teacher is operating within a larger system that was never designed to privilege these children. Societal power structures, hierarchies, and issues of status are constantly at play in the school environment causing a variety of challenges for teachers who seek to advance justice.

For example, although each child brings a wealth of brilliant knowledge into the classroom from their home community, too often this brilliance is not elicited, recognized, or not taken up in classrooms. To push back against this norm, teachers can intentionally get to know each child's identities, consider how these identities intersect to marginalize or privilege the child and the knowledge the child brings, and actively elicit and leverage their brilliance. Implicit in this work is teachers' understanding that the brilliance of Black children is axiomatic (Martin, 2011), and that the brilliance of other historically marginalized children is axiomatic as well. By this I mean that teachers must understand that children from historically marginalized groups are brilliant, and that this brilliance does not need to be proved. This foundational orientation is in direct opposition to dominant deficit views of such children. I argue that although teaching a heterogeneous group of children is complex work, classroom teachers hold a great deal of power to advance justice by redesigning mathematics education to explicitly benefit historically marginalized children.

Teachers wield a great deal of power to disrupt patterns of inequity when they position children as capable learners and doers of mathematics. Positioning theory asserts that in social situations, such as classrooms, individuals have unequal access to discourse, actions, and rights based on a variety of socially-constructed norms (Harré, 1999 & 2012). These include an individual's race, socioeconomic status, gender, English language proficiency, and a variety of other social constructions. Although children who are members of historically marginalized groups are poorly positioned in an oppressive society, once these children enter the classroom environment their teacher has power to influence their classroom positioning because "positions may be

temporary and involve changes in power, access, or blocking of access” (Herbel-Eisenmann, et al., 2015). Skillful teachers can leverage their influence to reduce privileged positioning in the classroom, offering children increased power and access. This disruption of the status quo can help to better position brilliant Black and other historically marginalized children as capable knowers and doers of mathematics.

Teachers frequently select tasks and instructional practices that privilege white, middle to high socioeconomic status learners (Aceves & Orosco, 2014). When this privileged positioning occurs, it voids the linguistic and cultural strengths that many children bring to the classroom (Orosco, 2010). Less effective teachers are more likely to view children’s cultural and linguistic differences as barriers to learning, whereas more effective teachers often view these differences as highly valuable resources. They view diversity in their classroom as capital to build on, leveraging children’s personal experiences, backgrounds, and interests to select tasks, build instructional connections, facilitate discussions, and develop classroom culture (Aceves & Orosco, 2014).

In the mathematics classroom, teachers may select specific mathematical tasks aimed at reducing privileged positioning. These tasks are meant to encourage equitable learning because they allow multiple entry points, support multiple solution pathways and representations, necessitate justification of reasoning, permit for high levels of extension, and encourage mathematical discourse between children. This flexibility allows children to develop both conceptual understanding and to enact multiple mathematical practices, rather than simply replicating the procedural teaching or

pedagogy of poverty frequently offered to children in diverse schools (Ladson-Billings, 1997; Haberman, 1991).

Such tasks are not the mainstay of required mathematics curricula. In my district, for example, I was required to utilize the *Everyday Mathematics* curriculum. While it was a highly-respected, standards-based program founded on well thought out principles, it was also considered curriculum that generally utilized a “procedures with connections” approach (Carroll & Isaacs, 2003). According to Stein, Smith, Henningsen & Silver (2000):

This approach focuses students’ attention on the use of procedures for the purpose of developing deeper levels of understanding of mathematical concepts and ideas. It suggests pathways to follow (explicitly or implicitly) that are broad general procedures that have close connections to underlying conceptual ideas.
(p. 16)

With over 20 years of experience teaching mathematics, I found using such a “procedures with connections” curriculum constraining in isolation. As I sought to promote increased mathematical literacy for children from historically marginalized groups, I often modified or supplemented the curriculum in order to develop tasks that were mathematically engaging for children and responsive to *their* thinking, rather than procedurally driven.

Motivations for this Study

The motivations for this study have developed steadily over my lifetime. As one of few white and Indigenous students in the Detroit Public Schools, it was evident that my schoolmates and I did not receive the educational opportunities to which our

suburban counterparts were privy. My classmates, who were predominantly Black and poor, were deprived of a high-quality education, and this was particularly salient in the area of mathematics. For example, in mathematics class we were often shown how to solve a problem, handed a decade old worksheet of similar problems, and expected to complete the problems alone and in silence. During this part of the lesson most of the teacher's attention was allocated to dealing with frustrated and upset children, who were often mislabeled noncompliant and punished. The personal educational inequities that I experienced as a child deeply upset me and began to drive my research.

I was also motivated to conduct this study as a result of my observations and experiences working with teachers over the past two decades. My work as a teacher educator has included serving as an instructional coach, a mentor teacher, a lead teacher, an educational researcher, an instructor of graduate courses, and an educational consultant. These positions frequently brought me into mathematics classrooms to support teachers as they sought to grow their practice. Through serving in these different capacities, I accumulated a great deal of personal knowledge of the injustices that children from historically marginalized groups often faced in their mathematics classrooms. These injustices deeply upset me and influenced me to conduct this study.

My motivation for conducting this study was also heavily influenced by my experiences teaching. I deliberately positioned myself to teach heterogeneous classes of children in public, Title I schools for over 20 years. Many years ago, I realized that mathematics served as a gatekeeper subject (Moses & Cobb, 2001). I started monitoring my own students' data through a new lens and I realized that the normalized,

well-intentioned work I was doing was reinforcing patterns of systemic racism and oppression. I also realized that the majority of my students who struggled with mathematics in elementary school continued to struggle with mathematics into high school. This negatively affected their ability to pass the mathematics courses required for high school graduation. Consequently, many of these children were denied admission to higher education and thereby access to numerous professional careers. More importantly, these children were denied critical mathematics literacy. It was also impossible to ignore that the majority of these children were from historically marginalized groups. This angered me and made me wonder what could be done to change things.

Because these children's mathematical struggles could often be traced back to elementary school, I began to wonder what work an elementary mathematics teacher would need to do in order to promote success for every child regardless of race, class, gender, socioeconomic status, neighborhood or city of residence, or English language proficiency. I also wondered what issues and tensions teachers would struggle with while seeking to improve the understandings and dispositions of all children and to disrupt who is considered capable. As with many societal institutions, mathematics education was primarily designed to privilege English speaking, gender-conforming, middle to high socioeconomic status, white children (Martin, 2015; Muhammad, 2020), and to position them as capable. Explicit attention to disrupting this pattern of inequity and studying a teacher's thinking and struggles during this process is the focus of my study.

I began to seek the answers to these questions many years ago by immersing myself in scholarship, enrolling in post-Master's coursework and professional development courses, and by joining several professional learning communities. I took a lens to my own teaching as I involved myself in Collaborative Action Research for Equity (CARE). For numerous CARE projects I explored my own practice in the area of mathematics, recording lessons, collecting student work samples, interviewing children, and writing about my experiences as a teacher. I continued on this path for a number of years, eventually seeking a doctoral program to improve my research skills so that I could more rigorously pursue my research questions from the inside. First-person study of practice research (Ball, 2000) offers a unique view into the teacher's thinking and struggles as she aims to promote justice for children from historically marginalized groups in a diverse classroom environment.

In my teaching I often thought about how the multiple identities of the children in my class impacted their learning, and it is important to consider how my own identities impacted my work. I have identified as a white, female, justice-focused Detroiter for the majority of my life. However, my identity started to expand when my grandmother revealed to my family, during my adulthood, that we are also Indigenous and Jewish. This information was intentionally suppressed in an attempt to protect family members from various forms of racism and oppression. Racism and oppression were rampant where we lived in Detroit. Growing up on the West Side of the City of Detroit during the 1970s and 1980s following an era of racial violence and white flight, I was unmistakably aware of the ways in which people were being oppressed, Black people in particular. At the same time, being immersed in predominantly Black spaces, I was able to see and

appreciate the strength, beauty, humanity, love, brilliance, and diversity of Black people as part of my daily childhood life. I was an ally of my friends and neighbors, who were predominantly Black, and I brought this allyship with me when I became a teacher.

As a novice teacher, I brought an orientation of allyship, but I struggled to navigate the educational space. I was being told and shown what to do by people in positions of authority in ways that seemed compulsory, and these directives seldom had to do with disrupting inequities or advancing justice. Instead, I was told things like what lesson I should be teaching on a particular day and that I should “fully take control of the class” so the children were working silently during mathematics. I noticed the system was perpetuating itself, not concentrating on justice for children. I decided the system was broken, and, although I felt like I could not control it, I could control my own teaching. I knew that I had a great deal of work to do.

Years later, as an experienced, award-winning educator, I still saw that there was much work to be done in my own teaching of children. I was also serving as a teacher educator in various roles, helping teachers learn to see that normalized, taken-for-granted practices often reproduce harmful patterns of oppression for children. As a researcher, I began to look at problems of practice grounded in the work of teaching. I had many questions, in particular about teaching mathematics. What was the work of a teacher attempting to teach mathematics in ways that disrupt pervasive patterns of inequity and promote justice for children from historically marginalized groups? What problems or tensions arise in pursuing these goals? How can the educational community better support teachers in this work?

CHAPTER II: Literature Review

Nearly three decades ago, the National Research Council and the National Council of Teachers of Mathematics contributed heavily to the launch of a large-scale, standards-based, education reform movement. The aim of this movement was to promote the systemic improvement of mathematics education across the nation (National Council of Teachers of Mathematics, 1989). Roughly twenty-five years later, the movement continued to progress as the majority of the United States adopted the Common Core State Standards for Mathematics (CCSSM), and pockets of student achievement in mathematics reached historic highs (National Council of Teachers of Mathematics, 2014). Despite some positive outcomes, extremely serious challenges persist. Data point to too few students from traditionally marginalized groups attaining high levels of mathematics learning (National Council of Teachers of Mathematics, 2014). Although the reform movement supported some children's achievement, the stated aim of the movement is to support the achievement of all children. The National Council of Teachers of Mathematics argues, "We must move from 'pockets of excellence' to 'systemic excellence' by providing mathematics education that supports the learning of all students at the highest possible level" (2014, p. 3).

A necessary critique of this stance is that the National Council of Teachers of Mathematics does not go far enough in arguing for disruptive change. Without disruptive change inequities will continue to persist because mathematics education,

like so many other institutions, was designed to serve only a subset of children (Martin, 2015; Muhammad, 2020). Following this argument, extreme change is necessary to interrupt the status quo. Mathematics education must be explicitly designed to benefit children from traditionally marginalized groups, and teachers are on the front line of implementing this radical change. The interplay among the teacher, the content, and the children must shift in order to disrupt the status quo and begin to advance justice.

Much has been theorized about equity and justice in elementary classrooms, but few empirical examples exist examining how justice-focused work is thought about and acted upon by teachers who contend with multiple forms of social difference among children. In her 2017 book, Shalaby studied the experiences of four elementary children who were treated unjustly when they did not conform to the norms of school culture. She conceptualized children who make “trouble” as canaries in the coal mine, signaling a poisoned educational system (Shalaby, 2017). However, although this work focuses on injustice and calls for the necessity of freedom, it does not explore how justice-focused work is thought about by teachers, nor how such teaching manifests in classrooms with various forms of social difference.

In social situations, such as mathematics classrooms, children do not have equal access to rights, discourse, and actions based on numerous socially-constructed norms (Harré, 1999, 2012). This results in some children entering the classroom already positioned as competent, while other children do not enter the classroom with this privileged positioning. As a powerful influence in the classroom, the teacher can affect this positioning in various ways. While some scholars have studied how to get teachers to notice the mathematical strengths of historically marginalized children (Jilk, 2016;

Willis, 2020), other scholars have researched pedagogical strategies to address status issues that arise in the classroom (Cohen, 1997; Featherstone et al., 2011). Although this body of work is extensive, few examples appear in the literature exploring the teacher's thinking while noticing a child's mathematical strengths, or the subsequent moves aimed at leveraging such strengths to mediate issues of status.

Likewise, there is a rich body of literature surrounding identity in mathematics classrooms, but there are few empirical examples focused on the teacher's thinking and decisions in the course of practice as they relate to children's multiple identities. In their 2013 book, Aguirre, Mayfield-Ingram and Martin invited teachers to reflect on their students' multiple identities and to envision new instruction through this lens. They called for teachers to reframe instruction using a set of specific, equity-based practices, arguing that this especially benefits children from historically marginalized groups. Gholson and Wilkes (2017) offered a comprehensive review of two strands of identity-based research in mathematics education, asserting:

The identities of Black children as doers and knowers of mathematics are often confused (or mistaken) with stereotypical images of various social identities, as well as wrongly confiscated (or mis-taken) in order to perpetuate persistent narratives of inferiority, criminality, and general ineducability of these children. (p. 228)

These scholars utilize the example of Black children to point out that a broader group of children within the "collective Black" also suffer such oppression and harm in mathematics classrooms. Gholson and Wilkes make clear that these two strands of identity-based research have the potential to disrupt narratives surrounding the

meanings of mathematical competence and brilliance for Black children and the “collective Black”, and argue for the critical inclusion of young children and girls in such research. This body of literature on identity in mathematics is growing at a rapid rate. Next, I move onto discussing children’s mathematical thinking.

Much has been theorized and studied related to learning about children’s mathematical thinking. A particularly impactful body of work exists on Cognitively Guided Instruction (CGI). CGI began with a framework of children’s cognitive development and eventually sought to explore this work with teachers (Carpenter, Fennema & Franke, 1996; Franke & Kazemi, 2001). The basic premise undergirding CGI is that children inherently possess understandings and knowledge, and that they actively apply these when problem solving (Carpenter, Fennema, Franke, Levi & Empson, 1999). Children’s strategies typically follow a developmental trajectory, and this trajectory generally begins with the concrete and evolves to the abstract. Although CGI has become a popular focus for teachers’ professional learning and much has been published discussing practicing teachers use of CGI, few empirical pieces exist that study the teacher’s thinking as she is learning about children’s thinking and identities in a heterogeneous classroom.

Scholars have explored how children choose to interact while working on mathematical tasks, and there are some examples in the literature that study the teacher’s thinking as she is in the process of learning about children’s patterns of work, but few examples study how the teacher decides to take actions in a heterogeneous classroom. Ball (1993a) discusses the dilemmas associated with the intertwined nature of the teacher’s role and authority for knowing and learning mathematics, and the

obligation to balance confusion and complacency. As the teacher, she holds a commitment to allow the children to think for themselves and struggle with complex mathematical ideas, but she wonders how much struggle is too much, and wrestles with what to do when it is. Ball asserts that, “Deciding when to provide an explanation, when to model, when to ask rather pointed questions that can change the direction of the discourse—is delicate and uncertain” (p. 393). Arguing that dilemmas are endemic to teaching (Lampert, 1985), Ball (1993a) points out that these uncertainties are heightened when the teacher has multiple ambitious aims, such as disrupting the traditional view of mathematics as rules, skills, and prescribed curriculum.

There is a growing body of literature surrounding translating prescribed curriculum materials, but few empirical examples exist that explicitly focus on the teacher’s thinking, struggles, and decisions as she translates curriculum in the course of practice in a heterogeneous mathematics classroom. Farmer (2019) studied the work of six elementary teachers as they “followed” externally-developed social studies lesson plans, and she analyzed what was entailed in this work. Farmer, “...conceives of the work of teaching from a lesson plan as a process of *translation* in which teachers convert the written guidance into instructional interaction” (p. ix). Her research challenges the notion that “following” curriculum is a straightforward process for teachers. Farmer cites two major challenges inherent in making use of externally-developed lesson plans in teaching: (1) no matter how detailed, the guidance is inherently incomplete leaving teachers to figure out various unspecified aspects; and (2) curricular guidance is unable to fully account for specifics in particular instructional

contexts. Studying some of these specifics, and how the teacher thought about and struggled with them in the course of practice, is the subject of my study.

CHAPTER III: Theoretical Framework

Three areas of work provide foundations for my study. These areas include intersectionality of identities, the instructional triangle as a set of lenses for examining teaching and learning, and dilemmas in teaching mathematics. I begin by discussing the relationships of each of these areas of scholarship to my study.

My research examines the multiple identities of each child and how they are situated in power structures, social relations, and history. For this reason, I use an intersectional framework to better understand those individuals and groupings that single identity constructions would leave unnoticed and to center social justice in my research. I also frame my work with the revised instructional triangle (Ball, 2018) because this framework helps to capture the complexities of the classroom interactions that I wish to investigate in my study, as well as the influences of the larger environments on those interactions. Since I analyze the considerations and struggles of the teacher, I also draw from work on dilemmas in teaching elementary mathematics. Next, I move to focusing on the instructional triangle as a set of lenses for examining teaching and learning.

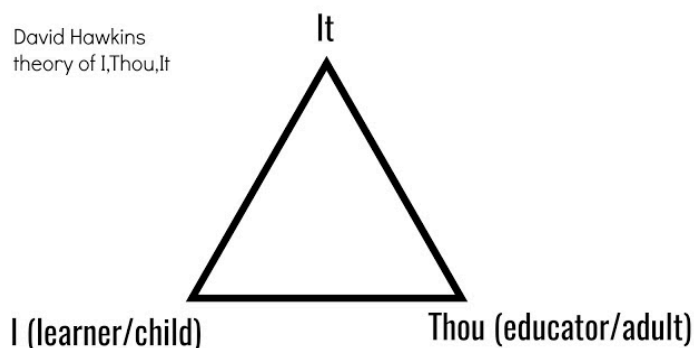
The Instructional Triangle Framework

The intricate interplay among the teacher, individual children, their classmates, the mathematical content and outside environments creates highly complex interactions within the elementary classroom. Identifying the interplay of these interactions in the

classroom is not new. In 1963, Henderson sought to articulate the forms of study that were taking place in his review of research on secondary mathematics teaching. Wishing to differentiate individuals from their roles and to develop connections among students, teachers and mathematics content, he offered an early triadic teaching model (Henderson, 1963). The triadic model emerged again in 1967 (see Figure 1), with Hawkins’s assertion that subject matter, or “it,” was central to the relationship between children and their teacher.

Figure 1

Hawkins’s Instructional Triangle



Note. (Hawkins, 1967)

In her 2001 book, Lampert also used a triadic frame to represent the complexity of instruction. She utilized this triad to explain what “all of the influences on who students and teachers are and that the subject matter must also be extended into different social configurations and across time” (Lampert, 2001, p. 445). In 2003, Cohen, Raudenbush and Ball offered what has become a widely known version of the “instructional triangle” in their effort to conceptualize “resources” and analyze how different sorts of resources matter for instruction. In 2018, Ball revised the 2003 version of the instructional triangle framework to make more salient the importance of

environments and the permeability of instruction, the notion that we cannot limit interaction to content alone, and to emphasize the prominence of students. The term “content” has been revised to “stuff” so that it also includes other substance, issues, and ideas around which students and teachers engage (Ball, 2018).

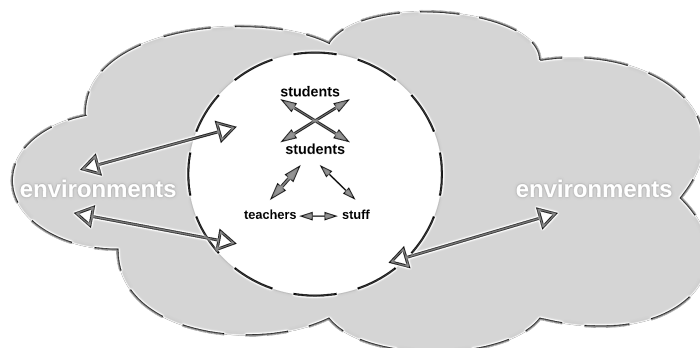
The instructional triangle frameworks of the 2000s (Ball, 2018; Cohen Raudenbush & Ball, 2003; Lampert, 2001) pushed back against the long-held notions that instruction is what teachers do and that environmental resources directly shape instruction. These environmental resources included curriculum, materials, teacher traits, student attributes, and the like, and were previously utilized to account for student learning. The instructional triangle as we currently know it refutes the previous frame of instruction as *resources* of the environment, and instead frames instruction as an ongoing process of mutual interpretation and interaction. Specifically, instruction is defined as interaction between teachers and students around stuff, within permeable environments (Ball, 2018; Cohen, Raudenbush & Ball, 2003).

In my study, I utilize Ball’s (2018) revised version of the instructional triangle because it conceptualizes instruction as ongoing interaction and centers the role and work of students, highlights the critical broadening of “content” to “stuff,” and emphasizes the importance of environmental influences constantly permeating the classroom (see Figure 2). Revising “content” to “stuff” is critical because this conceptualization still includes content but now also includes other substantive issues and ideas around which children and teachers engage at school. Emphasizing the environmental influences that constantly permeate the classroom is an important

distinction as well, as it highlights the idea that numerous influences flow in and out of the classroom constantly, affecting the interactions that take place inside.

Figure 2

The Instructional Triangle



Note. (Ball, 2018)

The 2018 instructional triangle conceptualizes instruction as an ongoing process of mutual interpretation and interaction. In mathematics instruction, this interaction flows between children and their peers, the teacher, and “stuff”² which is primarily, although not limited to, mathematical content. This interaction is continuously influenced by multiple layers of environment that permeate the classroom, as indicated by the porous boundaries in Figure 2. This representation of the instructional triangle embodies the theory that students, their peers, their teacher, and environmental features act as dynamic instructional agents (Cohen, Raudenbush & Ball, 2003; Ball, 2018). The teacher has discretionary space (Ball, 2018) to utilize personal judgement and take actions that influence this interplay of interactions. I utilize the instructional

² “Stuff” includes content, but also other substance, ideas, and issues around which teachers and students engage (see Ball, 2018).

triangle framework in my study to investigate how a teacher thinks about and struggles with these interactions.

Intersectionality Framework

I am investigating the complexities and tensions that exist for a teacher as she attempts to serve the needs of individual children and the community of children while teaching the mathematical content in a heterogeneous classroom. The classroom is situated within and impacted by larger institutions and environments that are heavily shaped by sexism, racism, classism, genderism and the like. Researching the teaching of a diverse group of children in an environment constantly permeated by “isms,” I am focused on the framework of intersectionality. Although commonly credited to legal scholar Kimberlé Crenshaw (1991), other scholars trace intersectionality back to women of color activists involved in liberation-focused social movements in the 1960s and earlier (Collins & Bilge, 2016).

Intersectionality first appeared in academic literature in 1989 as a framework to explain the oppression of Black women (Crenshaw). However, as Love explains, Black women writers and thinkers throughout history, like Anna Julia Cooper, Audre Lorde, Angela Davis, Frances Beal, Patricia Hill Collins, and the women of the Combahee River Collective, articulated the need to discuss race and gender together, understanding that multiple oppressions reinforce each other to create new categories of suffering. (2019, p. 3)

Legal scholar Kimberlé Crenshaw builds upon the work of these intellectuals (1989). Utilizing intersectionality as a framework for social justice, Crenshaw explains,

Intersectionality is a lens through which you can see where power comes from and collides, where it interlocks and intersects. It's not simply that there is a race problem here, a gender problem here, and a class and LGBTQ problem here. Many times, that erases what happens to people who are subject to *all* of those things. (2017, emphasis added)

According to Yuval-Davis, "The 'visibility project' of intersectionality that Kimberlé Crenshaw and other intersectionality scholars and activists have been promoting, helps to enrich and point out those individuals and groupings that unidimensional identity politics constructions would not have been able to do" (2015, p. 641). Rather than understanding an individual's layered identities emerging from power structures, history, or social relations as separate identities, intersectionality illuminates the impact of the *confluence* of these identities. Failure to recognize the intersection of identities permits individuals, experiences or perspectives to become partially concealed or invisible (Gholson, 2016). The intersectional framework recognizes that something *distinct* is formed at the point of intersection. From this perspective, the genealogy of intersectionality is arguably important "because it reveals both the centrality of the concept to social justice and the tendency for ideas circulated by professional academics to be privileged over the same ideas circulated by grassroots intellectuals" (Harris & Leonardo, 2018, p. 3).

Intersectionality is an analytic tool necessary to explain the realities and complexities of discrimination and power and how they intersect with identities (Love, 2019). Intersectionality grows from the idea that each of us has multiple, dynamic, identities. These identities emerge from social relations, history, and the activity of

power structures. Each of us is a member of more than one identity group at the same time and can therefore experience privilege and oppression simultaneously. For example, a person might experience privilege for being male and having high socioeconomic status, while at the same time experiencing marginalization for being Black and an English language learner. Because privilege and marginalization are multifaceted, they can be viewed through the lens of intersectionality to be better understood. Rather than viewing an individual's identities as mutually exclusive, intersectionality recognizes that the individual's identities compound to form something distinct (Crenshaw, 1991; Collins, 2015). In classrooms, intersectionality allows educators to focus on children as full people. It allows teachers "... (to sense) their students' challenges, the grace and beauty that is needed to juggle multiple identities seamlessly, and how schools perpetuate injustice" (Love, 2019, p. 7). Noticing and being explicit about the fact that something *distinct* is formed at the point of intersection of identities allows deeper conversations and understandings to develop around how systemic patterns of inequity in schools cause various injustices for children. The likelihood of injustice is greater when children have multiple marginalized identities, and the framework of intersectionality makes it possible to see this.

In considering alternative frameworks to intersectionality, many frames focus on only one identity at a time. Single category identity descriptions arguably imply that any individual who holds a given identity is somehow part of a homogeneous group. This allows individuals, experiences, or perspectives to become obscured or rendered completely invisible (Gholson, 2016). Intersectionality recognizes that something *distinct* is formed at the intersection point of various forms of discrimination. In the

elementary mathematics classroom, each child has multiple, dynamic identities. As a result of the ways these identities are valued or devalued by school structures, some children are pushed to the margins to experience discrimination while other children hold more privileged positions.

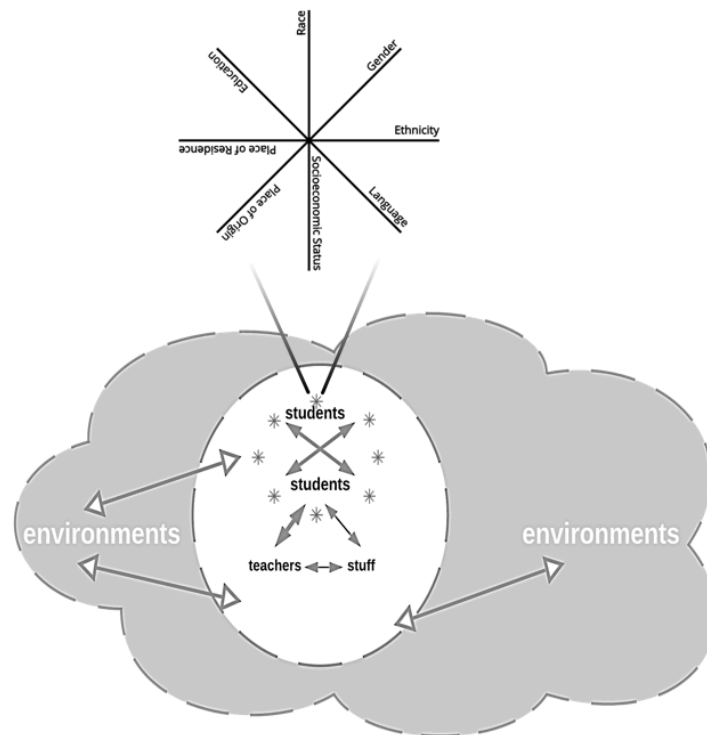
I have chosen to utilize the framework of intersectionality in my study because “...it is the most comprehensive, complex, and nuanced and does not reduce social hierarchical relations to one axle of power, be it class, race or gender” (Yuval-Davis, 2011). In elementary classrooms, each child has multiple identities, some of which afford children privilege, while other identities do not. As a combination of these intersecting identities, some children can be pushed to the margins to experience discrimination while other children hold more privileged positions. Utilizing the intersectional framework is critical for my study as I explore the complexities and tensions that exist for a teacher as she seeks to disrupt inequity while balancing the needs of individual children, the needs of the classroom community, and the demands of the mathematical content in a heterogeneous classroom. This framework will help illuminate the confluence of identities that would otherwise remain invisible.

In a classroom environment, I conceptualize the intersectional framework as operating within the instructional triangle framework (see Figure 3). This is because environmental influences constantly permeate the classroom affecting the interactions that take place inside, and intersectionality is a critical environmental influence that shapes the interactions between the children, the stuff, and the teacher. Social constructions of race, ethnicity, gender, socioeconomic status and the like, and how these constructions are valued or devalued by school structures, permeate the

classroom constantly affecting interactions inside. As these influences permeate the classroom and affect interactions, it inherently leads to dilemmas for the teacher who seeks to disrupt injustice.

Figure 3

Intersectionality Operating Within the Instructional Triangle



Note. Instructional Triangle from Ball, (2018)

Dilemma Management Framework

As I investigate the complexities and tensions that exist for a mathematics teacher of a heterogeneous class of children, it is important to consider the related contributions of first-person mathematics researchers. Beginning in the 1980s, researcher-teachers began work that highlighted some of the dilemmas of teaching mathematics to children. Lampert, Schoenfeld, Ball, and Heaton all wrote about their own practices and problems teaching mathematics. Schoenfeld's (1998) work explores

what it is to do mathematics, and highlights the impact of social context in mathematics learning. Ball's (1993a, 1993b, 2014, 2018) research focuses on such topics as the dilemmas associated with instructional representations, pedagogical content knowledge for teaching mathematics, representational contexts in mathematics, and equity in the mathematics classroom. Heaton's (1994, 2000) work explores the difficulties that an experienced teacher faced as she learned new pedagogy and subject matter. Lampert's (1985, 1986, 1987, 1988, 1989, 1990, 1992, 2001) research investigates dilemmas such as the problems associated with selecting mathematical tasks, developing tools to facilitate communication between children and their teacher, and understanding knowledge in the context of mathematical discussions.

Lampert frames the teacher as “a dilemma manager, a broker of contradictory interests” (1985, p. 178). As a scholar-teacher, Lampert taught fifth-grade mathematics and studied the dilemmas that emerged in the course of her practice. One such dilemma emerged when her students self-segregated to opposite sides of her classroom by gender. Lampert explains how, in this particular class, “(the boys) are talented and work productively under close supervision, but if left to their own devices, their behavior deteriorates and they bully one another, tell loud and silly jokes, and fool around with the math materials” (p. 178). She responded to this by teaching from the board that was on the boys' side of the classroom so that she could provide closer supervision. However, Lampert soon realized that her increased proximity to the boys inadvertently caused her attention to the girls to decrease, and her students were noticing:

One of the more outspoken girls impatiently pointed out that she had been trying to get my attention and thought I was ignoring her. She made me aware that my problem-solving strategy, devised to keep the boys' attention, had caused another, quite different problem. (p. 179)

Lampert confronted a forced choice between two equally objectionable options. She explained that she could either promote classroom order by choosing to teach from the boys' side, or she could promote equal opportunity by choosing to teach from the girls' side, but she felt that selecting either option would produce undesirable outcomes. Should she select order over equal opportunity, or equal opportunity over order? Knowing that neither option would produce a completely desirable outcome, this forced choice created a dilemma for Lampert. It was a dilemma that she had to face, take actions on, and live with the consequences of. Teachers are faced with such dilemmas each day, as dilemmas are inherent in the work of teaching.

Lampert's dilemma exemplifies a problem of practice that is not typically focused on in empirical research but that is faced by many teachers. She notes, "Efforts to build generalized theories of instruction, curriculum, or classroom management based on empirical research have much to contribute to the improvement of teaching, but they do not sufficiently describe the work of teaching" (Lampert, 1985, p. 179). Lampert argues that research and theories are limited in their capacity to assist teachers in knowing what to do about specific problems such as the one just described. She adds to this body of knowledge by using both tools of scholarly inquiry and her experience as a classroom teacher.

My research adds to this body of knowledge surrounding dilemmas as they relate to the study of teaching mathematics. It offers insight into a teacher's thoughts, considerations, tensions, struggles, and decisions as she seeks to teach in ways that promote justice in her heterogeneous classroom. The study expands outsider understanding of what it is actually like *on the inside* when teaching in ways that seek to reposition who is considered capable. It offers a unique teaching record that will provide a perspective on practice that often remains unrecognized.

I situate the dilemma management framework inside the instructional triangle frame (Ball, 2018), because as injustices such as sexism and racism seep into the porous boundaries of the classroom, these injustices inevitably create dilemmas for a teacher explicitly seeking to advance justice. The classroom, by default, is a microcosm of the larger environment in which it exists complete with its patterns of oppression and harm. The teacher faces inherent dilemmas as she works to disrupt these patterns in the classroom by shifting the interactions that take place inside, and the instructional triangle offers a useful frame to understand this. This is because the instructional triangle views instruction as an ongoing process of mutual interpretation and interaction between the students, their teacher, and content, but also other substance, ideas and issues around which teachers and students engage such as systemic patterns of oppression.

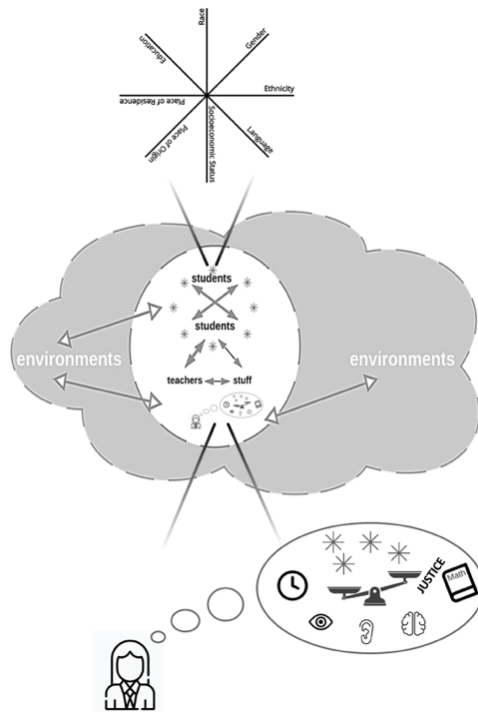
Using Multiple Frameworks

In this study, I conceptualize both intersectionality and dilemma management as operating within the overarching framework of the instructional triangle (see Figure 4). Environmental influences, such as intersecting identities and the valuations school

structures place on them, constantly permeate the classroom affecting the interactions that take place inside. As these outside influences permeate the classroom it leads to dilemmas for the teacher seeking to disrupt injustice because many of these influences perpetuate injustice and oppression. Together, these combined frameworks will enable analysis and discussion of teaching episodes that will be shared in later chapters.

Figure 4

Intersectionality and Dilemma Management Operating Within the Instructional Triangle



Note. Instructional Triangle from Ball (2018)

CHAPTER IV: Study Design and Methods

In order to learn more about the work of an elementary mathematics teacher at the beginning of the school year as she seeks to teach in ways that disrupt inequity in a diverse classroom, I used my own classroom as a strategic site for investigation. The following research questions guide my study:

What is the work of an elementary mathematics teacher as she begins the school year seeking to teach in ways that disrupt inequity and promote justice for children from historically marginalized groups in a heterogeneous classroom?

- a. What tensions exist for the teacher as she attempts to simultaneously address the needs of the individual child, the classroom community, and teaching the content?
- b. How does the teacher seek to manage these tensions in her work?

Methodology: Studying Teaching Elementary Mathematics from the Inside

Research on problems of practice from the perspective of the elementary mathematics researcher-teacher first emerged in the literature in the 1980s. During the decades that followed, several researcher-teachers utilized methods of first-person research (Ball, 2000) in their own elementary mathematics classrooms (Ball, 1993a; Heaton, 1994, 2000; Lampert, 1986, 2001; Lampert & Ball, 1988;). First-person research is distinct from other qualitative and case study research because,

Instead of merely studying what they (researcher-teachers) find, they begin with an issue and design a context in which to pursue it. The issue with which they begin is at once theoretical and practical, rooted in everyday challenges of practice but also situated in a larger scholarly discourse, and they create a way to examine and develop that issue further. (Ball, 2000)

Although these early researcher-teachers explored a variety of different questions from the inside, their work is similar in that it sought to develop theory and contribute to scholarly discourse. After conducting personal interviews with researcher-teachers and carefully considering other methods of qualitative research, including autoethnography and self-study, I decided to use methods of first-person research. This is because the issue I wished to study was theoretical, grounded in everyday challenges of practice, and situated in a larger scholarly discourse. I did not study my practice as I was in the process of enacting it; I intentionally studied data collected several years ago. Like the researcher-teachers who came before me, I used time to distance myself from the work of teaching so I could study records of practice produced by my former self. I will discuss this in greater detail below.

The elementary mathematics researcher-teachers preceding me all utilized similar methods to collect records of practice that would later serve as data. They audio-recorded or video-recorded mathematics lessons; collected a variety of work samples including students' mathematics notebook entries; accumulated representations that were used or created whole group; and kept detailed narrative journals (Ball, 1993a; Heaton, 1994, 2000; Lampert, 1986, 2001; Lampert & Ball, 1988).

Journaling became a key tool for researcher-teachers to capture their own voice and thinking. They recorded entries immediately following instruction to capture their thoughts as close to in-the-moment of teaching as possible. They generally wrote for no more time than they spent teaching mathematics, and entries flowed between thoughts about students or mathematics, dilemmas, considerations, motivations, decisions, plans, and perspectives (Ball, 1993a; Heaton, 1994, 2000; Lampert, 1986, 2001; Lampert & Ball, 1988). This type of journaling provides a distinct record of teaching that spans time, students, and curriculum (Lampert, 2001). Journaling helped these researcher-teachers authenticate claims about their own thinking, learning, and understanding as the teacher as related to their research questions:

While the idea of using journal writing is not new within this area of study (and indeed, is often regarded as ‘the’ method)...these documents, like photographs, serve as textual evidence in studying the interplay of past, present, and future in our work as teachers. (Mitchell, 2006, p. 117)

The researcher-teachers intentionally created a sense of distance before examining their own journal data to conduct an analysis through the lens of a researcher (Ball, 1993a; Heaton 1994 & 2000; Lampert, 1986 & 2001; Lampert & Ball, 1988). I did this as well so that I could examine, through the lens of a researcher, records of practice produced by the former teacher version of myself. Heaton (1994, 2000) created an additional sense of distance by explicitly developing multiple “versions of self.” By employing this methodological device, and/or by using time to create distance from the work of teaching, the researcher-teachers were able to analyze the data contained in their journals (Ball, 1993a; Heaton 1994, 2000; Lampert, 1986, 2001;

Lampert & Ball, 1988). Heaton explains that she, "...read through this [journal] data looking for particular words, phrases, patterns of behavior, ways I thought about things and events that repeated themselves or stood out for some reason" (1994, p.72). The researcher-teachers used this data analysis technique to identify patterns and to uncover prominent themes. They could then use lessons captured on video along with student work to provide additional data, context, and detail (Ball, 1993a; Heaton 1994, 2000; Lampert, 1986, 2001; Lampert & Ball, 1988).

My study is meant to help advance and expand the genre of first-person research (Ball, 2000). I do this by discussing issues of identity and how they intersect with teaching mathematics in the elementary classroom. Issues of identity are rarely taken up in first-person research conducted by elementary mathematics scholar-teachers. Although journaling about identity may break dominant cultural norms, the interaction between identity and mathematics in the elementary classroom can be significant.

I was well-positioned to conduct this investigation in my own classroom because I had already learned how to engage in various methods of research, and I had experience applying different methods in my own classroom for over a decade. I was well-seasoned at gathering different records necessary for a first-person study of my practice while concurrently fulfilling the demanding role of classroom teacher. Over approximately a decade of carrying out the work of a researcher-teacher, I had learned to teach and act as videographer, photographer, and audio engineer seamlessly. I had also committed to writing in my journal for roughly the same amount of time that I taught mathematics each day. The ability to gather these records of practice for later study

while simultaneously fulfilling the complex demands of a classroom teacher positioned me well to conduct this study in my own classroom.

Context: A Strategic Site for Investigation

For numerous reasons, my classroom was a strategic site to investigate a teacher's thinking and struggles at the beginning of the year as she focused on disrupting inequity in a heterogeneous classroom. Using my classroom as a site for research was a tremendous asset. Below I offer several arguments to support this claim.

The majority of students in my class were bussed in from different, geographically-separated neighborhoods of the city to intentionally create a diverse community. This practice is atypical in an elementary school environment. I also had a handful of children who joined our classroom community from outside of the district, which increased heterogeneity in our classroom as well. The group of students in my class was diverse because the children's backgrounds were different in terms of race, ethnicity, socioeconomic status, language, country of origin, neighborhood, and city of residence. The high level of diversity made my classroom the ideal site for investigation because I was seeking a heterogeneous environment for this study.

My classroom was also a strategic site to investigate my research questions because fifth-grade mathematics is complex. The focus on pre-algebra concepts increases significantly in fifth grade, laying the foundation for developing critical algebraic understandings. These understandings are essential for children's continued success in mathematics in middle and high school. In fifth-grade mathematics, children delve into various pre-algebra concepts such as properties of operations, rules of

evaluation of expressions, integer factorization, variable manipulation, and basics of equations. Fifth-grade students are pressed to develop a deep understanding of new types of numbers such as fractions, decimals, and negative numbers. They have to learn to make sense of performing operations on these new forms of numbers, even when new methods directly conflict with previous methods learned for performing operations on natural numbers. This level of mathematical complexity made the fifth-grade classroom an ideal setting for investigating the research questions that I sought to explore.

An additional reason that my classroom was a strategic site to investigate my research questions was because by fifth grade children have already developed relatively complex dispositions toward mathematics. Compared to younger children, fifth graders have established beliefs about what mathematics is, how their teacher will teach mathematics, what learning mathematics entails, how to decide if a conjecture is correct, and who is considered capable. Most have developed beliefs about themselves and how they relate to mathematics, such as expressing that they can or cannot “do” mathematics, or that they really like or dislike mathematics.

Additionally, this classroom was a strategic site to investigate my specific research questions because fifth grade was the final year in this school district that children would receive mathematics instruction *together* regardless of perceived “ability level.” At the end of fifth grade, the middle school administered an optional mathematics assessment in an attempt to determine students’ “ability levels,” and this test, if taken, along with special education information was used to establish each student’s mathematics placement for sixth grade. After this, children generally fell into

one of three placements for middle school mathematics. The high-stakes nature of fifth grade mathematics coupled with the fact that all children remained together for instruction made it an ideal site for investigating my research questions.

Finally, my classroom was a strategic site because I actively strived to create an environment in which I could study my specific questions. I continuously worked to construct and sustain an environment where I could later answer the question: What is the work of an elementary teacher as she aims to disrupt inequity and promote justice in a diverse mathematics classroom? I was able to create and sustain this environment in part because I was a passionate, capable, mathematics teacher with over 20 years of teaching experience and a strong commitment to social justice. I had taught fifth grade mathematics for the past few decades while continuously taking graduate level courses and serving as a teacher educator to develop robust content, curriculum, and pedagogical content knowledge. I had earned the respect and trust of important educational stakeholders including parents, students, colleagues and administrators.

Collectively, all of these factors allowed me the freedom and expertise to design and sustain the kind of environment that I needed to investigate my research questions. This environment would have been very difficult to find as an outside researcher. However, as a researcher-teacher, I was able to plan and enact the kind of justice-focused teaching that I wished to study, rather than attempting to find this type of teaching in an outside classroom.

Participants

Teacher

I participated as the teacher in this study, as the aim of this study was to investigate the work of an elementary mathematics teacher as she sought to teach in ways that promoted justice in a diverse classroom. I was a capable, nationally recognized, certified teacher. I was teaching fifth grade in a self-contained, general education classroom.

Students

The children who participated in this study were fifth-grade students at a public, Title I, elementary school located in the Midwest. The majority of the children were bussed in from vastly different neighborhoods of the city, or driven in from out-of-district (neighboring cities), yielding a heterogeneous group. The children who joined our class from inside the district were from households with dissimilar socioeconomic statuses, as the school bussed children in from both some of the most and least expensive neighborhoods in the city.

The class was comprised of 26 children, although this number varied slightly over the course of the school year as a couple of children moved with their families. Eight of the children in the class self-identified as Black, six as Latinx, seven as white, four as Asian, and one as Indigenous. Although the children primarily self-identified in this way, two of these children additionally self-identified as multiracial (see Table 1). Of the 26 children in this class, 15 received free or reduced-cost breakfast and lunch. Every child's name in this study is a pseudonym. Each pseudonym was aligned with the child's preferred gender identity, with particular care and attention given to preserving

the cultural, ethnic, or regional basis of names. It is also essential to note that children's identities are in their own words throughout the study.

Because this study attends to social constructions that often marginalize children at school, I focus on two of the most impactful social constructions when writing about children: race and gender. However, if shared by children, I also offer additional information, such as English language proficiency, homelessness status, or place of origin. The majority of this information was gathered by carefully listening to children as they taught the class, in their own words, about their multiple identities during the first several weeks of the school year. As first trimester progressed, many of the children informally offered additional information which was noted as well.

Data Collection: Records of Practice

In order to investigate these research questions from the inside, I gathered a variety of records of practice from the first trimester, or first 3 months, of the school year. I consistently kept a daily researcher-teacher journal as an information collection tool. Following the practices of the researcher-teachers who came before me (Ball, 1993a; Heaton 1994, 2000; Lampert, 1986, 2001; Lampert & Ball, 1988), I recorded a narrative of my thinking in my journal for no more time than I taught mathematics to the children in my class each day. I deliberately wrote in this journal immediately following instruction in order to capture my thinking as close to in-the-moment of teaching as possible. I used this approach so that the journal could serve as a tool to capture my thinking, learning, tensions and challenges as the teacher in the course of practice.

Table 1*Student Participants in the Study*

| Child's Name | Self-Identified Gender | Self-Identified Race | Other Self-Identities* (*if shared) |
|---------------------|-------------------------------|-----------------------------|---|
| Aaliyah | Female | Black & Asian | |
| Amelia | Female | White | |
| Aretha | Female | Asian | Vietnamese |
| Awa | Female | Black | West African, English language learner |
| Carolina | Female | Latinx | Brazilian, English language learner |
| Chad | Male | White | |
| Chelsea | Female | White | Jewish, Canadian |
| Danilo | Male | Black | |
| Darnell | Male | Black & Indigenous | Note: New to district at beginning of first trimester |
| Davon | Male | Black | |
| Devonte | Male | Black | |
| Elan | Male | Latinx | |
| Ernesto | Male | Latinx | Mexican, English language learner |
| Estevan | Male | Latinx | Columbian, English language learner |
| Ezekiel | Male | Black | Jewish |
| Jaeda | Female | Black | |
| Kaison | Male | Black | |
| Kamella | Female | Latinx | Mexican Note: Temporarily homeless during first trimester |
| Lake | Female | White | |
| Laura | Female | White | |
| Marie | Female | White | |
| Mei | Female | Asian | Chinese |
| Ramon | Male | Latinx | Mexican, English language learner |
| Seymour | Male | White | East Asian native |
| Sung | Female | Asian | Korean, English language learner Note: Moved away during first trimester |
| Young Soon | Female | Asian | Korean, English language learner |

I video-recorded every mathematics lesson that I taught during the first trimester of the school year. The video captured the entire lesson, with a single microphone gathering audio that captured the launch and our whole group discourse. I focused on whole group discourse because this is when the diversity of the group collides most, creating complexities and tensions for the teacher. Capturing video of every lesson that took place during first trimester allowed me to document my practice and the actions that I took in the course of teaching mathematics. Although the lack of detail in my journal writing caused some entries to be unclear in isolation, the lesson captured on video helped provide a more detailed account of the intricacies of teaching.

I kept careful records of all of the problems that I constructed to launch the mathematics lesson each day, as well as the problems that were utilized following the launch. To capture how the children responded in writing to these problems, I collected and documented a variety of student work throughout the course of first trimester. This included every child's mathematics notebook, mathematics journal, self-assessments, and end-of-unit assessments.

I documented every representation that we publicly constructed or utilized during whole group discourse. This typically consisted of documenting, through photography, the large easel chart where we represented our thinking during whole group components of mathematics lessons. Occasionally this also consisted of photographically documenting physical models that the children built, representations created on our white board, or representations recorded on scrap paper by the children.

I also meticulously documented conversations that I had with children and their parents and caregivers. These conversations varied widely in both form and topic, from

informal lunch time conversations with a child about who they were as a person, to formal conversations with parents, caregivers, and children about mathematical growth and goals at parent/teacher/student conferences.

Analysis

In order to answer my research questions, I conducted an analysis of the records of practice I collected during the first trimester of the school year. However, because my research question focuses on the *teacher*, I primarily analyzed the data contained in the teacher's journal. This journal data allowed me to authenticate claims about the teacher's thinking, motivations, and tensions as related to my research questions. I supplemented this journal data with data from other records of practice, such as video data and student work, as appropriate. For example, the journal typically contained the teacher's thoughts, motivations, and tensions, but it did not always contain detailed descriptions of all of the mathematical content or comprehensive illustrations of representations created in class. However, I retrieved this information and used it to fill in missing details by reviewing video clips, the children's mathematics notebook entries, and photographs of publicly constructed representations from our easel chart. In summary, the teacher's journal served both as the primary data source and as the map that led to secondary data sources.

When initially recording each journal entry as the teacher, I intentionally did not plan what to write about so that I was free to discuss the issues that were most salient to my practice that day. However, when later analyzing journal excerpts it became apparent that they had some shared structure, or anatomy. Entries generally began with the overarching goal for the day, and the mathematics problem for the children to

work on with a description of the problem. In most cases, entries offered a narrative about how the lesson unfolded before unpacking reflections. Reflections often included comments about individual children or groups of children, wonderings, frustrations, decisions, and ideas about future plans. These components of the anatomy were not always written about in this order, but the anatomy of the journal became apparent when viewing multiple journal excerpts over time.

Replicating a technique implemented by other researcher-teachers who came before me (Ball, 1993a; Lampert, 1986, 2001; Lampert & Ball, 1988), I created temporal distance from the work of teaching to be placed in a stronger position to conduct the analysis through the lens of a researcher. As a researcher, analysis of the journal data was crucial because each journal entry documented a fine-grained snapshot of the teacher's processing in a specific moment in time. Framing my analysis with the instructional triangle, intersectionality, and dilemma management in teaching, I carefully coded and examined journal excerpts to identify patterns and uncover themes.

Because analysis is an iterative process, I conducted my analysis in several phases. In the first phase, I read through each journal excerpt looking for and tracking on words, phrases, or ways of thinking that were particularly salient. In the second phase, I began coding to identify patterns in the ways of thinking, phrases, or use of words contained in the teacher's journal. In the third phase, I combined these initial codes into larger categories. In the fourth phase, I used these categories to draw out prominent themes contained in the teacher's journal (see Appendix A for an *Example of a Coded Teacher Journal Page*). Through careful analysis, identifying prominent themes illuminated the work at the beginning of the school year for an elementary

mathematics teacher as she sought to advance justice in a heterogeneous classroom. In the final phase of the analysis, I examined and explained specific classroom episodes to exemplify prominent themes that emerged. During all phases of this process I discussed my work with other scholars and researchers, studied relevant literature, and drafted analytic memos. I used these discussions and analytic memos to help articulate ideas, to reflect on what I had learned from the data, and to think about how these ideas related to the larger picture of theory.

My research questions took me into numerous careful re-readings of the teacher's journal. After several initial phases of analysis of the primary source of data, the teacher's journal, I drew out a number of initial codes. The initial codes presented a number of challenges. One challenge was the sheer number of initial codes. A second challenge was that some of the initial codes were too nuanced, and other initial codes were too broad. Other challenges involving the initial codes were that some codes lacked consistency or prevalence in the teacher's journal, the main source of data. As I conducted several additional phases of analysis of the primary source of data, the teacher's journal, I continued to meticulously revise the codes while consulting with other scholars.

After careful consideration, some of these initial codes were eliminated or redesigned because they lacked consistency or prevalence. For example, I initially had a code for the teacher using curriculum materials as written, but as I continued to read through the data the teacher rarely referred to this. However, as I continued to read through the data, the teacher frequently referred to modifying, redesigning or abandoning the curriculum materials, so I revised the code to reflect the way in which

curriculum materials were appearing in the journal. I continued to revise the codes based on what I read in the data and on my emerging sense of what the teacher seemed to be preoccupied with as she taught during first trimester.

Some initial codes proved to be consistent and prevalent, but were so similar to other initial codes that they were combined to form a more inclusive final code. Yet other initial codes had to be deconstructed into two codes to produce final codes of a similar grain size. All of the final codes were consistent in that they were well defined, similar in grain size, and were prevalent throughout the teacher's journal. As I turned these codes into categories, and categories were utilized to draw out themes, many insights emerged. I began to notice that everything was coalescing around one prominent theme: *centering children*.

CHAPTER V: Findings

What is the work of an elementary mathematics teacher seeking to teach in ways that disrupt inequity and advance justice for children from historically marginalized groups in a heterogeneous classroom? What stood out from the data was that across this work the teacher employed a variety of practices that I group together and call *centering children*. *Centering children* refers to instances when the teacher leveraged discretionary spaces (Ball, 2018) to deliberately understand who children are, how they interact, and what they think, in order to intentionally act to disrupt historical patterns of inequity, make instructional decisions, and position children from marginalized groups as capable learners and doers of mathematics. In looking at the codes and examining my data, I saw that there were multiple components that comprise what I coin *centering children*. One was learning about children's thinking. Here what I noticed was the teacher's repeated attention to the thinking of the children in her class. A second component of *centering children* was learning about children's patterns of work. This component involved the teacher's recurrent noticing surrounding how the children chose to work on tasks and interact with each other. A third component was foregrounding children's identities. Here what I noticed was the teacher's explicit attention to the importance of the multiple identities of children. A fourth component of *centering children* was positioning children as competent. I noticed the teacher's repeated attempts to elevate the positioning of children in her class who were members of

historically marginalized groups. Finally, the fifth component of *centering children* was translating curriculum (Farmer, 2019). Here I noticed the teacher modifying, redesigning, and at times abandoning the curriculum materials in an attempt to be responsive to the thinking and understandings of the children in her class.

Key Components of Centering Children

As just discussed briefly, *centering children* can be deconstructed into a number of key components including: learning about children's thinking, positioning children as competent, learning about children's patterns of work, foregrounding children's identities, and translating curriculum (Farmer, 2019). Here, I take each of these components up in turn.

One prominent component of *centering children* that showed up in the teacher's journal was learning about children's thinking. After numerous re-reads of the teacher's journal, I developed the label "learning about children's thinking" because the teacher repeatedly attended to specific ideas that the children had. Learning about children's thinking can refer to learning about an individual child's idea, about an idea shared by a partnership, or about an idea shared by a group of children. My analysis revealed that there were multiple dimensions of complexity associated with learning about children's thinking for this teacher. These dimensions will be discussed in detail and exemplified through classroom episodes later in the findings section.

A second distinct component of *centering children* that this teacher engaged in was seeking to position children as competent. I use the phrase "positioning children as competent" to describe instances in which, in her journal, the teacher placed value on children's perspectives, thinking, questions, or ways of being. Positioning theory

recognizes that children have unequal access to rights, actions, and discourse in classrooms based on a variety of socially-constructed norms (Harré, 1999, 2012). This causes some children to enter the classroom already positioned as competent, while, conversely, other children are not. Positioning children as competent seemed to create complexities for this teacher as she sought to push back against societal constructions of social position. In the sections below, I provide more details about this work.

A third key component of *centering children* for this teacher was learning about children's patterns of work. I define learning about children's patterns of work as when the teacher noticed how children chose to work on tasks or interact with each other. Multiple comments in the journal indicated that learning about patterns children exhibited as they interacted and worked on tasks was tied to the teacher's aim of isolating and changing specific patterns in order to promote equity and offer justice in her classroom. This will be unpacked further later in this section.

A fourth prominent component of *centering children* that was prevalent in the teacher's journal was foregrounding children's identities. I define foregrounding children's identities as when the teacher viewed children's identities as prominent or important. Every child held multiple identities simultaneously, and these identities were situated in power structures, history, and social relations. These identities included such markers as a child's gender, race, ethnicity, socioeconomic status, country of origin, area of residence, and home language. This study revealed multiple tensions and key aspects related to foregrounding children's identities. I will explain these later in the findings section, as well as exemplifying them in classroom episodes.

The fifth and final prominent component of what I termed *centering children* that was prevalent in the teacher's journal was translating curriculum (Farmer, 2019). I define translating curriculum as when the teacher interpreted, modified, redesigned, or abandoned the curriculum materials as she aimed to better meet children's needs by focusing on *their* understandings, questions, and thinking. The teacher repeatedly journaled about her aims to better support children's thinking and learning in her class by managing the curriculum materials. This was difficult work for the teacher that created a number of tensions. In the findings section, I will explain these complexities in detail, and offer examples through sharing characteristic classroom episodes.

In the sections that follow, I turn to grounding key components of *centering children* in the data to offer increased clarity. I will begin by explaining my research process and the thinking behind it, followed by grounding each prominent component in the data. Grounding the key components of *centering children* in the data allows me to unpack and illustrate each major component in greater depth.

Grounding the Findings in Context

Although I was the teacher in all of the in the episodes in this piece, I intentionally allowed several years of time to pass so that I could conduct an analysis through the lens of a researcher. In order to distinguish the former version of myself (the practitioner) from the current version of myself (the researcher), I refer to my former self as "the teacher" throughout my writing. When writing about classroom episodes, I intentionally write in past tense. Conversely, when including a teacher's journal excerpt, the excerpt was intentionally kept in present tense to help differentiate voice. I offer

increased clarity through the intentional use of different tenses coupled with referring to the past practitioner as “the teacher.”

In order to make these determinations, I studied the written work of other researcher-teachers and interviewed several of these scholars to learn how they created a distinction between the teacher and the researcher in their thinking and writing. While some researcher-teachers used chronological time to distance themselves from their teaching practice (Ball, 1993a; Lampert, 1986, 2001; Lampert & Ball, 1988), another created a sense of distance by explicitly developing a methodological device involving multiple “versions of self” (Heaton, 1994 & 2000). After weighing both of these options, I decided to employ this methodological device and to use time to create distance from the work of teaching. Through these combined mechanisms I offer the past perspectives of the teacher and the current analysis of a researcher.

What is the work of an elementary mathematics teacher seeking to teach in ways that disrupt inequity in a diverse classroom? The overarching answer to this question, that the teacher leveraged discretionary spaces to deliberately *center children*, is better understood in the context of practice. For this reason, we return to my classroom to illustrate these findings through various episodes (see Table 2). I utilize classroom episodes, along with excerpts from the teacher’s journal and children’s written work, to allow a nuanced view into particular phenomena and to contextualize and unpack these concepts. This approach will offer a fine-grained look at an episode that exemplifies both *centering children* and its component parts.

Table 2*Overview of Episodes*

| Date of Entry | Journal Entry (p. #) | Episode-Focal Student(s) | Component(s) of Centering Children | Focus of Lesson |
|----------------------|--|---------------------------------|--|--------------------------------------|
| Oct. 31 | "I called Ernesto up to share how he thought about his estimate with the class. He explained that he rounded 34 to 30, and 627 to 630. He told us this would be 5,000 and his classmates asked him if he multiplied to find that. He told us that he took a guess. When asked if this seemed reasonable, Ernesto looked worried. I noticed that tears were starting to form in his eyes. I placed my hand on his shoulder to reassure him and told him we were here to support him..." (pp. 50-51) | Ernesto & Darnell | Learning About Children's Thinking Translating Curriculum Positioning Children as Competent Foregrounding Children's Identities | Multiplication of Multidigit Numbers |
| Sept. 28 | "I noticed that Chad was building a model on the rug. This is wonderful because it will likely help him (and any friends observing) develop deeper conceptual understanding surrounding volume. I want the children to discover and apply formulas for volume of rectangular prisms through understanding and reasoning, not memorization. But | Chad | Learning About Children's Thinking | Volume of Rectangular Prisms |

| | | | | |
|------------|--|---|--|--|
| | <p>what exactly does Chad understand about volume formulas? As I walked by his build the first time, it appeared that he might be discovering, or preparing to utilize, $l \times w$ to calculate B (Base)...” (pp. 23-24)</p> | | | |
| Oct. 10 | <p>“I was concerned that so many children were utilizing the language ‘add a zero’ in our discussion. In mathematics ‘add a zero’ means $+0$. Is this really what they mean? I always want to give them the benefit of the doubt, but in this instance, language really does matter...” (p. 32)</p> | Whole Group | Learning About Children’s Thinking | Place Value Relationships |
| Sept. 5 | <p>“...I want all of us (the class) to get to know each other in much greater depth. I intend for us to learn each child’s individual story. I wonder where they come from, who they are, and what is important to each of them. But how to begin this dialogue?” (p. 1)</p> | Planning for Whole Group | Foregrounding Children’s Identities | Sharing of Identities |
| Nov. 3 | <p>“The discourse was fascinating as I circulated the classroom. Most of the children were working together to generate problems that confirmed the strategy, so I began to press them to find problems that might refute it. Many noted that the confirming problems seemed to have a pattern of ending in zero, and asked me if they ‘were allowed’ to</p> | Kamella Kamella with Small Group Kamella with Whole Group | Foregrounding Children’s Identities Positioning Children as Competent | Exploring the Conditions of a Proposed Multiplication Strategy |

| | | | | |
|---------|--|-------------|--|---------------------|
| | create a problem that didn't end in zero, which I encouraged them to do. I noticed that Kamella quietly shared a hunch with her table group that if the last digit wasn't zero, the strategy might not work anymore..." (pp. 56-57). | | | |
| Sept. 6 | "Although I intentionally placed them in groups by pushing tables together, many children still selected to work alone. Only a few discussed the problem quietly with a classmate nearby. My sense is that they are not used to working on problems collectively..." (p. 2) | Whole Group | Learning About Children's Patterns of Work | Pascal's Triangle |
| Oct. 13 | "...Kaison said he was curious to find out if we would get a similar answer or something really different if we didn't start with the exponent, but rather with 4×10 . For a second, I was a little concerned about letting him experiment with this in front of the class, because I thought it could possibly confuse others. However, I ultimately decided that it was worth exploring, and that the kids would decide if it made sense or not..." (p. 36) | Kaison | Translating Curriculum | Order of Operations |

In the first episode that I present below, the children were working on deepening their understanding of multiplication of multidigit numbers. Specifically, the children were thinking about how they might make a reasonable estimate for a multidigit multiplication problem so they could utilize it to consider whether their actual answer made sense or not. Instead of creating a new problem of the day for the children to work on, which was a norm in this classroom, the teacher instead decided to delve deeper into the children's reasoning surrounding forming an estimate on this day. Just before this classroom episode, the children discussed a problem from the curriculum materials with their table groups. The children were first asked to make a reasonable estimate for 627×34 . Next, they were asked to find the product of 627×34 . Last, they were asked to use their estimate to check whether their answer made sense.

The children discussed this work in small groups as the teacher walked from group to group, listening to discussions and observing children's written work. The teacher wrote in her journal,

As the kids began to work on the problem...I noticed several interesting things emerging during discourse at tables...(one) observation was that a few children seemed to be taking a guess rather than calculating an estimate. Ernesto adjusted his values reasonably but then seemed to guess at the product, so I thought it would be interesting for him to share his thinking about this with the class (in whole group discussion). (Teaching journal, October 31, p. 50)

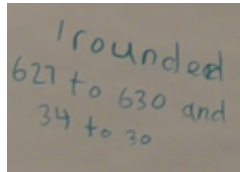
This excerpt from the teacher's journal exemplifies a prominent component of *centering children*: learning about children's thinking. Learning about children's thinking can be

understood as the teacher attending to specific ideas that a child has, and in this case, the teacher is attending to Ernesto's ideas about estimation.

Next, the teacher brought the class together to engage in a whole class discussion about strategies that they thought might lead to reasonable estimates for 627×34 . The teacher invited Ernesto up to the easel chart as his peers sat on the rug in a circle by his feet. Ernesto self-identified as Latinx and learning English, and he was generally reluctant to articulate his thinking in a whole class setting. He began to explain to his peers, with some support from the teacher, that he estimated the product of 627×34 by first rounding 627 to 630 and 34 to 30. He wrote on the chart:

Figure 5

Ernesto's Recorded Estimation Strategy



Next, he explained to the class that he guessed that the product would be 5,000. The teacher wrote in her journal that day,

...his classmates asked him if he multiplied to find that. He told us that he took a guess. When asked if this seemed reasonable, Ernesto looked worried. I noticed that tears were starting to form in his eyes. I placed my hand on his shoulder to reassure him and told him we were here to support him. (Teaching journal, October 31, p. 50)

Here, the teacher noticed how Ernesto chose to work on the task in front of the class and interact with the other children. Although the teacher noticed nonverbal cues that likely indicated stress, instead of allowing Ernesto to return to his seat, the teacher

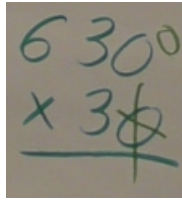
explicitly communicated support, maintaining the expectation that Ernesto's thinking was worth exploring with the class. In this way the teacher sought to position Ernesto as competent by placing public value on his perspectives, thinking, questions and ways of being. In a situation where a teacher might just as easily allow Ernesto to return to his seat after sensing his discomfort, instead this teacher encouraged him to continue, both by placing her hand on his shoulder and by explicitly communicating verbal support.

Other children raised their hands to respond to Ernesto's strategy. Mei, a classmate who self-identified as Asian, raised her hand and shared with Ernesto that the last part of his strategy was not reasonable to her, "...because if you do 630×10 it's already over 5,000." Lake, a classmate who self-identified as white, raised her hand and asked Ernesto, "When you finished doing the real answer after this estimation...could you tell if there's a difference?" At this point Darnell, a classmate who self-identified as Black and Indigenous, raised his hand to explain to Ernesto that he believed $630 \times 10 = 6,300$, and that $30 / 10 = 3$. He thought they could use this information to figure out 630×30 .

As this conversation among the children progressed, it seemed as though Ernesto was beginning to question part of his initial strategy. Ernesto invited Darnell to come up to the chart to show him how he reached his conjecture. Darnell approached the chart and represented his strategy writing:

Figure 6

Darnell's Invented Multiplication Strategy


$$\begin{array}{r} 6300 \\ \times 3 \\ \hline \end{array}$$

As Darnell's peers slowly began to realize that he was proposing a new multiplication strategy, they began to question him about it. Chelsea, a classmate who self-identified as white and Jewish, posed the first question to Darnell asking, "Why did you do 6,300 x 3—you carried that zero?"

At this point, some teachers might have stopped this line of discussion, rerouting it for a variety of reasons. Some might have rerouted the discussion because they did not recognize the brilliance of Darnell's thinking, unaware of the fact that it contained deep mathematical understanding and the potential for rich discussion. Other teachers might reroute the discourse because although they did recognize this brilliance, they did not see Darnell's thinking as "central" to the lesson. A third category of teachers may have recognized Darnell's brilliance, and viewed his idea as central to deepening children's understanding about multiplication, but still decided to reroute the discussion because they were worried about the possibility of other children becoming confused by this advanced idea. Counter to these normalized practices and seeking to disrupt the status quo, the teacher here utilized personal judgment in the moment and acted to support this line of discourse and Darnell's thinking. The teacher recorded in her journal,

At first only Chelsea asked Darnell about his strategy. I was really hoping others would ask more about it, so I intentionally allowed more time. When no one else asked, I then raised my hand asking *why* his strategy worked. This seemed to eventually spur an interesting discussion. Kaison,¹ Lake, Mei, Chelsea and Marie² all chimed in on this topic. Lake eventually asked Darnell if this strategy would work every time (which I loved!). The children seemed unsure, so I expressed that we should actually test it to see if it is mathematically valid or not. I generated a problem on the spot for Darnell to test out. I selected an example that I knew would work, but suggested that we would need to test this further before deciding if it always worked or not. Although I was not planning this, I was thrilled that it came up! We need more time to work on testing it out later this week.

On one hand I wonder how can I make time for this when I struggle to find the time to cover all of the required components of our mathematics curriculum. On the other hand, I know that I *need* to make time for this because it is an authentic and interesting idea to explore. If my goal is truly to encourage the children to think about *when* and *why* things work mathematically speaking (not just memorizing procedures), then I have to make time for this type of thinking. (Teaching journal, October 31, pp. 50-51)

This journal excerpt represents another key component of *centering children*: translation of curriculum. In response to Darnell's brilliant thinking and the subsequent class

¹ Kaison self-identified as a Black male.

² Marie self-identified as a white female.

discourse, the teacher modified the lesson, thereby translating the curriculum. The teacher wrote in her journal,

I also believe that exploring Darnell's strategy will help to position him as competent. He is a Black, Indigenous boy and he is here by school of choice...he has shared with me numerous times that he feels he arrived in our district 'way behind' and is 'not good at math.' I can completely relate to this. Having moved from Detroit to Ann Arbor as a teen I felt the exact same way. Although I shared my own story with Darnell and explained to him that we are both intelligent but simply lacked access to complex mathematics, I think exploring his strategy as a class will exemplify just how capable he truly is. (Teaching journal, October 31, p. 51)

This excerpt from the teacher's journal represents three prominent components of *centering children*: learning about children's thinking, foregrounding children's identities, and positioning children as competent. As the teacher considered Darnell's contribution to the discussion (his invented multiplication strategy), she also foregrounded Darnell's identities, viewing them as important. She thought about how all of the identities that he had communicated with her intersected, noting that he was Black, Indigenous, and felt "way behind" and "not good at math." She also foregrounded that Darnell came to school from a different city through a school of choice program. In this example, the brilliance of Darnell's mathematical thinking coupled with Darnell's intersecting identities drove the teacher to seek to position him as competent publicly in the classroom. The teacher enacted moves designed to place value on Darnell's thinking, perspectives, and ways of being, as she attended to his

compounding identities. The confluence of learning about children's thinking, foregrounding children's identities, and positioning children as competent were exemplified in this episode.

However, in the moment that Ernesto invited Darnell to come up to the chart to show him how he reached his conjecture, the teacher opted to do nothing to stop this. Following this, the teacher's moves allowed Darnell's ideas about multiplication to overshadow Ernesto's ideas about estimation. Although the teacher did not comment on this in her journal, it leaves many questions unanswered. Was allowing Ernesto to invite Darnell up to the chart a move that was intended to advance justice for Ernesto, or just for Darnell? To what extent does the confluence of Ernesto's identities and Darnell's identities matter in the context of this situation? Did Darnell's mathematical ideas completely eclipse Ernesto's ideas thereby lowering Ernesto's positioning or disempowering him? Or did exercising his personal agency to invite Darnell up to the chart empower Ernesto? I use this to exemplify the bumpiness of teaching in ways that aim to disrupt inequity. Oftentimes disrupting one inequity may unintentionally reinforce another.

Next, I shift attention to explaining *centering children* in more depth by examining each key component *individually*. I will follow a general structure as I explain individual components. First, I will offer a general definition of the component. Next, I will ground the component in two episodes from my classroom. Last, I will offer some discussion among the two episodes. Using the teacher's journal as a roadmap, episodes were selected to illustrate specific nuances of each component.

Learning About Children's Thinking

I define learning about children's thinking as the teacher attending to specific ideas that the children have. Learning about children's thinking can refer to the specific ideas of an individual child, or specific ideas shared by a partnership or a group of children. Next, I will ground learning about children's thinking in a few episodes from my classroom.

Episode 1: Learning About One Child's Thinking as They Construct a Model

The children had been learning about the concept of volume, and were working on a problem where they needed to figure out how many cubic inches are in one cubic foot. While many children decided to begin by writing a number model or representing the problem with a picture, Chad, who self-identified as a white male, chose to construct a physical model instead. The teacher wrote in her journal that day,

I noticed that Chad was building a model on the rug. This is wonderful because it will likely help him (and any friends observing) develop deeper conceptual understanding surrounding volume. I want the children to discover and apply formulas for volume of rectangular prisms through understanding and reasoning, not memorization. But what exactly does Chad understand about volume formulas? As I walked by his build the first time, it appeared that he might be discovering, or preparing to utilize, $l \times w$ to calculate B (Base). (Teaching journal, September 28, p. 23)

Figure 7 captures what the teacher observed when she initially walked by Chad's model.

Figure 7

Chad's Initial Model



As class progressed, the teacher continued to walk around the classroom attempting to track on the thinking of 25 different children as it related to volume of rectangular prisms. This was a demanding task because the children opted to take a variety of approaches. Chad's thinking in particular placed intense observational demands on the teacher because at the end of the lesson he would deconstruct his model, leaving behind little evidence of his thinking. For this reason, the teacher circled back to Chad during the lesson and wrote,

I believe I have a better understanding of Chad's thinking now. When I did a second pass to try to figure out how he was thinking about volume, it turned out that he was not utilizing $l \times w$ to calculate B after all. He actually determined B by physically placing 144 cubic inches in his model. Next, he explained that he needed to multiply 144 by 12 to find the volume. Now I believe that he is thinking about volume in layers, and has utilized the formula $B \times h = V$. But has he recognized yet that $l \times w = B$? (Teaching journal, September 28, p. 24)

Figure 8 reflects Chad's complete model as the teacher circled back to him.

Figure 8

Chad's Complete Model



In this episode, Chad's construction of a physical model placed demands on the teacher. This teacher's first observation led her to what was likely an incorrect understanding of Chad's thinking. Although the teacher's second observation clarified this initial misconception to some degree, it still left her with a lingering question about Chad's understanding. This case was selected to exemplify some of the dimensions of complexity surrounding using observation to learn about children's thinking in practice.

Episode 2: Learning About Children's Thinking Through Mathematical Discussion

A few weeks later, the children were learning about place value relationships, and had completed the following problem in their mathematics journals:

What is the value of the 2 in the following numbers?

2.3 _____

23 _____

230 _____

2,300 _____

23,000 _____

Next, the teacher asked the children to answer the following questions in their mathematics notebooks: What patterns do you notice? How can you use the patterns to predict the next sequence of numbers?

The children discussed their thinking with a partner, and then the teacher led them in a whole class discussion. During this discussion several children came up to the chart to share patterns they noticed, and the class discussed how these patterns might be applied to predict the next sequence of numbers. Several children shared the idea to multiply each value by 10 when working down the problems, but when some of the children talked about applying this to predict the next sequence of numbers, the teacher began to wonder about what they were thinking. That day the teacher wrote in her journal,

I was concerned that so many children were utilizing the language 'add a zero' in our discussion. In mathematics 'add a zero' means $+0$. Is this really what they mean? I always want to give them the benefit of the doubt, but in this instance, language really does matter. (Teaching journal, October 10, p. 32)

Near the end of the whole class discussion, Elan, who self-identified as a Latinx male, contributed a comment on the multiply by 10 strategy that had been shared by a classmate. "I think, for me, an easier way to think about it is every time you multiply something by 10 you add a zero to the...you add zero to that number...well, no. You *put* a zero at the end of the number that you're multiplying by 10."

The teacher noted that Elan's comment might indicate that he understood this important difference, but she expressed uncertainty about the rest of the children, writing,

Awa³ has commented on this in the past, and Elan just did, but I am unsure how all of the other children are currently thinking about this. I am hopeful that looking through their written work will provide me with some additional insights. (Teaching journal, October 10, p. 32)

In this episode, comments made by a group of children during a whole class mathematical discussion led this teacher to pay close attention to language. The language of mathematics was at odds with colloquial language, which made it challenging to interpret children's understanding. The teacher sought to clarify this through examining their written work, but this was not simple. What did they really mean by "add a zero"? Although she had paid close attention to their contributions in class, her journal reflects her remaining questions about the children's understanding of multiplying by 10 in place value numeration.

Discussion

Analysis shows that for this teacher there are multiple dimensions to learning about children's thinking. One dimension is that, although these ideas are often mathematical, they can also be nonmathematical. In some cases, this teacher attended to what children felt, knew, or could do related to mathematics. In other cases, she paid careful attention to the children's ideas as people, attending to their nonmathematical thinking.

An additional dimension of learning about children's thinking is that it created a number of demands on this teacher because children chose share their thinking through a variety of modalities. In some cases, children shared thinking through drawings,

³ Awa self-identified as a Black female from West Africa.

nonverbal gestures, body language, or by physically constructing models, placing observational demands on the teacher. In other cases, children shared their thinking through writing or discussion, placing language-related demands on the teacher. Yet, in other cases, the children shared their thinking through different modalities concurrently, creating multiple demands on the teacher simultaneously.

Learning about children's thinking is both challenging work and a key component of the overarching work of *centering children*. In addition to learning about children's thinking, another key component is foregrounding children's identities. Next, I will discuss foregrounding children's identities and root this component in two episodes from my classroom.

Foregrounding Children's Identities

In the work of *centering children* at the beginning of the year, one key component for this teacher was learning about the children's thinking, but another important component was learning about children's identities. Foregrounding children's identities was central to launching work in this classroom and building community at the beginning of the school year. This was not easy for the teacher because children held multiple identities, most aspects of these identities were not contained in school records, and children were not necessarily willing to share all aspects of their identities at the beginning of the school year. In this section I seek to unpack some of the work and dilemmas for this teacher in learning about and foregrounding children's identities.

Foregrounding children's identities can be understood as the teacher viewing the children's identities as prominent or important. Each child holds multiple identities, and these identities are situated in power structures, social relations, and history. These

identities can include a child's gender, race, ethnicity, socioeconomic status, place of origin, area of residence, and home language.

Episode 1: Difficulties of Establishing Routines to Support Sharing of Identities

The first set of tensions this teacher faced began even before she met the children. She found it important to think about how the children would begin to share their identities with one another as soon as the school year started. This had to do with her commitment to *centering children*, and she contemplated how she might do this. The night before the first day of school, the teacher wrote in her journal,

...I want all of us (the class) to get to know each other in much greater depth. I intend for us to learn each child's individual story. I wonder where they come from, who they are, and what is important to each of them. But how to begin this dialogue? (Teaching journal, September 5, p. 1)

In this excerpt, before the first day of school, the teacher centered the importance of the community of children learning about each other as individuals. She cited both the need for the collective group to acquire the unique story of each child, as well as her personal need to uncover different aspects of each child's identity.

Related to these needs, this teacher pondered how to best start this line of discussion with the children in her class. After additional thought and consideration, the teacher recorded in her journal,

I am thinking that we will each create a teachable 'identity nametag'...initially I had some reservations about this because it will undoubtedly take valuable instructional time, but I think the benefits will outweigh the costs. I will ask the children to start with their name in the center, and to add pictures or words

around their name that represent where they come from, who they are, what is important to them, and any other details they would like to share with us. We can each use this tag and the document camera to teach the class about ourselves. I intend to leave this fairly open so that each child can share the things they feel comfortable with. We can always add more to these as the year progresses and we continue to define ourselves. (Teaching journal, September 5, p. 1)

This exemplifies several difficulties this teacher was faced with related to establishing routines to support children in sharing their identities. One is that identity work is highly personal, so the teacher was concerned about the children's comfort as they initially shared different aspects of themselves. This was compounded by the fact that it was the beginning of the school year, and relational trust in the classroom was yet to be established. Although the teacher negotiated this demand by putting together a plan that she believed, "...[is] fairly open so that each child can share the things they feel comfortable with," she also acknowledged the likelihood of having to add to this identity information as the year progressed. In this way, the work of foregrounding children's identities created complexities for this teacher.

An additional dilemma this teacher faced as she aimed to gather identity information and to, "learn each child's individual story," was the dilemma of time. Even though the teacher's writing indicates that she viewed identity work and storytelling as important, she still felt the demands placed on her due to limited time with the children. She had roughly one hour to hold mathematics class each day, and during this short block of time she had a professional obligation to teach a variety of complex mathematical concepts. Teaching the mathematics lesson alone was often difficult to

do within the scope of one hour, and identity work and storytelling was not embedded in this mathematics program. This created a competing set of interests for this teacher. The teacher wrote, "...I had some reservations about this [identity work] because it will undoubtedly take valuable instructional time, but I think the benefits will outweigh the costs." Although this teacher ultimately decided to engage in the work with her class, her dilemma was exemplified as she weighed the affordance of identity work against the constraint of time.

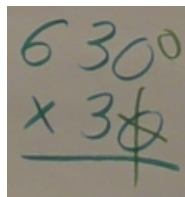
Learning about children's multiple identities made the intersection of these identities more visible for this teacher. Some of the ways in which intersectionality played out became apparent as the teacher watched the children work academically. The episode below takes this finding up, showing how the teacher closely attended to the confluences of identities of a child in her class.

Episode 2: Challenges of Taking an Intersectional Approach

A couple of months later, the children were working in small groups to assess the invented multiplication strategy that Darnell previously proposed to the class.

Figure 6

Darnell's Invented Multiplication Strategy



The teacher had posed the following for small groups to work on in their mathematics notebooks and discuss together:

Today we are exploring a proposed multiplication strategy.

- 1) Experiment to try to find cases where the strategy works.
- 2) Experiment to try to find cases where the strategy does not work.
- 3) Does this multiplication strategy always work? How do you know?
- 4) In cases where it works, why does it seem to be working, mathematically speaking?

As the children engaged in discussion with their small groups, the teacher walked around the room interacting with each group. The teacher wrote in her journal that day, The discourse was fascinating as I circulated the classroom. Most of the children were working together to generate problems that confirmed the strategy, so I began to press them to find problems that might refute it. Many noted that the confirming problems seemed to have a pattern of ending in zero, and asked me if they 'were allowed' to create a problem that didn't end in zero, which I encouraged them to do. I noticed that Kamella⁴ quietly shared a hunch with her table group that if the last digit wasn't zero, the strategy might not work anymore. (Teaching journal, November 3, p. 56)

The group of children that Kamella worked with heard her insight, but did not acknowledge it. The teacher noticed this and began to think about what might have been causing this marginalization to occur. She wrote in her journal,

Kamella self-identifies as Mexican and is very quiet in class. She had lunch with me the other day and told me that she and her dad were so poor that they just

⁴ Kamella self-identified as Latinx and female.

had to move in with grandma. She also said that this was the first year she started feeling smart at math. (Teaching journal, November 3, p. 56)

In this episode, the teacher paid close attention to Kamella's compounding identities. The teacher noted that Kamella self-identified as Mexican, living with her grandmother due to homelessness, and that she began to feel smart in mathematics class that year. Rather than viewing Kamella as holding a single identity, this teacher recognized that Kamella was a member of more than one identity group simultaneously. Only through this recognition could the teacher comprehend that Kamella's identities intersected to form something *distinct* that likely caused her peers to push her to the margins, but this created complicated work for the teacher. Although the teacher recognized that Kamella was being marginalized, this recognition offered the teacher no concrete answer about what action she should take to demarginalize Kamella in this small group or in their classroom. This was part of the complexity for the teacher as she took an intersectional approach: there was no single "correct" action she could take that would guarantee justice for a child from multiple historically marginalized groups.

Discussion

There are multiple key aspects related to foregrounding children's identities. One aspect that was particularly salient at the beginning of the year was that this teacher was faced with the complex task of establishing routines that aimed to encourage children to share different aspects of their identities. Without developing in-depth knowledge of children's identities, which is not sufficiently developed by reading identity

descriptors contained in CA-60s,⁵ the teacher loses opportunities to leverage the strengths children bring from their home communities or to teach across difference.

An additional aspect tied to foregrounding children's identities were the challenges created for this teacher when she took an intersectional approach. This approach necessitated the teacher to view children as members of more than one identity at the same time, to recognize that the compounding of identities formed something distinct, and to understand that social valuations placed on these combined identities were likely to marginalize some children if left unchecked. Once this teacher gained awareness of these inequalities, she was faced with the dilemma of what to *do* to try to disrupt them. The episodes above were selected to exemplify one or more of the aforementioned dimensions that became salient through detailed analysis.

Positioning Children as Competent

When deconstructing *centering children*, another principal component is positioning children as competent. Positioning children as competent was central to teaching and building community at the beginning of the school year in this classroom. This positioning work was difficult for the teacher because she had to push back against constructions of social position that were deeply rooted in larger society. In this section I seek to unpack some of the dilemmas and work for this teacher as she aimed to disrupt these societal constructions, and position children as competent.

Episode 1: Challenges of Positioning in a Small Group

The children were working in small groups to assess the invented multiplication strategy that Darnell proposed to them. The groups were engaged in experimentation,

⁵ CA-60s refer to the cumulative record files that school districts keep on all students.

attempting to find cases where Darnell's strategy worked and cases where his strategy did not work. When the teacher noticed that Kamella quietly shared a conjecture with her small group that, "If the last digit isn't zero, the strategy might not work anymore," the teacher also noticed that this group of children did not take Kamella's brilliant insight up. The small group of children looked up when Kamella offered her insight, an indication that they had heard her, but they did not respond. Aware of how this small group had begun to position Kamella, the teacher remained with them explicitly seeking to reposition her. The teacher wrote in her journal,

When I noticed the other children did not respond [to Kamella] I knew I needed to stay with this group and do something. But what exactly? I stood for a moment thinking, and then I asked the other children what they thought about Kamella's brilliant idea. (Teaching journal, November 3, p. 57)

After the teacher posed this question to the small group, the children asked Kamella what her idea was and then the group began to try it out together. As the group experimented with more and more examples, their excitement around Kamella's idea began to grow.

In this episode, the teacher believed that the small group Kamella worked with initially offered her unequal access to discourse, actions, and rights when they ignored her contribution. Influenced by the socially-constructed norms of larger society, these child-to-child interactions would have likely left Kamella positioned as less competent if left uninterrupted by the teacher. If this teacher had chosen to "do nothing," she would have also reinforced the privileged positioning of the other members of Kamella's group.

Even though this teacher was aware of this positioning and knew that she needed to do something to disrupt it, the difficulty lay in what to do. In her writing, the teacher admits to having to pause for a moment to think about what to do, which was difficult given the demands of teaching because multiple other children were seeking the teacher's attention at this moment in time. The teacher's solution of asking the other children in the group what they thought about "Kamella's brilliant idea" seemed to work in this case, but there is no guarantee that this solution will invariably yield like results. Next, I shift my attention to exemplifying the complexities surrounding positioning a child as competent in a whole group setting.

Episode 2: Complexities of Positioning in Whole Group

With this teacher's intervention, Kamella's mathematical competencies were highlighted in her small group, yet the teacher was still left dissatisfied. The teacher had been intentionally tracking on participation in whole group discourse up to this point in the school year, so she noticed that Kamella had contributed sparsely in the whole group setting. The teacher wondered if this had to do with the way Kamella was positioned in the classroom, and the teacher wanted to push back against this further. The teacher wrote in her journal,

This [idea] was genius thinking on Kamella's part! I believe it could help the entire class. I eventually decided I should ask her to share her idea in whole class discussion. Aside from benefiting the thinking of the group, I hope that highlighting Kamella's competencies will help to better position her, and show her brilliance. I want her inner feeling of mathematical smartness to flourish.

(Teaching journal, November 3, p. 57)

In this journal excerpt, the teacher recognizes both Kamella's intelligent mathematical contribution, and how her thinking would likely benefit the class' collective understanding. Looking at this episode through the lens of positioning, the teacher's journal excerpt demonstrates how she was thinking about using Kamella's contribution to help position Kamella as competent in the mathematics classroom. Kamella had previously disclosed to the teacher, "This is the first year I am starting to feel smart at math." In the episode at hand, the teacher reflected on this previous disclosure as she wrote that she wanted Kamella's feeling of mathematical smartness to flourish. Aiming to position Kamella as competent, the teacher had Kamella share her idea with the entire class. She worried that Kamella's small group viewing her as competent, in isolation, would not substantively alter her positioning in the classroom as a whole.

Discussion

Positioning children as competent occurred when the teacher placed value on children's perspectives, thinking, questions, or ways of being. This happened during whole class discussions, in small group settings, and in partnerships. Children do not have equal access to rights, discourse, and actions based on a variety of socially-constructed norms, so by default some children enter their classroom already positioned as competent, while other children do not. Although classroom positioning is complex because it depends on both child-to-child interactions, and child-to-teacher interactions, the teacher has a great deal of influence on the positioning of children because she wields power and authority in the classroom.

Learning About Children's Patterns of Work

In addition to the component of learning about children's thinking discussed earlier, the journal also showed the teacher actively attending to learning about children's patterns of work. I use the label learning about children's patterns of work to capture when the teacher noticed how children chose to work on tasks or interact. Numerous comments in the journal indicated that learning about patterns children exhibited was crucial for this teacher as she sought to disrupt the status quo in her mathematics classroom by altering these patterns. Several excerpts suggest that it was the awareness of these patterns that provided the teacher with the potential to disrupt them over time.

Episode 1: Challenges of Developing Collective Learning

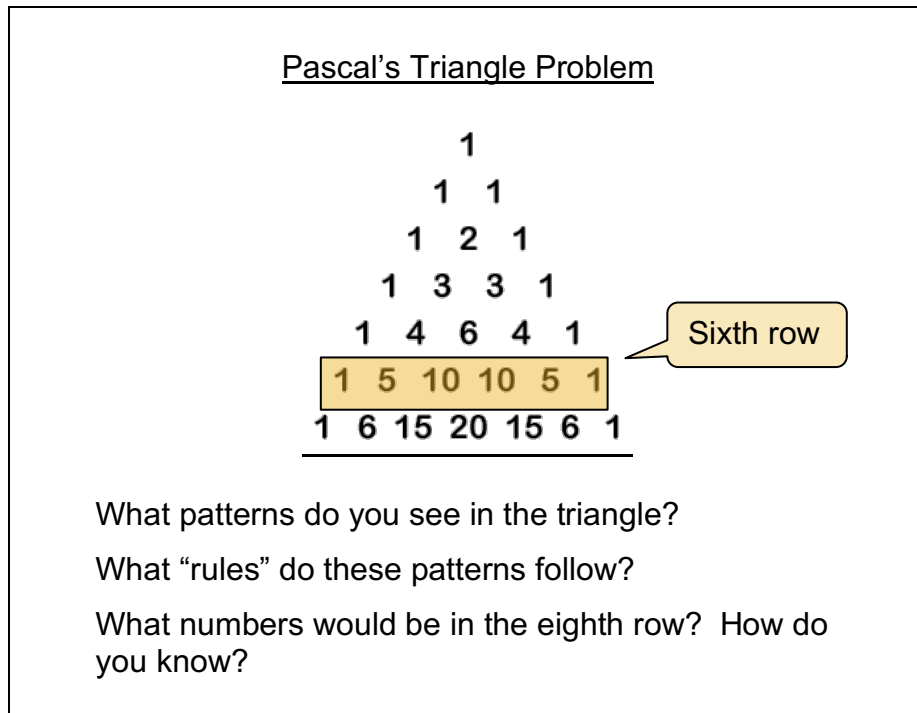
It was the first day of school and the children sat together in a circle on the rug for the launch of the first mathematics lesson. The teacher introduced the Pascal's Triangle Problem (see Figure 9) and discussed the directions together with the class. After unpacking the directions to the problem as a class, the teacher encouraged the children to work together.

Next, the children stood up and returned to their chairs to get to work, and the challenges began for the teacher. The teacher wrote in her journal,

Although I intentionally placed them in groups by pushing tables together, many children still selected to work alone. Only a few discussed the problem quietly with a classmate nearby. My sense is that they are not used to working on problems collectively. (Teaching journal, September 6, p. 2)

Figure 9

Pascal's Triangle Problem



Use words, symbols or diagrams to describe and explain the patterns in the triangle.

Note. The directions were created by the Mathematics Methods Planning Group at the University of Michigan School of Education.

In the preceding journal excerpt, the teacher noticed how the children chose to work on the task and interact, noting that many children opted not to collaborate with their peers. Despite the teacher's attempts to get the children to work collectively by asking them to work together, placing children in work groups, and pushing their tables together, most children still chose to work independently.

The teacher wrote that it seemed to her that the children were not used to working on problems collectively, but she wanted them to, and she did not have a clear path forward. How would she get them to work and think collectively so they could

become oriented to each other's ideas and learn from and with each other? In response to this tension, the teacher wrote,

After some work time, I decided to call the children together on the rug to engage in partner discourse. I observed various interesting interactions. In general, the children were quite accepting of each other's ideas. Only a few challenged their partner's thinking saying things like 'show me' or 'prove it to me'...this will definitely need to remain a focus for us as we move forward through the school year. (Teaching journal, September 6, p. 2)

The teacher thought she was able to make some headway orienting the children to each other's thinking through partner work, but her journal excerpts demonstrated that she continued to face challenges. Although she considered different approaches that might accomplish her goal, no approach was likely, she thought, to offer immediate or permanent success.

The next day, attempting to continue the work of orienting children to one another's thinking and getting them to learn collectively, the teacher decided to bring the whole class back together on the rug to have individual children discuss their noticings about Pascal's triangle with all of their classmates. This too created tensions for the teacher. She wrote in her journal,

As the first few children went up [to the easel chart] to share their thinking with the whole class, I sensed that many of their peers were not deeply attending to their ideas. As Kaison presented his pattern to the class I noticed that the next few hands up just wanted to share their own idea, or agree that he was right. I

wanted them to begin asking questions instead, so I modeled a clarifying question myself. (Teaching journal, September 7, p. 3)

The teacher also asked the children to repeat or rephrase ideas shared by their peers. After employing these moves repeatedly, the teacher sensed that the children were slowly increasing their ability to think and learn collectively. However, journal excerpts indicated that this continued to be ongoing work for the teacher, with no permanent solutions.

Episode 2: Challenges of Children Seeing Themselves as Capable Experts

After the class unpacked the directions to the Pascal's Triangle Problem together, the children returned to their chairs from the circle on the carpet and began to work on the problem. The teacher walked around the classroom observing and taking notes on the children's interactions and work on the task. Another complexity began to emerge for the teacher. She recorded in her journal that day,

I noticed that quite a few children called me over to look at their work seeking validation or praise... [but] I want them to see *themselves* as experts capable of deep mathematical thinking rather than looking to me as the mathematical authority. (Teaching journal, September 6, p. 2)

What was this teacher to do when the children called her over wanting praise and validation? Normalized practices would have included verbally praising the children, or telling them that their answers were correct or incorrect, but these practices would likely work against the teacher's goal. The journal made clear that the teacher wanted the children to view themselves as capable, mathematical experts, not her.

After briefly considering her options, the teacher made her move. She wrote in her journal,

Instead [of offering validation or praise] I posed questions for them, or asked them to record or defend their thinking in greater detail...[in addition to wanting them to see *themselves* as experts capable of deep mathematical thinking] I also want them to feel how intrinsically rewarding it is to ponder, experiment, struggle, discover, and learn from a fascinating problem. (Teaching journal, September 6, p. 2)

Although the teacher seemed to sense that these moves helped advance her goal of the children viewing themselves as capable learners and doers of mathematics, the work for this teacher was not “done.”

The next day, the children sat and compared their conjectures for the seventh and eighth rows of Pascal’s triangle. The teacher’s tension resumed, as the children continued to seek her out as the mathematical authority. She wrote in her journal,

...I noticed that Kaison and Sey⁶ (elbow neighbors) had different conjectures for the eighth row of the triangle. Sey argued to Kaison that they were both right, because multiple answers were possible. Kaison expressed that this did not make sense, and argued that there could only be one answer for the eighth row. As they looked to me to make a decision on this issue, I instead asked them to strengthen their own argument and to attempt to convince the other mathematician of their thinking. Chad, who was sitting nearby, suggested that they could bring it to the class if they could not agree (which I thought was a

⁶ Sey (Seymour) self-identified as a white male from East Asia.

great idea). However, they proceeded to discuss the issue and eventually came to a consensus. (Teaching journal, September 7, p. 3)

The teacher seemed to feel encouraged that the children were increasing their ability to see themselves and their peers as capable, mathematical experts, but the journal showed that she knew that this important work would be ongoing. Disrupting the long-held idea of teacher-as-expert would continue to be challenging work for this teacher, particularly at the beginning of the school year.

Discussion

In this section, I focused on two particular patterns with which the teacher seemed to be preoccupied as she wrote in her journal: (1) the pattern of children working and thinking predominantly alone, and (2) the pattern of children viewing their teacher as the mathematical expert, rather than themselves or their peers.

The journal showed how, instead of having the children continue to work alone, the teacher wanted to have the children work collectively so they could become oriented to one another's thinking and learn from and with each other. However, the journal comments indicated that was not easy work for the teacher. This presented a challenge for the teacher as she sought to disrupt the norm and engage the children in collective thinking and learning.

Journal entries suggest an additional challenge for the teacher related to this work was her eagerness to have the students see themselves and one another as capable mathematical experts. Her writing shows that this was complex work, as she found that most children began the school year viewing *her* as the mathematical expert, rather than themselves or their classmates. The journal showed how the teacher

sought to push back against these normalized views and change them. Because these views were likely long-held by the children, they seemed to be difficult for the teacher to change, particularly at the beginning of the school year.

Translating Curriculum

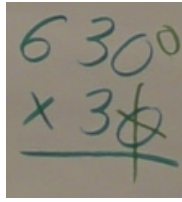
In my deconstruction of *centering children*, in addition to learning about children's thinking, positioning children as competent, learning about children's patterns of work, and foregrounding children's identities, lies a final key component: translating curriculum (Farmer, 2019). I define translating curriculum as when the teacher journaled about interpreting, modifying, redesigning or abandoning the curriculum materials in order to focus on the *children's* understandings, questions, and thinking. The teacher repeatedly journaled about her goals and actions aiming to support the thinking and learning of the children in her class by altering, redesigning or at times abandoning the required curriculum. Patterns in the journal suggest that this was complex and tension-filled work for the teacher.

Episode 1: Exploring Darnell's Invented Multiplication Strategy

Returning to the episode from earlier in this piece, Darnell stood at the chart demonstrating his invented multiplication strategy to the class. As his classmates slowly began to realize that he was proposing a new and unfamiliar multiplication strategy, they began to question him about it.

Figure 6

Darnell's Invented Multiplication Strategy



A photograph of a piece of paper with handwritten numbers in green ink. The top line is '6300'. The second line is 'x 30'. A horizontal line is drawn below the '30'. There is a small mark below the '0' in the second line, possibly a checkmark or a correction.

The teacher recorded in her journal,

Lake eventually asked Darnell if this strategy would work every time (which I loved!). The children seemed unsure, so I expressed that we should actually test it to see if it is mathematically valid or not. I generated a problem on the spot for Darnell to test out. I selected an example that I knew would work, but suggested that we would need to test this further before deciding if it always worked or not. Although I was not planning this, I was thrilled that it came up! We need more time to work on testing it out later this week.

On one hand I wonder how can I make time for this when I struggle to find the time to cover all of the required components of our mathematics curriculum. On the other hand, I know that I *need* to make time for this because it is an authentic and interesting idea to explore. If my goal is truly to encourage the children to think about *when* and *why* things work mathematically speaking (not just memorizing procedures), then I have to make time for this type of thinking. (Teaching journal, October 31, p. 50)

This excerpt represents one of this teacher's characteristic dilemmas: weighing translating the curriculum to center children's thinking and understandings against the constraint of time. While the teacher's journal entry acknowledged the mathematical

importance of Darnell's idea, her desire to have the children "test it out" to discover the conditions under which it worked, and her goal of growing the children's conceptual understandings "not just memorizing procedures," she also wrote about the tension she felt due to limited time. In numerous journal excerpts, the teacher seemed particularly concerned about how she would, "...cover all of the required components of the mathematics curriculum..." while still making time to center the children's ideas, discoveries, and to foster their deeper mathematical understandings. In spite of this ongoing tension, journal excerpts show the teacher continued to leverage her discretion to translate the curriculum in response to the rich thinking, questions and understandings that the children brought.

Episode 2: Kaison's Mathematical Experimentation

On a Friday, the children had been identifying patterns in the number of zeros in different powers of ten and creating a class chart to record these patterns. The following Monday, the teacher aimed to provide a synopsis of these patterns, and have the children begin to consider how these new insights might be applied to help them solve problems. The teacher wrote in her journal,

After the kids summarized some of the patterns we discovered on Friday, I put 4×10^3 up on the chart and had kids talk with a partner about how they might solve this. I asked Young Soon⁷ to come up and walk us through her method for solving, both because she has not presented much of her thinking to the whole group yet and because she explicitly stated that we should start with exponents when she was explaining to her partner. After some clarifying questions, the

⁷ Young Soon self-identified as an Asian female and English language learner.

class seemed to agree with her conjecture and justification. However, Kaison said he was curious to find out if we would get a similar answer or something really different if we didn't start with the exponent, but rather with 4×10 . For a second, I was a little concerned about letting him experiment with this in front of the class, because I thought it could possibly confuse others. However, I ultimately decided that it was worth exploring, and that the kids would decide if it made sense or not. Kaison made some computation errors in this work on the chart, but he felt that his method produced an answer that was unreasonable and that it didn't make sense to start with 4×10 . As the children worked and engaged in discourse back at their seats I walked around the room observing. I could not find any evidence that Kaison's experimentation threw anyone off. Conversely, I heard kids reminding each other to work on the exponents first because 'the other way didn't make sense.' (Teaching journal, October 13, p. 36)

The excerpt above represents another characteristic dilemma for this teacher: weighing the possible risks versus rewards of public mathematical experimentation. In this episode, the teacher's tension surrounding the confusion or misunderstanding that might have been caused by this public mathematical experimentation was ultimately overruled by her reasoning that, "...[Kaison's idea] was worth exploring" and that the children were capable of deciding, "...if it made sense or not." Although in this particular episode the teacher's writing seems to claim that Kaison's experimentation increased the collective understanding of the group, decisions like this remained difficult for the teacher as evidenced by her journal excerpts. Translating the curriculum in order to

better meet children's needs by focusing on *their* understandings, questions, and thinking remained complex work for this teacher.

Discussion

Journal entries indicate that the teacher repeatedly utilized her discretion to manage the curriculum to *center children*. However, translating the curriculum to focus on children created a number of tensions for this teacher. A prominent tension evident in the teacher's journal was that the required mathematics curriculum centered *itself*, not the rich thinking, questions and understandings that the children brought. One way the curriculum centered itself was that it "required" the teacher to teach specific, Western-centric, "standard" algorithms, when the children often preferred to utilize "alternative" or non-Western algorithms, or to experiment with self-created strategies or methods instead. The curriculum also centered itself, rather than the rich thinking, questions and understandings the children brought, through its pacing schedule. The curriculum "required" the teacher to complete most lessons in a single class period. However, the children brought their own questions, noticings, discussion topics, and proposed experimentations that were typically in conflict with this curricular pacing. In addition to these tensions, patterns in the journal suggest that numerous, lengthy required assessments for the children, including curricular, local, and state tests, made tensions increasingly complex for the teacher by further limiting her instructional time with the children.

Journal entries indicated that this teacher translated the curriculum aiming to increase children's investigation into their own mathematical ideas and understandings, although it often caused her some level of tension. These tensions surrounded both

time constraints and the possible unintended negative consequences of mathematical investigation. For example, the teacher journaled about her concern surrounding the confusion or misunderstanding that might be caused by public mathematical experimentation even as she aimed to better meet children's needs by focusing on *their* understandings, questions, and thinking at the beginning of the school year.

CHAPTER VI: Concluding Thoughts

In this chapter I return to looking at the patterns of this teacher's practice and discuss what it was about this practice that aimed to disrupt normalized patterns. Many practices in schools, although taken-for-granted, reinforce the ways in which children from historically marginalized groups suffer from systemic racism and oppression. Nowhere is this more evident than at the beginning of the school year. Many taken-for-granted practices that teachers enact at the beginning of the year contribute to the invisible yet powerful perpetuation of oppression. One example would be the emphasis of creating "control" in the classroom at the beginning of the school year. This typically involves creating rules, being firm with children, and disciplining or excluding children who do not "conform" to the rules. A disproportionate amount of this discipline and exclusion routinely falls on children of color.

Another common taken-for-granted emphasis at the beginning of the school year is the focus on review and testing. Oftentimes, as teachers review previous material with students, they explicitly show "correct" or preferred ways to solve problems. Children are rarely given opportunities to explore unbounded problems at the beginning of the year, to employ non-standard methods, or to teach their ideas about problem solving to their classmates. Testing is also routine in mathematics classrooms at the beginning of the school year. One of the common purposes of testing is to sort children

into “ability” groups. Despite the fact that “ability” groups often end up segregated by markers such as race and English language proficiency, few teachers attend to this as they create the groups. Teachers frequently identify one group as the “low ability” group, and this group typically contains a disproportionate number of children of color and English language learners.

Taken together, commonplace practices like these add up to the perpetuation of marginalization as children learn that mathematics classrooms are a place where they must be quiet, replicate specific methods, take tests, conform to the rules, and work alone or in an “ability” group with other children who look like them. This often leaves children feeling not smart and like they do not matter. These normalized practices have become institutionalized. In that institutionalization, they have created a set of structures that, from the beginning of the year, marginalize and oppress children. Because of these institutionalized patterns, any teacher who wants to focus on creating an environment where children who are often marginalized can thrive will face some important challenges.

In my research I set out to study what it would look like if a teacher were actively trying not to subscribe to these practices, but to figure out what to do such that children who are typically marginalized matter, feel valued, are included, and are ready to engage in complex mathematics. This study looked at the practice of one capable, justice-focused teacher to understand how she aimed to disrupt these patterns and what her struggles were in attempting to do this work. What stood out from the data was that across this work she employed a variety of practices that I group together and call *centering children*. What I noticed as the teacher *centered children* was that she

diminished her attention to many of the normalized practices. However, this teacher still struggled with translating her required curriculum, which I will discuss at the end of this chapter. Curriculum is an imperative of schooling, and when this teacher tried to do things differently it often resulted in tensions and complexities.

The findings of this study suggest that aiming to disrupt normalized practices through *centering children* is difficult work. This study showed the complexity of one teacher's work as she tried to do this. As she *centered children* at the beginning of the school year in her classroom she was actively learning about them, listening to their ideas, learning how they interacted, changing the curriculum to be responsive to them, and continuously finding ways to interrupt issues of status that arose. Those practices took her into a space that was disruptive compared to what would be considered normal at the beginning of the school year.

Not only is *centering children* difficult and disruptive work, the findings of this study also suggest that it was both fraught with tension and ongoing. At the beginning of the year when the teacher was attempting to interrupt issues of status in the classroom, no prescriptive surefire solutions existed, causing dilemmas and tension for the teacher. For example, elevating the position of one child often inadvertently lowered the position of another. Furthermore, the teacher's solutions were oftentimes temporary, or were compromises, causing the work of *centering children* to be without full closure. Given all of the complexities associated with *centering children*, it is not difficult to see why a teacher who aimed to act in justice-focused ways also unintentionally reinforced some normalized patterns of practice that are pervasive in schools. Although the teacher was conscious of certain oppressive patterns that exist in

school structures, certainly there were numerous other patterns that the teacher was not consciously aware of.

Schools are well-established structures with histories of reinforcing normalized practices and compliance, so as this teacher *centered children*, it was not an easy task. It was difficult, tension filled and ongoing, yet it had the potential to disrupt inequity and advance justice for children. What was involved in doing this? One thing this teacher was doing was attending to specific ideas that the children had by learning about their thinking. As she was learning about children's thinking, it disrupted the normalized practice of the teacher simply showing the children how to solve problems in mathematics class. Instead, this teacher was eliciting children's thinking and attempting to learn more about them. As she did this, she not only learned more about what the children thought, but also communicated to them that their thinking, wonderings, and brilliance would be central to her attention this year. This is substantially different than a typical classroom where the teacher shows the children again and again a preferred method of solving a problem.

Another practice the teacher was frequently engaged in at the beginning of the school year was foregrounding children's identities. She sought to learn as much as she could about each child in their *own* words, and she viewed each child's identities as highly important. She learned about children's identities and listened to their stories, recognizing that something distinct is formed at the intersection of these identities. This helped her disrupt some of the patterns of inequity that are perpetuated by normalized practices. To learn more about a child at the beginning of the year, normalized practices include a teacher reading the child's CA-60 file, or having the child or their

family complete a form. These practices often reduce the child's identity to a single descriptor, obscuring the child's multiple identities and masking how these identities compound in ways that can either push a child to the margins or privilege them. Typical practice does not include the teacher asking children to openly teach the class about themselves and their identities in their own words, particularly when it comes to race. As the teacher did this, she not only learned more about each child, but it also communicated to children that they mattered, and that their identities were valuable, positive identifiers that enriched the classroom community. It also let children know that they could openly discuss issues like race, gender and class in this mathematics classroom.

The teacher also repetitively strived to position children as competent at the beginning of the school year. Based on a variety of socially-constructed norms some children enter the classroom already positioned as competent while other children do not. Much of this positioning has to do with the confluence of children's identities, and how school structures and mainstream society values or devalues those identities. Since normalized practices at the beginning of the school year do not attend to children's multiple identities, much less the *confluence* of these identities, normalized practices do not adequately support the work of positioning children as competent. This practice helped the teacher disrupt some of the structural racism and oppression in her classroom because it allowed her to see inequities based on constructions of status and social position, and to push back against them helping to elevate the status of children in her class. When the teacher pushed back against these constructions, it communicated to children that they had power and voice in this classroom.

Another practice the teacher engaged in over and over again at the beginning of the school year was learning about children's patterns of work. The teacher actively attended to and tracked on the ways in which children chose to work on tasks and interact with each other. Her continued attention to learning about children's patterns of work helped her notice and act to disrupt the normalized practice of having children work and think predominantly alone in mathematics class and the pattern of children viewing their teacher as the mathematical expert, rather than themselves or their peers. The teacher wanted to orient children to one another's thinking so they could learn with and from each other. She strived to grow a community of collective learning. As she had children do things like present their mathematical ideas to peers, or debate what was or was not mathematically valid, it communicated to the class that they could learn from and with other children because they were smart and possessed expertise. It also helped them see their classmates as partners in learning, rather than competitors.

This teacher also repetitively translated curriculum at the beginning of the school year to *center children*. She interpreted, modified, redesigned or abandoned the curriculum materials in order to increase focus on the children's understandings, questions, and thinking. As she was translating the curriculum, it disrupted the normalized practice of simply teaching the curriculum as written, or only altering it slightly, which is an explicit directive in most schools. Instead, this teacher concentrated on what the children thought, understood, and wondered about, and on "non-standard" strategies or methods that children invented or shared from their home communities. She took up the children's ideas and used them to guide her teaching. As she worked to increase children's investigation into their own mathematical ideas and

understandings, it communicated to the children that their teacher knew they possessed brilliance and that they were capable of deep mathematical thinking and experimentation.

My findings suggest that the practice of translating curriculum was a consistent source of struggle for this teacher. She was in an ongoing state of tension and often encountered dilemmas as she interpreted, modified, redesigned or abandoned the curriculum materials. This tension came from many sources. The teacher was expected to adhere to the curriculum, to teach lessons in sequential order, and to have them completed by certain dates. There were specific algorithms that she was required to teach, and certain mathematical topics that were compulsory for her to cover. Leadership was repeatedly pressing her to develop math “ability” groups to teach the curriculum, which she refused. She was told to administer specific tests that were intended to assess how well she had taught this required curriculum, which she reluctantly succumbed to. Most importantly, she held a commitment to uphold her social contract with children and their families to teach from these curriculum materials.

As the teacher translated the curriculum aiming to center the children’s strategies, questions, thoughts and ideas, additional dilemmas arose. One of her recurring dilemmas was competing interests related to limited time. For every class period the teacher spent focused on increasing children’s investigation into their own mathematical ideas and understandings, there were fewer class periods left for her to cover compulsory aspects of the curriculum. She navigated this dilemma constantly, often weighing affordances and constraints as she made decisions about what to do next. The teacher also worried about possible unintended consequences of the

children's public mathematical investigation, weighing the risks versus rewards of such experimentation. Although she typically deemed children's proposed investigations worth exploring, at the same time she worried about potential confusion that might result. Although her belief in the children's capabilities usually led her to support their public experimentation, it remained a source of tension for her at the beginning of the school year.

Although the component practices of *centering children*, including learning about children's thinking, positioning children as competent, learning about children's patterns of work, foregrounding children's identities, and translating curriculum were difficult for the teacher, she continued to employ these practices throughout the beginning of the school year. The component practices involved in *centering children* may not seem particularly impactful in isolation, but when enacted *together* they can combine to cause a substantial disruption. School structures are set up to center such things as testing, control, curriculum, and sorting of children, and without acting to intentionally disrupt these patterns, teachers play a major part in perpetuating them. In the next section, I turn to considering implications of the work of studying this teacher.

Implications

Using methods of first-person research, this study provides a close examination of one teacher's thinking, tensions, and actions as she began a school year intentionally aiming to disrupt inequity and instead to offer children from historically marginalized groups justice in their mathematics classroom. The findings demonstrate how this teacher leveraged discretionary spaces (Ball, 2018), seeking to deliberately enact what I term *centering children*; that is, she acted on her decisions to focus on children's

identities, learn about children's thinking and patterns of work, position children as competent, and translate the curriculum to focus on children's understandings and foreground their brilliance. This study brought into focus the tensions and dilemmas that accompanied this work for her at the beginning of the school year in a heterogeneous, elementary mathematics classroom.

The beginning of the school year is so impactful that a body of literature exists focused on providing information and advice for teachers on how to begin the year (Bergman, 2010; DeBruyn, 2017; Responsive Classroom, 2015; Wong & Wong, 1998). This body of literature includes common themes such as developing lesson and curriculum mastery, establishing rules and routines, physical classroom set-up and organization, and getting to know students' academic records and interests (Bergman, 2010; DeBruyn, 2017; Responsive Classroom, 2015; Wong & Wong, 1998). The findings of my study offer a new theme, *centering children*, as well as its component parts, to enhance this body of literature. The findings also challenge some of the assumptions about what is most important for teachers to do at the beginning of the school year.

The findings challenge a number of assumptions that pervade normalized patterns of practice. They suggest that justice-focused work is important, demanding, highly complex, fraught with tensions, and ongoing. The findings challenge the notion that teaching with practices intended to offer children justice is simple, prescriptive work that guarantees success or offers closure. The findings also push back against the idea that schooling is so controlled by curricula, testing and rules that teachers lack all discretion to incorporate practices intended to offer children justice. Conversely, the

findings of this study suggest that in spite of these systemic constraints, teaching is still filled with discretion (Ball, 2018), and a teacher's practice includes many spaces for such work. The findings also challenge the idea that a teacher must wait for their school or district to embark on an officially sanctioned "equity transformation" or the like in order to engage in this work in their own classroom. Although a collective, supported, research-informed, sustained effort is certainly ideal, the findings of this study suggest that individual teachers do have power to begin this journey. It would be misleading to claim that an individual journey is easy, but in some environments of schooling it is the only option a teacher may have. A teacher embarking on this journey must both believe in the right things and develop the capacity to do something: to actually act. Saying, "I can't..." or choosing inaction only reinforces the status quo and perpetuates systemic patterns of racism, oppression and injustice that already exist in schools. In spite of the many difficulties and uncertainties that this is likely to cause an individual teacher, I argue that it is still a journey worth taking because it is what is just for the children that we serve.

What Other Justice-Focused Teachers Might Face

This study offers several implications that highlight the struggles that other justice-focused teachers might face. Typically, justice-focused teachers will face systems filled with patterned inequities that cause Black, Latinx, Indigenous, low SES, female, gender-nonconforming, and English language learners to be ignored or silenced. Pervasive systemic injustices position these learners as less capable, and seldom do they get to control the discourse or do the teaching in classrooms. Less attention is paid to what they know and can do, yet oppressive systems in schools often

highlight their deficits. Little value is placed on their thoughts, ideas, or questions, and it is normative that their brilliance is disregarded.

Justice-focused teachers will have to contend with the fact that the greater the number of marginalization markers a child has, the higher their likelihood of receiving this unjust normative treatment, because school structures were designed to position children with multiple marginalization markers this way—as inferior to white, male, English speaking, gender-conforming, middle to upper class children. If teachers are not intentionally teaching in ways explicitly focused on disrupting patterns of inequity, their inaction alone reinforces the normalized patterns of racism, classism, sexism, languageism and genderism that are pervasive in school structures.

Systemic inequities in schools make this oppressive treatment normative and patterned, but for equity-focused teachers, intentional disruption of these normalized patterns in their classrooms may offer a path to teach in ways that can advance justice. To advance justice, education must be explicitly designed to benefit children from historically marginalized groups, and justice-focused teachers are on the front line of implementing this change. Teachers have power to shift the interplay between the teacher, the content, and the children in order to disrupt what is normative and dismantle some systemic constraints.

What Supports Would Help Justice-Focused Teachers?

The individual journey of the subject of this study as a capable, justice-focused teacher who had the support of educational stakeholders was filled with complexity, tension and non-closure. How can our educational community build the capacity to

support teachers in justice-focused work, particularly for those teachers who are already experiencing lack of support in general?

I offer several suggestions. First, I call on teachers to unite to *collectively* enact a journey of justice-focused change to disrupt normalized practice. Teachers, as collective agents of change, are a strong force to be reckoned with. When operating in unity teachers possess increased power to both contend with systemic constraints and to dismantle them. Pervasive systemic constraints must be removed, and collectively, teachers have increased power to do something to disrupt inequities and to instead offer children from historically marginalized groups justice so they can thrive.

Second, I call on the greater educational community to increase its capacity to prioritize, teach, study, and support justice-focused work and teaching practices, and to identify and dismantle systemic constraints *together with teachers*. This greater educational community includes teacher educators, educational researchers, curriculum developers, policy writers, lawmakers, building and district-level administrators, instructional coaches, school boards, educational consultants, children and their caregivers, school community members, social justice advocates, and all others who work to support education. I call on this larger community to pull together as partners to prioritize research, teaching, and policies that disrupt the systems in schools that damage children, in part by better supporting teachers in their frontline, justice-focused work with children.

Third, I call on the aforementioned partners to dismantle systemic inequities in ways that are both informed by research and that offer longevity. Prioritizing, teaching, studying, and supporting justice-focused work and teaching practices is complex and

difficult work. This complex work will need to be both research-aligned and sustained over time in order to offer systemic change that is positive and lasting for children. If this work were straightforward and easy, it would likely already be complete.

Last, I call on the greater educational community to specifically focus on teaching practices that have the potential to advance justice for children. Although teaching for justice is not prescriptive work, this study has brought into focus several components of the practice of *centering children* that may help teachers begin to disrupt systems of oppression. It is not enough for the educational community to tell teachers to recognize injustice and to think about trying different practices to interrupt it. The educational community must support teachers to actually *act* to interrupt injustice, and in order to do this our community needs to develop a rich variety of justice-focused practices *worth enacting*. Although I am not arguing that the component practices of *centering children* that I have articulated in this study are guaranteed to offer children justice, I am suggesting that they warrant continued application and study. I move that the educational community employ and study a wide variety of teaching practices that have the potential to offer children justice, so we can grow our collective knowledge of practices that are worth enacting.

Limitations

There are several limitations to this study. One limitation is that the journal, the main source of data, was not written in the actual act of teaching. Clearly this is unreasonable given the demands of teaching, but it presents some limitations nonetheless. An event that seemed noteworthy and interesting during the act of teaching may have become slightly obscured as the lesson progressed and other

significant events occurred. Although I intentionally minimized this limitation by journaling immediately after instruction, certain experiences I had as the teacher may have become less distinct over time. It is important to recognize that although this record of practice is close to practice, no record is totally complete (Ball, et al., 2014).

Another limitation is that certain aspects of the teacher's thinking were not captured in the journal, such as the teacher's thinking as it relates to confidential student issues. These include a child's special education status, medical background, physical or psychological exceptionalities, or trauma such as abuse or neglect. Confidential issues also include additional aspects such as illness, death, imprisonment, or deportation of a child or their family member, and legal issues concerning the child or their family. The interaction between confidential issues and teaching mathematics in the elementary classroom can be impactful, but they are outside of the scope of this study in order to protect the privacy of the children in this study and their families.

An additional limitation of this study is that it only reflects the work of *one* elementary mathematics teacher as she sought to teach in ways that disrupted inequity and promoted success for children in a heterogeneous classroom. It explored what the teacher faced during the first trimester of the school year as she sought to foster mathematical understanding for one group of students in a Midwest classroom.

Contributions to the Field

This study will help increase outsider understanding of what it is like *on the inside* when teaching in ways that seek to disrupt inequity and promote justice for children. No matter how carefully and deeply an outsider immerses themselves in the experiences of a teacher, the outsider's perspective will never be analogous to the perspective of the

teacher. Therefore, this study will offer unique insight into a teacher's thoughts, motivations, tensions, considerations, decisions, and perspectives as she seeks to teach in ways that promote success for children from marginalized groups in her heterogeneous classroom. This study offers a distinct teaching record, contributing an important and often unacknowledged perspective on practice.

I also hope that this study will help expand and evolve the genre of first-person research by discussing issues of identity and how they intersect with teaching mathematics in the elementary classroom. Identity includes but is not limited to race, ethnicity, language, socioeconomic status, gender identity, and place of origin. Issues of identity are rarely taken up in first-person studies conducted by elementary mathematics researcher-teachers. Journaling about identity pushes back against dominant cultural norms but is worth engaging in and studying because the interaction between aspects of identity and mathematics in the elementary classroom are both complex and impactful.

The results from this study will provide the teacher education and mathematics education communities with an analysis of the work of an elementary mathematics teacher as she seeks to teach in ways that disrupt inequity and promote success for children from historically marginalized groups in a diverse classroom. Through detailed examination of a single case, this study makes explicit some of the current complexities associated with teaching elementary mathematics for understanding to a heterogeneous group of children. The study does not seek to offer generalizable answers to all of the issues that an elementary mathematics teacher could face but instead offers perspective on how some of the most pressing issues that occur at the

beginning of the school year are thought about and approached by a capable, experienced, justice-focused, elementary mathematics teacher. Through this study, I develop and share insight about the broader struggles that teachers might encounter as they attempt to position all of their students as capable learners and doers of mathematics. I hope this study will raise further questions about the nature of teaching elementary mathematics, as well as questions about the intricacies surrounding the study of a teaching practice aimed at disrupting inequity and promoting justice for children.

APPENDIX A

Example of a Coded Teacher Journal Page

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Lake eventually asked Darnell if this strategy would work every time (which I loved!). The kids seemed unsure,⁸ so I expressed that we should actually test it to see if it is mathematically valid or not. I selected an example that I knew would work, but suggested that we would need to test this further before deciding if it always worked or not. Although I was not planning this, I was thrilled that it came up! We need more time to work on testing it out later this week.

On one hand I wonder how can I make time for this when I struggle to find the time to cover all of the required components of our mathematics curriculum.⁹ On the other hand, I know that I need to make time for this because it is an authentic and interesting idea to explore. If my goal is truly to encourage the children to think about *when* and *why* things work mathematically speaking (not just memorizing procedures), then I have to make time for this type of thinking.¹⁰

I also believe that exploring Darnell's strategy will help to position him as competent.¹¹ He is a Black, Indigenous boy and he is here by school of choice...he has shared with me numerous times that he feels he arrived in our district 'way behind' and is 'not good at math'.¹² I can completely relate to this. Having moved from Detroit to Ann Arbor as a teen I felt the exact same way.

⁸ Learning About Children's Thinking

⁹ Tension or Dilemma

¹⁰ Translating Curriculum

¹¹ Positioning Children as Competent

¹² Foregrounding Children's Identities

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