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Teacher's Narratives: Navigating Culturally Responsive Teaching in Upper Elementary Mathematics Classrooms

LaToya Byrd

ACCEPTANCE

This dissertation, TEACHERS' NARRATIVES: NAVIGATING CULTURALLY RESPONSIVE TEACHING IN UPPER ELEMENTARY MATHEMATICS CLASSROOMS, by LATOYA M. BYRD, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Education, in the College of Education & Human Development, Georgia State University.

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TEACHERS' NARRATIVES: NAVIGATING CULTURALLY RESPONSIVE TEACHING IN UPPER ELEMENTARY MATHEMATICS CLASSROOMS

by

LATOYA M. BYRD

Under the Direction of Dr. Shonda Lemons-Smith

ABSTRACT

This qualitative study explored the experiences of teachers implementing culturally responsive teaching practices within four upper elementary mathematics classrooms. The teachers self-identified as being culturally responsive teachers who attended a voluntary district training on culturally responsive teaching. The purpose of this study was to describe the experiences of upper elementary mathematics teachers' implementation of culturally responsive teaching. The research questions addressed were: In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching? How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms? This narrative inquiry allowed the researcher to co-construct stories with the participants about their experiences facilitating culturally responsive teaching in 3rd-5th grade mathematics classrooms. The data collection consisted of multiple semi-structured teacher interviews with open-ended interview questions, in combination with analyzing the researcher and participants' journals, classroom observation

notes, and classroom documents to describe the experiences of each teacher. The researcher used the narrative approaches: thematic and performative for a thorough examination of teachers' experiences. Participants explored their understanding of culturally responsive teaching (CRT) as well as their experiences. An analysis of the data revealed that the participants' understanding of CRT included: a) cultural decontextualization of mathematics disadvantages minority learners; and b) culturally responsive teaching in mathematics is effective in promoting educational equity in diverse classrooms. The analysis further revealed that the participants negotiated CRT by: c) teaching the whole child in a positive and academically challenging environment; and d) promoting student engagement and success by in mathematics by connecting to students' lived experiences. The findings of this study have implications for school leaders and teachers who desire to support culturally responsive teachers or to become more culturally responsive in their mathematics classroom.

INDEX WORDS: Narrative inquiry, Teacher narratives, Culturally responsive teaching, Elementary mathematics

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DEDICATION

I dedicate this dissertation to my lifelines, also known as Tremayne and Bryce Byrd. Thank you for being you and loving me unconditionally. You both make me strive to be a better person each and every day. Thank you for your continued support and for never leaving my side. I also dedicate this dissertation to my mother, Cheryl Morgan. Thank you for instilling in me a love for learning. Thank you for your unceasing encouragement and inspiration throughout my schooling experience, teaching career, and personal life.

XOXO- Forever Ever

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Finally, I am thankful to my teacher participants for their willingness to share their classrooms, stories, and experiences as culturally responsive teachers and openness throughout the process. I have sincerely enjoyed working with and learning from each of you.

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CHAPTER 1 INTRODUCTION

I got the job! Before I officially graduated from Georgia State University (GSU), I received my first job offer at a local middle school. I would be teaching seventh-grade mathematics and social studies to a team of students who had never passed a standardized assessment. I was excited and literally ready to change to the world, one class at a time. As a first-year teacher, I was asked to talk about culture as much as I could during social studies instruction. There was no rationale or guidance given, but that was the known expectation. No one ever followed up to see if I needed support or if I even knew what it meant to talk about culture. Year two came around quickly for me, and I received the same directives about including students' cultures. The difference with my second year was that I was now the only mathematics teacher on the grade level. A colleague told me that I should be happy because I no longer had to worry about including culture. Luckily for me, as a second-year teacher, I was also entering graduate school at GSU. I took a multicultural education course that required us to explore educational reforms concerning race, ethnicity, culture, gender, and diversity. Through this course, I was able to gain knowledge about incorporating culture into various content areas. Unbeknownst to me, my GSU professor was employing culturally responsive instructional practices. The cohort worked collaboratively to solve problems, and we were given group projects tailored to our interests. My professor instilled in me that I was a brilliant African American mathematics teacher and learner.

I started my third year of teaching with a new perspective. I knew that my focus should be on creating a positive classroom community. I wanted to learn from my students as much as I wanted them to learn from me. To do this, I had to include the cultures of the students who were in my class because I was seeking to be a culturally responsive teacher. I wanted to "utilize students' culture as a vehicle for learning" (Ladson-Billings, 1995). I did what I could on my own, but I did not have anyone around me with whom I could relate. Many of my colleagues were

knowledgeable in their content area but were not prepared to work with culturally diverse student populations. No one understood why my classroom had a different look with student-led centers and student roles that students took seriously. I maintained positive relationships with my students by modeling mutual respect. It was our classroom, and we worked on creating an engaging and welcoming climate. My personal experiences were leveraged to make personal connections with students. As year four of teaching approached, I was elated because I would no longer be considered a new teacher. This was when I decided to become a teacher leader. I spoke to my colleagues about the importance of being a part of the classroom and valuing the input and lived experiences of students. Through positive relationships, I could teach my students anything! We were departmentalized, so we all taught different subject areas. It was nice to collaborate with others and work towards collectively changing the norms of the school.

My personal experiences with cultural responsiveness led me to this research. My colleagues and I had vastly different experiences, although we were collaborating together and considered ourselves culturally responsive educators. At the time, we utilized three of Gay's (2010) four aspects of culturally responsive teaching: caring, communication, and instruction. We felt that we were not adequate enough to take on the curriculum. Some students immediately took ownership of their classroom and classroom norms. They were excited to learn more about their classmates while also sharing their outside of school experiences. Other students were not interested. They seemed to get aggravated whenever there was a deviation from the textbook. As a team, we discussed both students and content when we realized that some students may thrive in mathematics and shut down during science. The conversations left us with more questions than answers. Mainly, we wanted to know if there was something that we were doing that caused students to respond to us differently. As the year came to a close, we decided to continue our work

the following year and jot down notes about each class that we could review during our common planning time. We were committed to learning about our students and their communities since none of the teachers on my team, or myself, lived in the community. Our goal was to use social connections with students and students' families to meet the academic needs of our students.

Unfortunately, that next year, many of us left the school for various reasons. The team we worked so hard to build was breaking up. I felt bad because there would be a new team that did not know about the work that began before they started working at the school. So many positive relationships were developed with students and their families, in addition to the connections made by incorporating students' lived experiences in the classroom. Student engagement increased when students used choice boards to select a task to work on in all content areas. Students selected a task of interest, but all of the tasks were aligned to the current content standards. Reflecting on this time, I wish there were records or notes kept that could have helped the new teachers continue the work. "Stories are powerful means for people to establish bridges across other factors that separate them" (Gay, 2010, p. 3). There were meaningful cross-curricular cultural and community conversations that drove the work. Descriptions of conversations and the work of teachers are important to learning and understanding more about the day-to-day interactions and experiences of teachers.

Problem Statement

Diverse learning environments include students with different cultural heritages and ethnic identities. Students who enter mathematics classrooms should not be expected to leave their social and cultural backgrounds at the door. For that reason, culturally responsive teaching practices have been suggested as an approach for incorporating students' cultural backgrounds into classroom learning experiences (Ladson-Billings, 1995; Gay, 2002). Culturally responsive teaching (CRT) unpacks the overarching problem of homogenizing heterogeneous student populations

(Gay, 2010). Some teachers are being asked to include culturally responsive teaching to meet the needs of diverse classrooms. Classrooms should be positive, inclusive learning environments for all students. The importance of culturally responsive instruction lies in its transformative potential for more meaningful student learning when academic knowledge is situated within the lived experiences and frames of reference of students (Gay, 2002). Through this research, I learned about and described opportunities that teachers and students have in upper elementary mathematics classrooms to construct cultural and academic knowledge through teacher narratives. There is a need to document how teachers define CRT. This documentation could be used to support other culturally responsive teachers or teachers who aspire to include culturally responsive teaching in their mathematics classrooms. More examples are needed for what CRT looks like in mathematics classrooms.

Purpose and Research Questions

The purpose of this study was to share the stories of the ways that upper elementary mathematics teachers describe their understanding of culturally responsive teaching (CRT). I wanted to share teachers' experiences of CRT as well as how they implement CRT based on their knowledge of CRT. Research about the experiences of teachers learning, preparing, and implementing CRT is limited. Teacher narratives of activities and interactions within a culturally responsive mathematics classroom setting can inform teachers, administrators, and stakeholders about negotiations that may support or impede their enactment of culturally responsive teaching practices.

The research questions guiding this study were:

1. In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching?

2. How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms?

Significance of the Study

The racial diversity in school environments represents a challenge for some schools and a cultural shift for others. An overall look at how teachers adapt their pedagogic procedures to account for the cultural diversity in their classrooms is needed. Dead Prez (2000) asserted that teachers often failed to recognize the problems of minority students, and thus attempted to teach them lessons that were irrelevant, neglectful, or even disrespectful. Lessons like the ones taught in mathematics classrooms should teach the students how to evaluate and solve problems. When the students' cultures are included, they can solve real-life problems that they can relate to instead of focusing on theoretical issues (Royal & Gibson, 2017). Teachers are being asked to rethink how they teach mathematics, but little attempt is made to discover what those experiences are like for the teachers. Larnell, Bullock, and Jett (2016) outline the evidence pointing towards the benefits of implementing culturally relevant pedagogy in mathematics. Among those benefits, Larnell, Bullock, and Jett (2016) noted a considerable improvement in the quality of teaching and a better experience for both mathematics teachers and students. What was it about those lessons they studied that they believed led to an improvement in their teaching practices? Although my study does not focus on teacher improvements, I want to describe how much work it takes to infuse culturally responsive practices in a mathematics classroom using teachers' experiences.

My study is significant because more teacher narratives about how mathematics teachers in grades 3-5 define cultural responsiveness and their subsequent experiences implementing culturally responsive teaching could encourage more teachers to implement a framework that benefits all students (Banks, 2008; Nieto, 2000). By gaining perspectives on how this group of upper

elementary mathematics teachers understands culturally responsive teaching, knowledge was gained to uncover what is needed to increase the use of these teaching practices in mathematics classrooms. These practices encourage teachers to provide students with opportunities to operate in and enhance their ways of communicating, interacting, doing, and thinking into the learning process (Gay, 2000; Ladson-Billings, 1994). Research on the use of instructional practices consistent with culturally responsive teaching (CRT) emphasizes teachers' ability to validate and affirm students' cultural differences and to see those differences as a catalyst for learning instead of deficits impeding learning (Gay, 2000; Ladson-Billings, 1994; Villegas & Lucas, 2002). Documenting those experiences from the lens of the teacher gives us more insights into how those experiences made the teachers feel, and if those feelings encouraged them to continue to use those practices. My research presents concrete examples of CRT through the teachers' lens and perspectives intentionally ensuring that the focus of the study is on their definitions of CRT and their classroom narratives. My study, exploring how upper elementary mathematics teachers describe their understanding of culturally responsive teaching and how they negotiate their understandings in the classroom, can enrich appreciations of current classroom experiences, as well as support the continued development of models that are beneficial to both teachers and students.

Definition of Terms

For the purposes of this study, the following terms were defined as:

Culture: Students' values, beliefs, motivations, and social groups and norms (Gay, 2010).

Culturally Relevant Pedagogy (CRP): Using the following principles to meet the intellectual and social needs of minority students: 1) treating students as competent; 2) providing scaffolding so students can build from prior knowledge; 3) demonstrating high-quality instruction; 4) possessing an in-depth knowledge of students and content; 5) extending students thinking abilities; and 6) linking content to students' cultural practices (Ladson-Billings, 1994).

Culturally Responsive Teaching (CRT): "Using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant and effective for them" (Gay, 2000, p. 29).

Diversity: Visible (race, gender, language, ethnicity) and invisible (religion, ability, social class, sexual orientation) differences from the mainstream culture as well as age, physical appearance, political orientation, and regional or geographic home (Nieto, 2013).

Negotiate: a thought process or action taken that involves using culturally responsive teaching for mathematics classrooms.

Summary

Many teachers work hard to understand and learn how to teach mathematics in addition to acknowledging the diverse ethnic and cultural backgrounds of students in their classrooms. Culturally responsive teachers desire to use their students' cultural experiences to enhance the classroom environment. Developing these traits and skills, however, requires an ability to think critically about possible stereotypes, attitudes, and behaviors that may impact their ability to create positive teacher-student relationships. Culturally responsive teaching practices have relevance and meaning to students' social and cultural realities. Narratives from teachers about how they navigate these realities can paint a picture of what it takes to be a culturally responsive teacher. Years ago, I missed the opportunity to share my culturally responsive experiences. This study was a space for me to document the experiences of four upper-level mathematics teachers who self-identify as being culturally responsive teachers.

My beliefs are grounded in two frameworks - culturally relevant pedagogy and culturally responsive teaching; however, culturally responsive teaching was utilized for the purposes of this study. The remainder of this study consists of four more chapters. I offer a literature review in Chapter 2 concerning literature that is relevant to and has informed the questions put forth in this

introduction as well as a methodology for data collection and analysis in Chapter 3. The results in Chapter 4 is where I share the narratives of the participants and myself and with the discussion in Chapter 5 being where I present an overview of the study, the conclusions, and recommendations for future studies. The references and appendices conclude the study.

CHAPTER 2 REVIEW OF THE LITERATURE

Students enter classrooms with the knowledge that is gained through lived experiences. Culturally responsive teachers acknowledge those experiences and try to understand the diverse ethnic and cultural backgrounds of students in addition to teaching their required content. Teachers who are culturally aware also help students discover that they can uphold high standards of excellence without compromising their cultural identity (Ladson-Billings, 1994); thus, culturally responsive teaching (CRT), gives all students an equal chance at academic success (Nieto, 2000). Mathematics teachers cannot overlook the effect that culture has on students' learning experiences; they find ways to implement instructional practices that are culturally responsive for all students. Through such teaching practices, teachers can use what is familiar to students as a frame of reference and connect it to mathematical knowledge.

In my study, how four upper elementary mathematics teachers define and negotiate culturally responsive teaching was described. This literature review focuses on the theoretical lenses I used to answer my research questions, background on culturally relevant pedagogy and culturally responsive teaching, empirical studies, gaps in the literature, and affordances.

Theoretical Framework

Cultural diversity in the United States has increased and reflects in school enrollment with higher numbers of Latino, African American, and Asian students. The Black and Hispanic populations have grown at a more rapid rate than the total population. A survey conducted by the National Center for Education Statistics (NCES, 2014) states that the proportion of Latino and Asian students in schools continues to increase as the population of white students decreases. According to this study, the white student population in American schools will reduce to about 35% by 2060 (NCES, 2014) while the population of students of color will increase to 57% (U.S. Census Bureau, 2012). As these trends continue, stakeholders (policymakers, community, and

educational leaders, parents, etc.) are charged with ensuring an equitable education for all students. An equitable education requires some sensitivity regarding the factors that may impact the culture of mathematics classrooms of culturally diverse students.

Two frameworks in the field of cultural diversity and education are *Culturally Relevant Pedagogy* (Ladson-Billings, 1994) and *Culturally Responsive Teaching* (Gay, 2000). My study utilized culturally responsive teaching (CRT) as a framework; however, this literature review also includes research on culturally relevant pedagogy (CRP) as it is important to review the research on both frameworks (see Figure 1). CRP, as defined by Ladson-Billings (1994), "empowers students intellectually, socially, emotionally, and politically using cultural referents to impart knowledge, skills, and attitudes" (pp. 16–17), also extending to collective empowerment. This empowerment can change mindsets; thus, influencing both thinking and actions. Classroom teachers are asked and encouraged to broaden their sociocultural consciousness, which refers to the awareness that people have varied worldviews, and those perspectives are influenced by life experiences (Villegas & Lucas, 2002). More time and effort can also be given to their stances on educational and social inequalities that are considered integral to the empowerment process (Ladson-Billings, 1995). Gay (2010) describes culturally responsive teaching as including the knowledge of culture, prior experiences, frames of reference, and performance styles of students to make learning encounters more relevant and effective for them. While Gay's (1975, 1980) earlier work focused more directly on formal curriculum, her literature and additional work on culturally responsive teaching have evolved to embody the roles of teachers and their instructional practices (Aronson & Laughter, 2016).

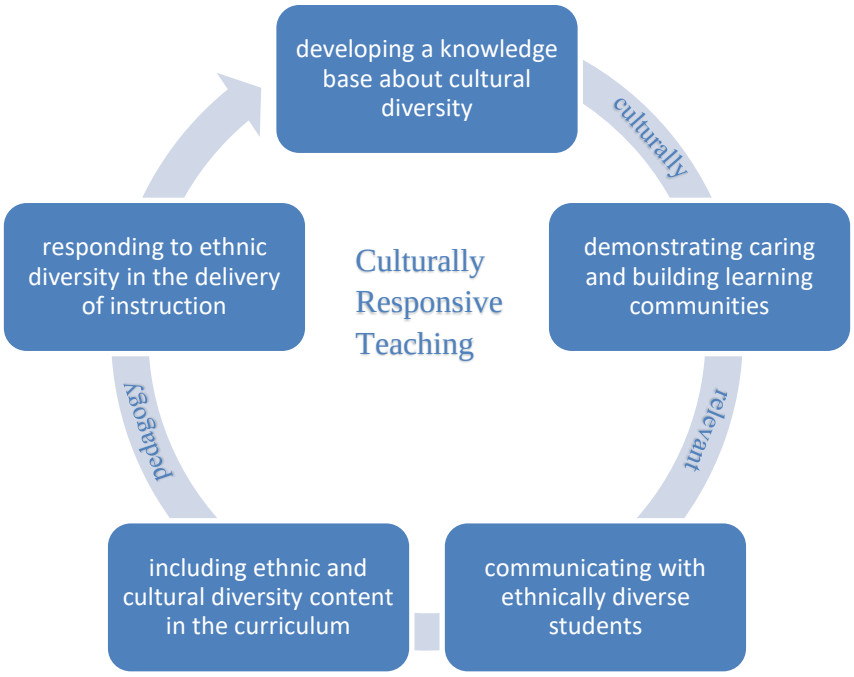
Culturally relevant pedagogy and culturally responsive teaching both developed in response to the educational disadvantages experienced by Black students and ethnic minority

groups; therefore, the literature for both frameworks focuses primarily on racial and ethnic dimensions of culture. Understandings of culture are evolving and encompass many dimensions beyond race and ethnicity (e.g., gender, socioeconomic status) and acknowledge membership to multiple cultural groups (Howard & Rodriguez-Minkoff, 2017). The understanding and research of culture continue to be shaped by political and historical contexts. Some pedagogies that recognize the value and importance of the culture of non-White students are culturally congruent (Mohatt & Erickson, 1981), culturally appropriate (Au & Jordan, 1981), culturally compatible (Jordan, 1985), and culturally sustaining (Paris, 2012). In their frameworks, Ladson-Billings (1994) and Gay (2010) identify the classroom as the main space for social justice and change, and they give emphasis to the significance of teachers' beliefs and practices in creating these spaces.

Students and teachers enter classrooms with the knowledge that they have constructed based on their cultural lenses and lived experiences. What happens when teachers know about and value these cultural lenses and experiences? What happens when teachers link students' home and school lives to mathematical content? What affordances or constraints are teachers presented with when attempting to access these cultural lenses during mathematics instruction? In this study, I described the experiences of four upper elementary mathematics teachers as they negotiate their experiences teaching mathematics using culturally responsive teaching practices. Too often, individuals from diverse backgrounds are expected to abandon their home cultures and assimilate into the mainstream culture (Sleeter, 2001). Researchers have stated that the experiences of teachers influence their behavior(s) in the classroom (McCray, Sindelar, Kilgore, & Neal, 2002). These influences can be seen within and between school segregation (Gay, 2002; Kozol, 2005). Teachers' pedagogical practices allow for the creation and facilitation of inclusive environments for all students (Gay, 2013; Ladson-Billings, 1995).

Figure 1

Culturally Responsive Teaching Practices



Note. The arrow in the figure represents the knowledge of culturally relevant pedagogy (Ladson-Billings, 1994) and how it flows through Gay's (2000) culturally responsive teaching practices.

Resistance to Culturally Relevant Pedagogy and Responsive Teaching

There have been many objections to, and questions raised about culturally relevant pedagogy (CRP). For the purposes of my study, culturally relevant pedagogy is seen as a foundation of culturally responsive teaching, so I felt that these objections would also be made for culturally responsive teaching. It is important for teachers to understand the resistance to culturally responsive teaching from opponents, so they are more self-confident and knowledgeable in implementation (Gay, 2013). The most resistance stems from the connection between culturally relevant pedagogy and academic achievement. Ladson-Billings (2006) voiced her concern and regret in using the term "academic achievement" when she conceptualized the theory. This is in part because educators immediately associated academic achievement with student test scores. What

Ladson-Billings intended, however, was that CRP would allow for and encourage skilled teachers to be facilitators of student learning (Ladson-Billings, 2006). Academic achievement is about students learning and teachers teaching in a way that cultivates learning opportunities that connect students to the content. Student learning will not always show up on a standardized assessment because not all of the learning will be assessed. Hirsch (1987) and Ravitch (2003) questioned whether or not culturally relevant pedagogy was rigorous enough and claimed that students would not have access to culturally neutral content like reading, writing, and mathematics. As Ladson-Billings (1997) articulates, mathematics is neither "culture free" nor all about memorizing formulas and gaining problem-solving conceptions. There is more to it, and the cultural aspects in schools make a difference in how different students perform in mathematics.

Also, there is a critique that cultural relevance is only for students of color. Irvine and Armento's (2000) research shows that culturally relevant teaching is not new. Culturally relevant teaching has been in United States (U.S.) schools for people who were born in the U.S., are middle-class, English-speaking, and White. This is also the reason Irvine and Armento assert that White middle-class students have performed better in school and on standardized assessments. Some scholars believe that more emphasis is needed in the area of culture through a sociocultural approach by connecting curriculum and its pedagogy since they are grounded in the historical and current particulars of students' everyday lives (Gutierrez & Rogoff, 2008; Lee, 2007; Nasir, 2002). Mathematics has a history of being a "gendered and racialized experience" (Leonard et al., 2010, p. 262); therefore, culturally responsive teaching is important because it can be utilized to assist all students in developing a positive mathematics identity.

Why Culturally Responsive Teaching?

Culture is intertwined with who we are and how we interact with other people. Interestingly, culture also shaped thought processes and communications. Historically, cultural differences have been viewed using deficit thinking and seen as barriers to learning. Schmeichel (2012) offers, "*cultural deprivation* or *disadvantage* was the frame used to describe children of color within the literature in the years immediately following the Brown decision" (p. 214). Rather than valuing students' cultural experiences, the differences that existed between "mainstream culture" and students of color were perceived as "a gap" that needed to be filled (Schmeichel, 2012). Students and teachers negotiate between their home culture and school culture. When cultural differences are treated like deficits, many important strengths, prior knowledge, and experiences may be overlooked in the classroom. Knowledge is based on our lived experiences, which are influenced by culture. We choose to accept or reject the various forms of knowledge based on whether they match or support cultural values, beliefs, norms, and practices (Gay, 2010). Culture can be seen through things like behaviors, food, language, and clothing. This is in addition to being influenced by cultural values, practices, and attitudes on a daily basis. Students' cultural experiences influence how they think, act, and respond in learning experiences; therefore, mathematics "is situated within a cultural context" (Leonard et al., 2010, p. 262).

Both culturally relevant and culturally responsive pedagogies "recognize the salience of student culture, both contend that the affirmation of students' identities is important, and both advocate for student achievement to occur without compromising cultural integrity" (Howard & Rodriguez-Minkoff, 2017, p. 7). Ladson-Billings' (1995, 2001) work lays the foundation for cultural relevance by combining culture and pedagogy from a critical race lens. The focus is on ped-

agogy while primarily seeking to influence attitudes and dispositions that would determine planning, instruction, and assessment. Culturally relevant pedagogy is a way of being or way of thinking that then manifests into ways of doing (Aronson & Laughter, 2016). So, culturally relevant pedagogy affects attitudes and dispositions, whereas culturally responsive teaching affects competence and practice. I chose to center my study on Gay's (2000) work on culturally responsive teaching because the focus is on teaching and primarily seeks to influence competency and methods by describing beneficial strategies for teachers to use in culturally responsive classrooms. My study is focused primarily on sharing the descriptions of and experiences with culturally responsive teaching in mathematics.

Culturally Responsive Teaching

The National Council of Teachers of Mathematics' equity principle (2003) asserts that teachers should support and set high expectations for all students. Discussions centered around the best method of educating a diverse population have changed over time. Researchers have recommended multicultural education (Nieto, 2000; Sleeter, 1989), culturally relevant pedagogy (Ladson-Billings, 1995), and culturally responsive teaching (Gay, 2000, 2002) as ways to meet the needs of all students. Culturally responsive teaching is founded within critical theory and critical pedagogy with ideologies and practices that seek to further social justice and equality through teaching and learning (Freire, 2000; Ladson-Billings, 1995, 1998; Ladson-Billings & Tate, 1995).

Culturally responsive teaching is affirming and validating by displaying varied ways of knowing, interpreting, and portraying information (Gay, 2000). Instruction that is culturally validating assists students in developing a positive self-efficacy and the ability to see themselves in the learning process (Bonner, 2014; Gay, 2000; Ladson-Billings, 1994; 1995). Such instruction utilizes student characteristics and experiences as a conduit for learning resulting in all cultures

being equally exemplified and embraced. Culturally responsive teachers create learning communities that welcome parental and family involvement. Families that are invited to share their knowledge with the school community provide teachers with an insightful view of students' prior experiences, knowledge base, educational abilities, and preferred learning experiences (Gay, 2000; Ladson-Billings, 1995; Moll et al., 1992). Likewise, culturally responsive teachers cultivate learning communities that foster positive interrelationships among students, their families, peers, teachers, administrators, other school personnel and community members (Banks, 2008; Gay, 2000; Irvine & Armento, 2000; Ladson-Billings, 1994, 1995; Nieto, 2000).

Culturally responsive teachers have positive classroom interactions while utilizing learner-centered, small group discussions, and active instructional methods. The primary role of the teacher is to facilitate the learning process by linking the curriculum to students' cultures. Culturally responsive teachers are suitable for all learners, including students whose culture is prevailing in public schools (Sleeter & Cornbleth, 2011). Culturally responsive teachers also have a set of skills that allow them to reach students inside and outside of the classroom by having high expectations and using inquiry-based and student-centered practices (Villegas & Lucas, 2002).

Culturally responsive teaching requires instructors to redesign the curriculum by incorporating ethnic and linguistic traits of students in the curriculum. In addition to the textbook, interdisciplinary lessons and activities reflect students' backgrounds. Many countries have experienced immense globalization, and according to Aceves and Orosco (2014), the proportion of culturally diverse students in the U.S. had increased to 48% in 2011, and it continues to increase over time. Bearing this in mind, teachers can strive to possess cultural competence to ensure effective institutional practices. Gay (2010) wondered why students of color who were successful

in so many areas outside of school were failing in school settings. Differences in race and ethnicity cause cultural gaps between students and teachers, and if not well handled, the disparities can affect student achievement (Ladson-Billings, 1995). These multiplicities can be viewed as steppingstones to dynamic teaching and learning. An important quality of culturally responsive teaching is improving equity and instruction for more authentic learning experiences and higher achievement outcomes (Gay, 2010). With cultural knowledge concerning different student backgrounds, teachers can interact more with students and form an environment conducive for everyone to learn. These culturally responsive instructional practices embody constructivist teaching, where the classroom environment contains meaningful tasks, time for investigating in those tasks, and opportunities for students to justify and explain their thinking. Teachers authentically link what students already know and have experienced in their everyday lives to the mathematical goals they have set for themselves. By linking students' language and culture to the mathematics content, teachers can provide all students with quality mathematics education. Students' cultural experiences influence how they think, act, and respond to learning experiences.

Culturally Responsive Teaching in Practice

Teacher and student beliefs about culturally responsive teaching. Irvine (2002) interviewed African American teachers who facilitated culturally responsive teaching practices. These teachers described their beliefs about culturally responsive teaching. For them, teaching is caring for the whole student by providing honest feedback about their performance and using culturally specific instruction. Teaching also requires educators to engage in 'other mothering' or a feeling of kinship toward their students. Teaching is believing in one's own instructional practices and ability to influence the achievement of students. Lastly, teaching is maintaining high expectations for all students, and teaching is a calling with a special purpose. Another study with high school mathematics teachers who incorporated culture in a mathematics course, engaged in

critical reflection about their beliefs (Parker et al., 2017). The findings from this study revealed that the participants changed their perceptions about mathematics teaching by expressing the importance of getting to know their students and contextualizing mathematics.

In a 2009 case study, Sullivan gathered data over a three-month period of five culturally responsive classroom teachers and their students. The data sources were classroom observations, teacher and student questionnaires, and teacher and student interviews. Culturally responsive instructional and classroom management strategies used to support the communication and cognitive styles of African American male students were examined. According to Sullivan (2009), cultural responsiveness was seen in teachers affirming students' identities and having a genuine concern for the academic welfare of African American male students. Sullivan's study showed that culturally responsive teaching practices had a positive impact on their academic success, and teachers can connect with students' cultures in a variety of ways.

Morrison, Robbins, and Rose (2008) described the actions of teachers in 45 classrooms when implementing a culturally responsive curriculum. High expectations, cultural competence or student prior cultural knowledge, and critical consciousness or awareness of power and privilege were the three themes that emerged from their culturally responsive curriculum study. Additionally, each theme was broken down into subcategories. High expectations had five subgroups, prior cultural knowledge had three subgroups, and critical consciousness had four subgroups. They concluded that none of the teachers used all 12 competencies as they related to the subgroups, but each teacher consistently used a few of them. The findings revealed both the troubles and successes of the teachers. What was missing from this synthesis were teacher narratives. There is a need to expound on the experiences of teachers to better understand some overall areas of strength and areas for growth.

Culturally responsive teaching in mathematics. Eight elementary classroom teachers from public and private schools across Colorado were interviewed for an article on culturally responsive teaching in mathematics (Harding-DeKam, 2014). Teachers were identified by peers and administration as being culturally responsive teachers. Teachers shared their knowledge of their students' home and community life, defined culturally responsive teaching, and gave examples of how students learn math through culture in their classrooms. Findings from two semi-structured interviews, classroom observations, and student artifacts revealed that teachers have thorough cultural knowledge of the students in their classrooms. These teachers also defined culturally responsive mathematical practices consistent with research, used culturally responsive teaching in mathematics for authentic learning, and express a need for additional professional development and curriculum support for culturally responsive mathematics instruction. Authentic mathematics learning and caring also took place when teachers linked the concept of factoring numbers to the role of family and relationships within African American culture (Bonner, 2014; Bonner & Adams, 2012; Cholewa et al., 2012).

Teachers' voices were included in Bonner's (2014) study of three successful mathematics teachers who had different teaching styles with their predominantly African American students. One teacher required students to keep a math journal as one of their tools for learning. Students would start journaling and chanting as they learned the concepts that they put in their journals. She used movement, song, and choral response chanting in the tradition of the African American church. Another teacher used differentiated learning centers, where students rotated around the room, and a third used a high-tech classroom design with centers including prerecorded teacher-made lessons on a classroom computer, exercises on the whiteboard, and small group work while

she served as a facilitator. In this grounded theory study, Bonner developed a theoretical framework for the application of CRT in math classrooms, which began with getting to know the students. Studies that included instructional engagement described a variety of student responses to their teachers' emphasis on culture. Student feedback included increased interest, enjoyment, and confidence in mathematics (Bonner 2014; Corp 2017; Shumate et al. 2012).

Connecting language and mathematics. According to Gutiérrez (2002), for many Latinos, speaking Spanish was part of their cultural identity. Still, not all Latinos were proficient in Spanish, nor was mathematics a culture-free and universal language. Gutiérrez examined teachers' implementation of CRT through interviews and observations. The teachers recognized that students' speaking to each other in their first language while solving problems in small groups helped students learn their mathematics. The three math teachers, two of whom were not fluent in Spanish, viewed the use of the Spanish language as an asset to making math class more productive since students were able to understand and explain math problems while speaking English and Spanish. The collaborative grouping was also a culturally responsive way for the non-White students to interact and learn. Gutiérrez concluded that effective teachers of Latinos did not have to be bilingual or trained in language acquisition; students in these classrooms became more productive and competent in higher-level mathematics when using Spanish to access difficult concepts in collaborative learning groups. Similarly, teachers in a special education setting also provided opportunities for their Latino students to work collaboratively with mathematical language and problem-solving to increase their engagement and learning (Shumate et al., 2012).

The aforementioned studies provide insight into the knowledge and implementation of culturally responsive teaching in mathematics. Culturally responsive teachers know their students well and use what they know about their students to give them access to learning (Villegas

& Lucas, 2002). To that end, more studies on the experiences of culturally responsive teachers would give an inside view and detailed descriptions of today's classrooms.

Gaps in the Literature

There is a need for more qualitative research that seeks to more fully acknowledge the complexities of incorporating culturally responsive teaching in classrooms (Morrison, Robbins, and Rose, 2008). More specifically, there is a gap in the literature regarding culturally responsive teaching in elementary mathematics classrooms. Additional studies are also needed to address the role of culture in mathematical knowledge construction and the political climate in which teaching and learning are situated (Matthews, 2008). Technology has extended to every aspect of life, and this includes education. In recent years, more secondary schools have adopted one-to-one (1:1) student-to-computer ratios in high school (Dunleavy & Heinecke, 2008). There is a gap in the literature regarding teacher experiences implementing culturally responsive teaching with 1:1 devices in elementary mathematics classrooms. Also, the existing research focused on web-based instruction rather than teacher beliefs. Studies have shown that teachers struggle with teaching all required standards within a school year due to time constraints (Assude, 2005; Leong & Chick, 2011). More narratives are needed to show how being culturally responsive is infused with daily learning. By using culturally responsive teaching practices, teachers can create a supportive classroom environment that works alongside the teaching of standards. A detailed account of what is taking place inside classrooms from the perspectives of teachers could shed light on the affordances and/or constraints teachers encounter when engaging in culturally responsive pedagogy.

Summary

The diversity among schools within and across various communities in the United States challenges educational researchers to identify realistic dynamics of school and community into

teachers' approaches to instruction. Culturally relevant pedagogy recognizes the importance of including students' culture in all aspects of learning (Ladson-Billings, 1994). Positive school experiences that embrace cultures are essential to learning because they can be used to acknowledge, respond to, and celebrate diversity in a way that promotes equitable access to education for students. The mindset and practice of CRP help to ensure that all students, regardless of background and family income status have access to successful education models, enabling larger numbers of students to gain the skill sets they need to be successful, productive citizens (Darling-Hammond, 2010; Gay, 2000; Ladson-Billings, 1997). Using CRP as a foundation, culturally responsive teaching evolved as a student-centered approach to teaching by positioning teachers as both facilitators and learners.

Culturally responsive teaching (CRT) "encompasses curriculum content, learning context, classroom climate, student-teacher relationships, instructional techniques, classroom management, and performance assessment" (Gay, 2010, p. 33). In my research, it is important to note that teachers were given support and encouraged to get to know students while leveraging the mathematical resources of students, their families, and their communities (Aguirre & Zavala, 2013). CRT is for the benefit of all students, not just particular groups; therefore, my participant selection can include any grades 3rd-5th mathematics teacher who self identifies as being a culturally responsive teacher.

The literature reviewed was constructed and viewed through the lens of my fundamental beliefs about mathematics and making it relevant through classroom practices. A lot can be learned about individuals when their cultures are welcomed into classrooms, and in a culturally responsive environment, individuals may learn more. Bruner (2002) states that oral narratives are ways in which individuals share their stories. These stories can be used to better understand

teachers' knowledge of and negotiations with culturally responsive classroom practices. This study was designed to add to the body of research on culturally responsive teaching practices, specifically in upper elementary mathematics classrooms.

CHAPTER 3 METHODOLOGY

The purpose of my study was to shed light on how upper elementary mathematics teachers define and negotiate culturally responsive teaching (CRT) as they incorporate these practices into their mathematics classrooms. My study was framed in CRT so that I could situate the stories of teachers who include culture as an intellectual resource. What teachers need to teach is given to them in the form of state standards, and the recommended instructional practices are centered on grade-level content. When teachers learn the basic tenets of culturally responsive teaching, many teachers respond with, "But that's just good teaching" (Ladson-Billings, 1995, p. 159).

Scholars have introduced frameworks for culturally responsive teaching (Gay, 2000, 2002; Ladson-Billings, 2001; Villegas & Lucas, 2002) outlining the essential elements. For the purposes of this research, Gay's (2000) framework was used. Gay (2000) suggested five essential elements of culturally responsive teaching: a) developing a knowledge base about cultural diversity; b) demonstrating caring and building learning communities; c) communicating with ethnically diverse students; d) including ethnic and cultural diversity content in the curriculum; and e) responding to ethnic diversity in the delivery of instruction. The implementation of these elements was explored through teachers' narratives since they may present differently depending on the classroom culture. "Teaching is a personal endeavor, and what it looks and feels like in actual practice is best conveyed through personal stories" (Gay, 2010, p. 215). My study used narrative inquiry to examine the stories of teachers using culturally responsive practices. The purpose of this chapter is to describe the methodology that was employed in this study. Next, I explored the research design, narrative inquiry, context, participant selection, data collection procedures, data analysis, researcher's subjectivities, and delimitations.

Research Design

Descriptive qualitative study was used to describe from the viewpoint of the classroom teacher about their experiences when teaching and learning in a culturally responsive classroom as well as how culturally responsive teaching (CRT) is defined. Teachers' voices are essential for understanding potential connections between teachers' perspectives, culture, instruction, and mathematics. The narrative inquiry methodology, as outlined by Clandinin (2013), was used to explore my research. Knowing that "thinking narratively about a phenomenon challenges the dominant story of the phenomenon as fixed and unchanging throughout an inquiry" (Clandinin, 2013, p. 38), I worked with participants to co-construct their stories. This narrative inquiry documented how teachers define and negotiate CRT using their own words.

Narrative Inquiry

There are many reasons why I chose narrative inquiry as a methodology for this study. Narrative inquiry is the study of experiences as told through stories, which makes it possible to recount experiences in a manner that brings life to the stories. "Narrative inquiry is an approach to the study of human lives conceived as a way of honoring lived experiences as a source of important knowledge and understanding" (Clandinin, 2013, p. 17). Humans make sense of the events in their lives by interpreting events for themselves and others through narrative. In a narrative inquiry, participants' stories are collected and retold from the combined viewpoint of the participants and the researcher (Clandinin, 2013). When the researcher and the participants are committed to the process collectively, a collaborative narrative is created. I used narrative inquiry because, with it, I gained an in-depth and detailed accounting of the participants' knowledge and negotiations of culturally responsive teaching as they see it.

A narrative inquiry collects participants' stories and retells the participants' views by combining the researcher's experience with those of the participants to produce a collaborative

narrative (Creswell, 2003). The use of narratives "give meaning to temporal events" (Polkinghorne, 1991, p. 138) when communicating and sharing experiences (Kramp & Humphreys, 1993; Kramp, 2004). My research was a dual effort of inquiring about participants' understanding and implementation of culturally responsive teaching while also responding to their replies in the interviews. Through researcher and participant collaboration, narrative inquiry became a way of understanding experiences (Clandinin & Connelly, 2000). The dual role allowed for an *emic*, or insider's perspective in addition to the *etic*, or outsider's perspective of the implementation of culturally responsive practices in mathematics classrooms (Pike, 1967). The study allowed teachers to share relevant and meaningful personal stories about their social experiences (Connelly & Clandinin, 1990; Kramp, 2004).

Context

This study was conducted at Community Elementary School (a pseudonym). Community Elementary School (CES) is located in the Southeast region of the United States. CES was opened in 1973 and has a current enrollment of about 700 students serving Pre-K through Grade 5. This community school has large attendances for programs like Grandparents Day, Muffins for Mom, Donuts for Dad, and the Spring Carnival. Some teachers at CES have committed to incorporating social and emotional learning (SEL) skills into their classroom culture. CES has been led by four different principals and three different assistant principals in five years.

On the 2019 College and Career Ready Performance Index (CCRPI), Community Elementary School (CES) earned four out of a possible five stars on the state school climate survey. An overall score of about 71.5 out of a possible 100 points was earned. All the teachers have access to the same curriculum and resources, including a laptop for all 3rd-5th-grade students. Laptops are taken home daily for homework and access to curriculum resources like digital textbooks. According to demographic information provided by the district, CES has a Black

population of approximately 80%, Hispanic population around 11%, White population of about 4%, and about 5% comprises Multi-racial and Asian. More than 50% of the total student population comes from families with a low socioeconomic status.

Participant Selection

Criteria. There was a total of 12 female teachers teaching either 3rd, 4th, or 5th grade mathematics at Community Elementary School (CES). Using purposive selection (Polkinghorne, 2005), teachers were identified by self-identifying as being a culturally responsive teacher and had participated in the district's training on culturally responsive teaching. An interest email was sent to solicit teacher participation for my research study (see Appendix A). Eleven of the twelve teachers responded to the interest email. Four of the eleven teachers responded, saying that they were not culturally responsive teachers. The remaining seven teachers received the questionnaire (see Appendix B). Purposive selection involves choosing people from which the researcher can substantially learn about the experience (Polkinghorne, 2005). After examining each response to the questions, participants who answered all the questions and included personal experiences related to culturally responsive teaching were selected. The responses received from three teachers who were not selected either did not thoroughly answer the questions from the questionnaire or did not include personal experiences; therefore, it would not be beneficial to my study. The four participants included in my study were those who were willing to reflect upon and share their experiences for the purposes of my research. Four teachers, who (a) teach mathematics- 3rd, 4th, or 5th grade- and (b) self-reported the use of culturally responsive teaching were selected. If I was unable to get enough participants at CES, I was prepared to expand my criteria to add teachers from another school. The second site selection was in the same district, two miles from CES, and had similar student and teacher populations.

Procedure. Approval through the Institutional Review Board (IRB), as well as consent from teacher participants (see Appendix B), were granted to conduct this study. To begin the selection process, I first administered a questionnaire (see Appendix B) to gather background information about each volunteer participant before purposefully selecting four teacher participants. Some of the background data included degree earned, previous teaching mathematics experiences, and information on teaching and learning mathematics. Of the 12 teachers who taught 3rd, 4th, or 5th grade at CES, 10 identified as a Black female, and 2 identified as a White female. Having a sample that reflected the population was important so that all types of self-identified culturally responsive teaching participants were included in the study to reduce potential biases. The sample selection was four Black females, and that reflected the makeup of the teaching population at Community Elementary School (CES).

Participants. The teacher participants teach at Community Elementary School (CES) and range from ages 27 to 45. Their years of experience range from 3 to 22 years. Pseudonyms were used for each teacher participant and their school (see Table 1).

Table 1

Demographics of Participants

Name	Age	Gender	Race	Education	Current Grade Level and Subject	Years of Teaching
Cara	35	Female	Black	M.Ed- Master of Education	4th- Mathematics and Science	6
Emma	43	Female	Black	MS- Master of Science in Education	5th- Mathematics and Social Studies	18
Raakel	45	Female	Black	BSE- Bachelor of Science in Education	3rd- Mathematics, Reading, Science, and Social Studies	22
Serenity	27	Female	Black	M.Ed- Master of Education	5th- Mathematics and Science	3

Cara. Cara is a 35-year-old Black female who *loves the world of numbers*. As a little girl, Cara remembers how much her mother was loved and looked up too by the children at their church. Cara's mother was the Sunday school teacher and they never missed a Sunday. Even though there were plenty of days that her mother did not want to go, she always put the needs of the children first *since no learning would take place without her*. Cara could relate the love that the children at the church had for her mother with the love that she had for some of her teachers from school. Cara talked at length about the positive impact that several teachers had on her. *It was something about math. I don't know if I learned and loved math just because or if it was because of the amazing teachers who happen to teach math. Either way, at a young age, I knew that teaching was for me, and I wanted students to leave my classroom with all the good feels that my teachers gave me, and my mom gave to her students.*

Cara has been a teacher for six years. Two of those years were at the middle school level, and the other four have been in upper elementary grades. She has a master's degree in middle-level education and is certified to teach PK-8th grade. She is also endorsed in giftedness and K-5 mathematics. In addition to teaching full time, she now tutors students from her church. The same church that her mom teaches Sunday school. Cara believes that given a chance, *all students can learn, and they can learn at high levels. Cultural diversity should be welcomed because it can be used to help students learn even more.* Cara considers herself a lifelong student. She challenges herself daily to learn something new either from or about her students. Talking to students about things going on inside and outside of the typical school setting is done regularly. She especially enjoys her time during car rider duty. *When I'm on duty, I get to see firsthand how many students interact with their parents. I get to see some dads still in their work uniforms and younger siblings in the back seat. I get to talk to grandparents who pick students up because*

their parents are at work. Sadly, I also get to see the students who drag and act like they aren't excited to go home. I get to see the parents who barely make it because their transportation is unreliable. The local taxi service makes a lot of money as well. Some families would rather pay a taxi than put their children on a school bus. It truly breaks my heart when I see students get out of vehicles with clothes and food falling out. Sometimes it looks like they are living out of their car. Issues like these are reported to the school counselor in an effort to get the families some help.

According to Cara, *classrooms are a safe space for many students. These welcoming environments are positive and encourage all students to learn and grow*. Cara describes her classroom as a *space to learn, love, and build healthy relationships. It isn't about the math; it is about relationships. The math just happens.* Throughout each lesson, Cara helps students make connections between mathematics and their daily lives. She used a basketball game to teach elapsed time. Many of her students played basketball, were cheerleaders, or on the dance team. After the basketball example, a student asked about elapsed time during a soccer game. *I know my students. I know what will keep their attention. I get them curious, and they beg me for the math!*

Emma. Emma is a 43-year-old Black female. Education is her passion, although it was her second career choice. She initially went to college to be a lawyer, but marriage and children came sooner than she anticipated. Emma has a master's degree in early childhood development with endorsements in reading and giftedness. *As a young adult, I was okay with being in school forever for a law degree. After having kids, I realized that financial stability was needed; therefore, a fulltime job was the solution. I saw my father struggle as he provided the only income for our household. I wasn't going to do that to my husband. A degree in education made sense for us at the time, and I planned on teaching for ten years.*

Emma has been teaching for 18 years. *After ten years of teaching, the plan was for me to go to law school. I've been teaching for 18 years, so I guess God had other plans.* During her teaching career, Emma has taught all content areas in grades 4-8. She found her love for mathematics and has been teaching mathematics for the past seven years. At a previous school, she was the mathematics lead. *I think I'm at the point of wanting to return to a lead position. Here, we work collaboratively, and that is great; however, there are some things that I want to take the lead on, but I can't. I can suggest strategies and ways of thinking to my colleagues, but it is a suggestion. I can't make them do implement it.*

Mathematics was the content that Emma never had to think about, but her grades were good. Her classroom experience differs from the experiences of today's students. *Reflecting back on my school days, I recall math just being math. It wasn't fun or exciting, but I got it. I honestly think that was just the time we were living in. Nothing was really exciting. Now compared to today, that type of education would never work for our kids. For them, everything comes with fireworks. I think about that when I'm planning for my math class. I want students to be engaged with learning and understand how concepts relate to them and their communities.* Emma is able to use technology to help her make many of those connections. *I am always thinking outside of the box to ensure that my students experience math in a way that makes it memorable. They enjoy having virtual meetings with professionals who live in or serve their communities, discuss the importance of math, and how it helps them do their jobs.*

Raakel. Raakel is a 45-year-old Black female who is *a loud and proud teacher*. She is the oldest of four siblings and remembers teaching them as they were growing up. *My sisters and brother were my first students. I think they turned out all right.* Raakel has a bachelor's degree in early childhood development. She has attempted to continue her education several times and is a

few classes away from obtaining a master's degree in early childhood education. *Like all other teachers in the world, we don't go into education for the money. I wanted to teach so bad, and at the time, a bachelor's degree was a big deal. Now that I am divorced with kids, an advanced degree would be beneficial. My teaching certificate may not have all of the bells and whistles, but I watch webinars every night, and I keep up with the latest research and evidence-based instructional strategies.*

Raakel has been teaching for 22 years. As a child, she loved attending school. She would wake up early to get dressed and have some quiet time before school. *I created a morning routine for myself because I needed quiet time to work on extra math and science problems before school. They weren't real problems; they were problems I created and would teach my sisters when they let me. I had to work a little harder getting my brother involved. He only joined us when there was an experiment or objects to play with.* Raakel's parents did not understand why she enjoyed school so much, but they were happy that she did. They wanted her sisters and brother to love school as well. *My parents would make comments about me getting up on my own and not complaining about school or schoolwork. I was the oldest, so anytime someone had a question about homework, my parents told them to ask me. My parents also made sure my brother and sisters had the same teachers I had when possible.*

Raakel started envisioning her classroom from the moment she entered her first classroom. Each classroom she entered had something to offer. Her current classroom has some things from her elementary classrooms. *My first day of kindergarten, I wasn't thinking about friends, I was thinking about the look and feel of the classroom. It sounds strange now that I am saying it out loud, but I looked around and made adjustments to the classroom that I was creating in my head. I loved that every item in the classroom had a label on it. Something else that I*

vividly remember is the morning meetings from my second-grade classroom. We expressed ourselves by talking about how we felt and how to communicate our feelings to others. According to Raakel, there were also some things that she did not like, so she worked to make her classroom different. *When I got to middle school, I did not like the empty feel of the classrooms. I'm not saying all classrooms were this way, but the classes I attended were dull. The mathematics classes were especially empty. There were no charts or labels on anything. The walls were white, and the only color came from the textbooks. I made a note that my mathematics classroom would be full of color and conversation.*

Serenity. Serenity is a 27-year-old Black female. As a student, she thrived in any STEM (science, technology, engineering, mathematics) environment. *I loved experiments and anything interactive when I was in school. I always wanted to be a teacher, an active and engaging teacher, so I wanted to teach mathematics or science.* Serenity has a master's degree in middle-level education with a mathematics and science concentration. She is considered an induction phase teacher because she has zero to three years of teaching experience. Teachers who are in the induction phase receive professional development through monthly meetings. These meetings consist of any topic that new teachers request more support with.

Serenity said she has always wanted to be a teacher and an author. She has been teaching for three years and working on writing her first book. She believes the new teacher meetings, as well as her mentor, are helping to mold her into a more effective teacher. *Being a first-year teacher, I didn't think I was doing anything right. There was always a new strategy to learn and always a meeting that I had missed. My mentor teacher would catch me up on what I missed and tell me not to be hard on myself since there was so much to keep up with. The new teacher meetings that I enjoyed the most were on topics like leveraging technology, time management, and*

culturally responsive teaching. Being a recent graduate, all of these topics were fresh on my mind. I was happy to see that my school district also wanted to build my capacity in these areas.

Serenity believes that her classroom is more inviting than many of her coworkers. *I don't want to say that my coworkers don't have welcoming environments, but I will say that my mathematics classroom is more student-friendly. I just obtained my master's degree a few months ago. I have been learning about classroom management and the importance of having a culturally responsive environment. When discussing ways to value students in all classrooms, many of my teammates look to me for examples. They have been teaching for much longer than me, and they say that students today are not the same as students from ten or more years ago. I suggest having times for students to express themselves because we all like to be heard and ensuring that they can see themselves in the content. As a class, we talk about what we are learning and why we are learning it at the beginning of each math class. We also close with similar questions.*

Data Collection Procedures

During a 5-week period, this study employed qualitative data collection techniques such as interviews, teacher-selected artifacts, observations, and journaling. I chose specific data sources intentionally so that there was an alignment between my research questions and data (see Table 2). The professional learning that perspective participants attended took place in July, September, and November of 2019. The study took place in February and March of 2020. Each session provided by the school district was on six culturally responsive instructional practices: culturally validated instruction, teacher as facilitator, diverse teaching strategies, student-centered environment, positive classroom interactions, and the ability to redesign the curriculum. These practices were referred to during the interviews, observations, data collection, and analysis phases.

Participants completed a questionnaire about their background, teaching experience, and classroom practices (see Appendix B). During the first week, individual interviews were held with participants as a follow-up to the questionnaire. Weeks 2-5 were reserved for interviews and one classroom observation per participant. Structured interviews require participants to select their answers from those provided by the interviewer; semi-structured interviews use an interview guide to ask open-ended questions with probing follow-ups, and unstructured interviews have no formal guide, which leaves room for the interviewer and interviewee to ask questions (Roulston, 2010). Given the nature of narrative analysis, I conducted semi-structured interviews with each participant.

Table 2
Research Questions and Corresponding Data Sources

Research Questions	Data Sources
1. In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching?	Teachers' questionnaire Teachers' journal Researcher's journal Transcribed interviews
2. How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms?	Teachers' journal Classroom observations Lesson plans Transcribed interviews

Data Sources

Triangulation was accomplished through a comparison of data gathered from using five data sources: 1) questionnaire; 2) interviews; 3) classroom observations; 4) teachers' and researcher's journals; and 5) artifacts. Each school year has two semesters. I focused my data collection to occur during the second semester of school.

Questionnaire. The purpose of the questionnaire (see Appendix B) was to obtain general background information about the degrees, mathematics teaching experiences, and culturally responsive teaching practices of teachers volunteering to participate in my study. I used an open-ended questionnaire in my qualitative study as an effective way to collect data in a way that invited participants to elaborate on their answers. An example of an open-ended question that was included in the questionnaire was: "How do you establish and foster relationships with your students?"

By administering the open-ended questionnaire to all seven initial volunteer participants, I received information to analyze and to make purposeful selections of participants for my study. I also paid close attention to the participants' willingness to respond to questions thoroughly. The teachers who volunteered for my study signed an IRB-approved informed consent form (see Appendix C) that detailed the goals of the study as well as information about how participant confidentiality would be maintained. Participants were assured that their responses would not be shared with anyone, including school and district leaders. Each participant was given a pseudonym prior to completing the questionnaire and could withdraw from the study at any time without penalty.

Interviews. The study used four 90-minute individual interviews on four separate occasions at local restaurants. The semi-structured interviews were conversational in nature to create a relaxed space for collaboration at the location, day, and time of the participants' choosing. The participants were given the research timeframe of February and March 2020, then asked to select the interview day and time that would be convenient for them. The week of February 17th was not included due to the school district being out on winter break. Only one interview was scheduled per week to ensure that the study obligations were not overwhelming. This also allowed

time for both the participants and researcher to reflect on the interview between interviews. The purpose of the interviews was to give participants an opportunity to expound on and describe their culturally responsive understandings and teaching practices. I used the interview protocol in Appendix D that focused on (a) the teachers' autobiographical narratives, (b) descriptions of culturally responsive teaching, and (c) stories of culturally responsive teaching in mathematics classrooms. The interview protocol was refined and later approved based on recommendations from my dissertation committee. The interview protocol contained a greeting, description of the purpose of the research, open-ended interview questions, follow-up questions to each key research question, space between follow up questions for my notes and observations, and space for reflective notes (Creswell, 2003). Every interview was audio recorded using my phone and computer to ensure accurate reporting of data.

Classroom Observations. Participants selected an observation day and time during week two of the study. A 1-hour long classroom observation was conducted with the researcher acting in a moderate participation role. In a moderate participation role, the researcher is identifiable, but only occasionally interacts with participants (DeWalt & DeWalt, 2011). The objective of the classroom observations was to collect qualitative data about each teachers' culturally responsive teaching practices. My researcher's log contained (a) What surprised me? (b) What intrigued me? and (c) What disturbed me? The same researcher's journal was used to record notes during the individual participant interviews.

All of the participants taught multiple content areas; however, each observation was strategical during their mathematics block. During this block of instruction, I observed the teachers' day-to-day mathematics instruction in regard to culturally responsive teaching practices. In addi-

tion to the instruction, I observed the classroom environment. After the observations, my researcher's journal was used to categorize my observations into Gay's (2000) five essential elements of culturally responsive teaching: a) developing a knowledge base about cultural diversity; b) demonstrating caring and building learning communities; c) communicating with ethnically diverse students; d) including ethnic and cultural diversity content in the curriculum; and e) responding to ethnic diversity in the delivery of instruction.

Journals. The journals that participants had were used to write down thoughts and experiences about culturally responsive teaching. Participants had access to their journals from the first day to the last day of the study so they can write in them at any time. The participants' journals were collected at the end of the study. Journals were examined for more details on culturally responsive teaching negotiations. Journals and the interpretations of those journal writings yielded more meaning and understanding for me, the researcher, and participants. The researcher's journal was used to capture any non-verbal interview interactions, like body language and facial expressions, that may not be captured on transcripts. The same researcher's journal was used during classroom observations to document classroom activities, interactions, and the environment.

Artifact Data. Artifact data included documents (Prior, 2003) that teachers shared during interviews and observed during the observation. These artifacts were lesson plans, handouts, anchor charts, and presentations. All of the documents were resources that were from the internet or teacher-made. These documents were utilized during mathematics class. Participants used the documents provided to share and give context to their stories. Artifacts such as lesson plans and classroom resources were viewed to support some culturally responsive teaching practices. Participants were also asked to bring in artifacts that were used during mathematics instruction to

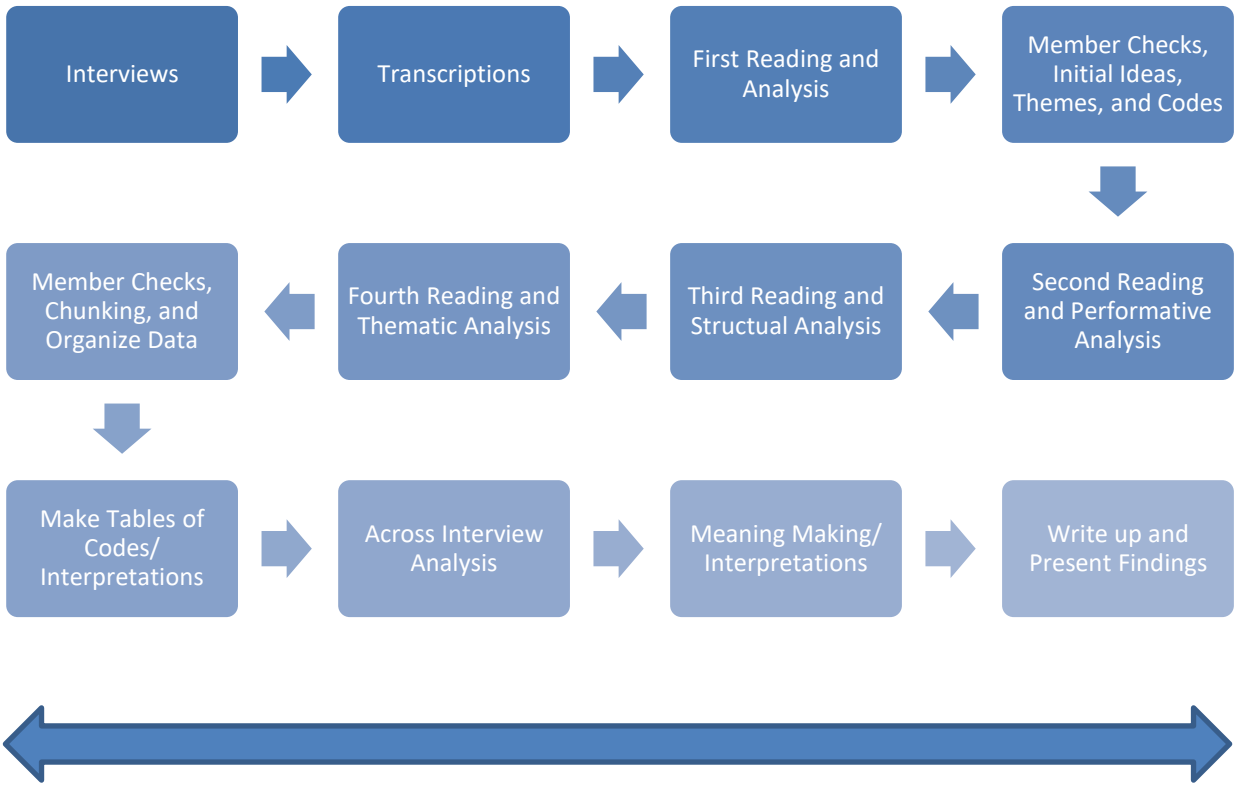
facilitate each interview. These lesson plans also helped document the culturally responsive mathematics taken place in their classrooms. In addition to lesson plans, we examined mathematics activities that students worked through during class. Some classroom procedures were discussed as they related to the community building in the classroom.

Data Analysis

The purpose of this study was to explore upper elementary mathematics teachers' understanding and implementation of culturally responsive teaching. Data analysis is the process of collecting and organizing the data, then bringing together explicit data chunks to make sense of the research and to answer the research question(s). The process of data analysis in qualitative research is not linear or fixed. I used specific narrative analysis techniques to analyze the data since these techniques can be used within narrative inquiry. I detailed my data analysis steps to provide clarity; however, the actual process of analysis was a continuous spiral between data collection procedures and data analysis procedures. The data collection procedures consisted of semi-structured interviews, lesson artifacts, classroom observation notes, and journaling (participant and researcher). The data analysis procedures will entail transcribing, chunking topics, determining themes, reading and rereading transcripts, describing and visually representing data, findings, and conclusions (see Figure 2). I elaborate more on this process in the next chapter, Chapter 4.

Figure 2

Data Analysis Procedure Flow Chart



Note. The bidirectional arrow on the bottom of the figure is incorporated to indicate the iterative nature of the analysis, in which insights that emerged during a given step could indicate revisions to previous steps to represent participants' narratives more accurately.

I audio-recorded and transcribed all of the interviews verbatim and then verified the transcripts by rereading them while replaying the recordings. Each audio-recorded interview was transcribed and entered into a word document. Transcripts were then uploaded into computer software, NVivo 12, for analysis based on Riessman's (2003) performative, structural, and thematic approaches. Once the codes were generated, I condensed the codes into manageable categories to organize the data further. A pertinent feature of NVivo 12 is that it uses the words of participants, and those words can be analyzed individually or as a group to enhance the understanding of each category. I initially organized all of the data by teacher, to see the culturally

responsive teaching key ideas and phrases. This process allowed for the personal views of Cara, Emma, Raakel, and Serenity to be identified and accurately represented before additional groupings and filtration. Then, I looked at the connections between the four participants. The data analysis was used to construct four narratives in addition to four themes. With the assistance of NVivo 12 software, I used an inductive approach to generate meanings from the data collected and to look for patterns and relationships within the narratives as I transcribed each interview and classroom observation notes (Goddard & Melville, 2004). These patterns are *narrative threads* (Clandinin, 2013). These narrative threads were developed while transcribing interviews. Patterns were written in my researcher's journal, then referred to after an NVivo 12 search. Narrative threads are detailed in the results section, Chapter 4, by way of noting some similarities and differences of participant responses. To classify and interpret the data, multiple models of analysis were used because a single form of narrative analysis is insufficient (Riessman, 1993). To learn the nuances and get a more in-depth look at each story, narrative approaches suggested by Riessman (2003): thematic, structural, interactional, and performative were evaluated as it related to my study.

Table 3
Timeline and Overview of Data Collection and Analysis Methods

Dates	Activities
11/14	Prospectus presentation
Week of 12/2	IRB submissions (GSU, school district)
Week of 1/13	Emailed potential participants and administrators
Week of 1/27	Participant selection and reviewed informed consent form
Week of 2/3	Interview round 1 Questionnaire follow-up

	Data analysis began
Week of 2/10	Interview round 2 Classroom observations Ongoing data analysis
Week of 2/24	Member checks round 1 Transcribed interviews Ongoing data analysis
Week of 3/2	Interview round 3 Transcribed interviews Ongoing data analysis
Week of 3/9	Interview round 4 Transcribed interviews Ongoing data analysis
Week of 3/16	Thorough data analysis
3/23-4/10	Wrote up results Member checks 2
4/13-5/26	Submitted and revised dissertation
7/8	Defended dissertation

Thematic Analysis

By utilizing thematic analysis, I looked for recurring themes in stories or classroom observations that I could draw from when retelling the narratives (Rubin & Rubin, 2005). With this method, I incorporated ways to identify, organize, describe, and report themes found within the teachers' experiences. Here, the content of the text was the emphasis in that "what" was said more than "how" it was said; a focus was on the "told" rather than the "telling" knowing that one's own theory can shape the interpretation of spoken and written narratives (Riessman, 2003, p. 332). The inductive process of looking for themes means that I intentionally listened for and honored the language participants use to group the data (Rubin & Rubin, 2005). Unlike other analysis methods that are case-centered, thematic analysis focuses on theorizing across cases.

Performative Analysis

Performative analysis is beneficial for groups, meetings, and classrooms. The interest goes beyond the spoken word and focuses on the context of narratives as being multi-voiced and co-constructed. Riessman (1993) emphasized how language, historical, and cultural contexts influence the construction and performance of narratives. Salient points in data can be missed if only thematic analysis was used, and context was given little or no attention. I used this approach to analyze how teachers were retelling their experiences. Are there certain words or phrases they emphasize? Is there a particular story or part of a story that is told more than once? How do their mannerisms change when they recall events? Performative analysis afforded me the opportunity of accounting for things like word choice and gestures that may be missed if the sole focus was on what was said and not how it was said.

Structural Analysis

Structural analysis focuses on the way stories are told. With structural analysis, I looked at the structure of individual participant interviews or classroom observations to compare these stories. Texts were constructed into sections using participants' intonation and discourse as a guide. These stanzas were analyzed to reveal recurrent themes and embedded meanings. I represented each narrative independent of each other while detailing the commonalities and differences that may appear. As I reviewed each narrative, I noticed that some of the codes aligned with performative analysis because I honed in on participants' mannerisms. Also, some recurrent themes were the same themes that were generated within the thematic analysis process. Due to these findings, structural analysis is not detailed in my results, Chapter 4, as it was not salient as described in my study.

I selected thematic and performative analysis narrative approaches because they were all flexible and best met the descriptive nature of my study. Flexibility is important because a detailed data analysis process supports and allows greater depth to the stories and experiences that teachers retold. Thematic analysis was mainly determined through the use of NVivo 12. The performative analyses included a manual process that more effectively captured classroom observations. Throughout this process, interview transcripts and notes from the researcher's journal were reviewed multiple times in an effort to avoid excluding any information that may be deemed valuable to this study. Although interactional and structural analysis were not used for my study, both were thoroughly examined with all of the narrative approaches suggested by Riessman (2003) in relation to my study.

Quality of Study

There are varied approaches to qualitative research. When determining the overall quality of qualitative research, the criteria can also vary based on the audience. Validity in narrative research refers to the "believability of a statement or knowledge claim" (Polkinghorne, 2007, p. 474). Knowing this, I used evidence to prove or convince the readers that a knowledge claim is justified. Transcribing and constructing the narratives was the most time-consuming. "Close and repeated listenings, coupled with methodic transcribing, often leads to insights that in turn shape how we choose to represent an interview narrative in our text" (Riessman, 1993, p. 60). There was a clear understanding of roles for the researcher and participant, both during interviews and while interpreting them (Chase, 2005). Member checking with the participants for the accuracy of their background and responses to interview questions confirmed the reconstruction of experiences. Since the ultimate goal of the study was to capture and share the teachers' understanding

of and experiences with culturally responsive teaching, it was essential to check whether my initial narrative write-ups from the study were truly reflective of their voices. The first member checks took place during interviews two and three. The second member check occurred after all four interviews were completed.

Polkinghorne (2007) further suggests that in narrative research, readers are asked: "to make judgments on whether or not the evidence and argument convince them at the level of plausibility, credibleness, or trustworthiness of the claim" (p. 477). Credibility in a qualitative study helps determine how reliable the findings are given the data presented; therefore, I used the concept of credibility to achieve trustworthiness in my study (Merriam & Tisdell, 2016). The three components of triangulation, member checks, and adequate engagement in data collection, as Merriam and Tisdell theorized, were used throughout the study. For triangulation of the data and engagement, I used five data sources: 1) questionnaire; 2) interviews; 3) classroom observations; 4) teachers' and researcher's journals; and 5) artifacts. Multiple data points and data analysis were used, knowing that there are strengths and limitations to all methods employed, thus the need for cross validation. Cross validation occurs when data collected is analyzed in different ways (DeWalt & DeWalt, 2011). Various practices and methods are used to achieve a quality qualitative study. The overall quality of my study, therefore, relates to personal meaning drawn from the narrative stories, not to a measurable truth.

The co-construction of teachers' narratives was used to describe those personal meanings during the performative analysis phase. An in-depth analysis was conducted as I interacted with the data on a deeper level to begin the meaning-making process for each participant. It was an iterative process that required two rounds of member checking. When creating the narratives, I also made decisions as to what to include since I could not possibly include everything.

Researcher's Subjectivities

As a former mathematics teacher, now mathematics coach, and a graduate student who has studied culturally responsive teaching, I had to be mindful of my own positionalities during the study. My personal experiences of being an educator in public education and a college student contributed to my subjectivities. In qualitative studies, the product, mode of production, and method of knowing are all connected to the researcher (Richardson & Adams St. Pierre, 2005). I am making my subjectivities clear to my audience because my subjectivities contributed to my researcher's lens as I conducted my study and analyzed the results.

My positionality partly stems from my current role as a district mathematics coach who believes that culturally responsive teaching in mathematics benefits teachers and students in all content areas. I started incorporating CRT during my second year of teaching with my classroom teaching experiences spanning from grades 1-7, including teaching mathematics, reading, science, social studies, and writing. It was during my second year of teaching that I was able to understand how many of my teaching practices aligned with culturally responsive teaching. Four years later, I had the opportunity to support teachers from different schools across my district. This was my narrative, not the narrative of my participants.

I had the pleasure of attending an Ed.D. program where I was immersed in academic literature and research. This fueled my passion for equity and access in all classrooms, especially in the area of mathematics. If educators operate under the mindset that mathematics is void of culture, the students' classroom experiences may be limited. I have supported the teachers in this study with mathematics content knowledge for at least two years. Through this study, I was able to share my background and personal stories with them. These were the experiences and beliefs I

brought into my study that made up my subjectivities. I used triangulation and member checks to ensure that my subjectivities did not interfere with my findings and subsequent write-up. Instead, my subjectivities were used to develop the findings and multi-perspective write-up even further.

Delimitations

A delimitation of my study would be that I, the researcher, will also be the Mathematics Coach for my participants. My personal and professional experiences with my participants may impact what and how participants share information. There was a concern that there may be hesitation amongst the participants to share their open and honest experiences from fear of reprisal if their principals, or any evaluator, were to learn of their experiences. If my participants were unfamiliar with culturally responsive teaching, it would be difficult for them to implement it immediately. Rubin and Rubin (2005) suggested that interviewees be experienced and knowledgeable in the area you are discussing. For this study, only teachers who self-identify as being culturally responsive were included. One observation was completed for each participant. A pattern of culturally responsive teaching could be seen with multiple classroom observations. A more extended study may produce a different outcome. Furthermore, member checks were used to check my understanding and get clarification on the participants' background. The second member check was completed virtually due to movement and personal contact being limited due to the coronavirus disease. Lastly, it would be the inability to generalize the data to a larger population. The data was obtained from four teachers at one school. The goal of this study was to assist administrators, fellow educators, students, and parents in understanding how four elementary teachers and their students navigate teaching and learning in a culturally responsive mathematics classroom. The participants' experiences may differ from the experiences of others in the school or district.

Summary

Multiple data sources were reviewed and selected to show the complexity of teacher narratives and culturally responsive teaching for the study. The purpose of the study was to share how upper elementary mathematics teachers define and negotiate culturally responsive teaching. The overall methodology and data processes were described in such detail that a study of this kind could be transferred to another context or situation. Moderate participation observations, semi-structured interviews, researcher and participant journals, and artifact data were documented and analyzed. In the next chapter, I will share my findings from the study.

CHAPTER 4 RESULTS

The purpose of my study was to describe the ways that four upper elementary mathematics teachers described their understanding of culturally responsive teaching (CRT). Furthermore, the study shared the experiences of four upper elementary mathematics teachers as they negotiated culturally responsive teaching in a school located in the Southeast region of the United States. Gay's (2000) definition was used in this study to define CRT as the use of "the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant and effective for them" (p. 29). The following two research questions were developed to guide the study:

1. In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching?
2. How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms?

Chapter 4 includes explanations and visuals depicting how the data collection and data analysis procedures were carried out, as described in Chapter 3, see Figure 2. Next, this chapter includes a presentation of the performative analysis results, which are organized by participants and then summarized across participants. This chapter then proceeds with a presentation of the thematic analysis results, which are organized by research question. This chapter concludes with a summary.

Results

The results of the analysis are organized into two main sections. The first section indicates the results of the performative analyses. These results are presented first because they include a summary of each participant's narrative, which will serve to re-introduce the reader to the participants. The narrative threads mentioned in the previous chapter will also be in the first

section. The narrative threads were created by comparing and contrasting the participants' responses. The second major section of the chapter indicates the results of the thematic analysis.

Performative Analysis Results

This presentation of the performative analysis results is organized by participants. As discussed in Chapter 3, performative analysis was conducted by noting, describing, and interpreting how participants told their stories, including their demeanor and patterns of emphasis as they spoke (Riessman, 2003). The researcher's journal detailing classroom observations and interview notes were used for this analysis. A summary indicating commonalities in contextual influences across participants was completed last. The first four sub-sections of this section include a summary of each participant's individual narrative. The fifth sub-section includes a summary of performative analysis findings across participants.

Cara. When Cara began teaching mathematics during her second year as a teacher. She had confidence in the appropriateness of her teaching practices, but she found her students unresponsive to the curriculum and unsuccessful in learning the course content. In particular, she observed that her students struggled to interconnect different approaches to problem-solving to develop a robust and versatile skill set. Perhaps more troublingly, she observed that her students were unwilling to help one another when some were struggling with the assigned work. Cara expressed her discomfort with her students' adversarial attitude performatively in the following choice of words: "Students were competitive in a bad way. They refused to help each other. It was not a good feeling. If they felt that I spent too much time with a group, students started to dislike me as well."

Cara independently researched social-emotional learning to identify teaching practices she could implement to make mathematics more engaging for her students and to build a sense of

community within her classroom. She perceived the practice of conveying to her students that their social and emotional well-being were her main priorities and that mathematics instruction was a secondary goal, as her most important takeaway from this research. She expressed her new sense of empowerment and direction performatively the raised volume of her voice and faster tempo of her speech as she stated, "Instead of being all over the place and just a nice teacher, I honed in on building a positive community. I showed my students that they came first, then the math." Cara first became aware of CRT through her continued research to identify means of helping her students to engage with mathematics curriculum.

For Cara, CRT's most effective focus is on bringing the students and their individual experiences outside of school into the classroom. She implements one example of her CRT practices by incorporating her students' names and favorite activities outside of school into word problems to make the problems more engaging and relevant. Cara believes that CRT is essential to effective instruction and that mathematics instruction should include students' cultures. Still, she noted that the lack of any district- or school-level mandate for teachers to implement CRT necessitates their dedicating time outside of school to adapting team-planned lessons to incorporate it.

Cara often uses her Saturday and Sunday evenings to re-plan the lessons she developed with her team during their planning hour the previous week, but she cannot always take the time to do so. When a shortage of independent planning time causes her to omit CRT from her instruction, she feels anger and guilt, a point she emphasized strongly and repeatedly during her interviews. She associates these negative feelings with her perception that she, her school, and her district are failing students by not making adequate efforts to build CRT into everyday instruction. Cara expressed her frustration with the lack of focus on CRT in her choice of words

and sharp tone when stating, “I could say that I perhaps get angry. Angry because this is the type of math instruction that every student deserves. Why is the focus not on culturally responsive teaching?” Cara expressed that she strongly believes CRT cannot be implemented effectively on a school- or district-wide basis without administrative support that includes allocations of dedicated CRT planning time. Cara expressed the perceived relationship between inadequate CRT implementation in individual classrooms and the lack of supports in stating, “I believe more educators would embrace culturally responsive teaching if they were given the time and proper guidance. I was self-taught and self-motived, but not all teachers are that way.”

Emma. Emma’s experiences of implementing CRT impressed upon her that all students bring a rich base of knowledge to the classroom and that it is the instructor’s task to align teaching practices with students’ prior knowledge in such a way that successful comprehension of the course content emerges as a natural extension of students’ positive life trajectories. She expressed her perception of her obligation to achieve an alignment between the cultural orientation of mathematics instruction and her students’ real-world contexts in stating: “Students enter classrooms full of prior knowledge. My job is to build from those experiences and give many opportunities to discuss the math with the class.”

To implement this principle in her CRT practices, Emma asks students to talk about topics that interest them outside of school (i.e., interest inventories). Then, on her own time, Emma works to identify mathematical principles relevant to those topics and the associated state standards. She was vehement in expressing her beliefs that CRT is necessary for effective content delivery in diverse classrooms and that mathematics instruction cannot be culture-free. Emma ex-

pressed frustration with the lack of supports for CRT in stating, “It would be nice if the administration was encouraging [CRT]. If the expectation is for us to know our students and to value them, we have to do more than just talk about it.”

Like Cara, Emma emphasized that she bears the burden of planning her CRT practices on her own time outside of school. She believes CRT is the most effective means of ensuring her students’ success, however, and she spoke of her love for her students as making the effort of incorporating CRT practices worthwhile and personally rewarding for her. Her demeanor as she described this experience expressed a strong sense of empowerment and of fulfillment in nurturing her students. Emma’s choice of words was also a performative expression of her positive experiences with CRT when she stated, “I love my students as if they were my own children. Culturally responsive practices allow me to go beyond the academics to teach them.”

There were some high and low moments for Emma, and she tended to be very emotional about them. Emma noted a risk potentially associated with asking students to bring their out-of-school experiences into the classroom in expressing that her most challenging experiences with CRT occurred when students manifest symptoms of triggered, pre-existing trauma in the classroom. In discussing these experiences, she appeared to feel powerless and also personally hurt by her exclusion from any subsequent therapeutic interventions for the student. Emma expressed her distress at seeing students triggered, and the feeling of regretful resignation she felt in relation to her exclusion from subsequent interventions, in the following choices of words:

> My worst experience would have to be dealing with trauma. In a classroom that is truly responsive, you learn so much about students and their families. Sometimes deep-rooted things come up during our group discussions or letters to the teacher. I do not feel that I am in a position to fully support students and families. A counseling referral has to be submitted. When issues are elevated, I am seen as just their math teacher. I get removed from the follow-up conversations and actions. (Interview, Spring 2020)

Raakel. In describing her experiences of traditional instruction, Raakel's choice of words expressed her frustration with traditional instructional practices and their misalignment with her students' lives and cultures: "I was just tired of reading word problems that didn't have the names of my kids or the interests of my kids." Raakel described her incorporation of CRT into mathematics instruction as successful for two reasons. First, bringing her students' experiences and prior knowledge into the classroom and incorporating familiar cultural references into the curriculum make her students excited about math, and their resulting engagement promotes their success in the subject. Raakel expressed her perception that welcoming students' lived experiences into the classroom was also imperative because, "Students should be reflected in the spaces where they spend most of their time." The second reason Raakel gave for describing her CRT practices as successful was the knowledge she gains about her students by welcoming their experiences and knowledge into the classroom allows her to identify and contextualize their individual learning needs and differentiate instruction accordingly. Raakel's manner of expressing herself in describing these benefits and her methods of facilitating them expressed the satisfaction of a dedicated worker empowered to exercise her agency in meeting goals she highly values. She stated:

> Kids care more about [math] when they can relate to it . . . [So after] listening to and taking heed of what's important to them and what matters to them . . . the first time a student gets invested and is 100% engaged and you know it's because they care about the content of the course, it's a proud feeling. (Interview, Spring 2020)

Unlike Cara and Emma, Raakel does not feel that she practices CRT alone. Raakel proudly reported her experiences of training other teachers in CRT, and she stated that CRT has spread in her school as a result. Her overall demeanor and choice of words expressed modest pride in the positive outcomes of her authorized discretion to teach other teachers some of the rudiments of CRT: "[My knowledge of CRT has] rubbed off on teachers I work with. At trainings,

I set aside time for teachers to create story problems that are authentic and real-life for their students." Raakel stated with strong emphasis that she perceives CRT as necessary for students' success and well-being: "Math is everywhere; therefore, there is no way it can be culture-free. It would be educational malpractice, in my opinion [to implement culture-free mathematics instruction]." For Raakel, the best experiences of CRT occurred when students who were previously unsuccessful and uninterested in math become enthusiastic about the subject because her CRT practices made it relevant to their lives outside of school. Her most distressing experiences with CRT occurred when she felt unable to facilitate this connection for a student.

Serenity. Serenity attributed her success with CRT to the one-to-one student-teacher interactions and interest inventories that allow her to bridge her instruction to students' cultures and histories. She strives to get to know her students so that she can intentionally plan for their needs. She described the perceived effects of the misalignment of traditional mathematics instruction with her students' lives and cultures outside of school in stating:

> I've seen students who quickly became discouraged and frustrated when they were not understanding a mathematical concept. This led to misbehavior, trying to divert attention away from their own deficits. Many students could not relate to the "real-world" experiences that were presented within word problems. (Interview, Spring 2020)

She indicated that CRT allows mathematics instruction to be student-focused, making it adaptable to students' learning styles and relevant to their cultural, historical, and social contexts. She implements CRT by incorporating cultural references into the instruction (e.g., references to hip-hop culture) and by allowing students to work together in teams and engage in kinesthetic learning (e.g., garbage-can basketball) when doing so facilitates their positive engagement with the content. Her way of expressing herself was somewhat cerebral, but rather than suggesting a sense

of detachment from her teaching practices, her more abstract perspective suggested that she attributes an importance to CRT that aligns with her deepest principles and transcends her individual experiences.

Serenity associated her most positive experiences with CRT with her feelings of increased connection to students and their families. Her awareness of her students' circumstances outside of school, in particular, allows her to achieve a more contextually sensitive perspective on behaviors and omissions that might otherwise frustrate her. For example, she may know that a student is putting their head down on the desk at the beginning of class, not because of willful disengagement, but because they had to get up early to help their younger siblings prepare for school while their mother worked a morning shift. The knowledge she gains of her students through her implementation of CRT practices allows her to distinguish between circumstances and resulting behaviors that are beyond her students' control, and discretionary behaviors that positive interventions might successfully modify. Serenity expressed a paradoxical sense of empowerment in the words she used to describe her awareness and acceptance that she and her students were limited in their ability to influence many contextual conditions: "I know there are circumstances outside of my and the students' control. I feel that I can protect them while they are with me in our math community."

Summary. Commonalities observed across the narratives of the four participants included their belief that their students' social contexts made mathematics a prerequisite to full participation in society. Additionally, all participants believed that their students' social and historical contexts were inseparable from mathematics instruction, and CRT as necessary for building the bridge between those contexts and the abstract lesson content. The most significant commonality across participants' narratives was their perception that the application and relevance of

mathematics content to students' social contexts are obscured by culturally decontextualized or "culture free" pedagogies. Consequently, ethnically diverse learners' academic or emotional needs may not be met.

Participants expressed that CRT facilitates teachers' understanding of students' prior knowledge, experiences, and interests as a starting point for instruction. This led to sparking student interest and engagement. Additionally, the reported administrative influence on teachers' willingness and ability to practice CRT was a commonality. Without support, teachers' incorporation of CRT into lesson-planning is a private endeavor for which adequate time cannot always be made. When support is present, as in Raakel's experience, a supportive community of practice can develop around CRT, with the result that educational equity is improved for all students.

All participants associated the success of CRT with positive emotional experiences, which they manifested in their nonverbal cues as they spoke. The positive emotions they expressed verbally included a sense of connection to students and their families, as well as the sense of fulfillment associated with engaging the enthusiasm of students who were previously uninterested in mathematics. Participants associated emotional distress, including anger and sadness, with barriers to CRT, and their agitation was visible as they reported these feelings and their contextual causes. Identified barriers to CRT include a lack of support from district and school-level administrators and the potential for elicitation of out-of-school experiences to be painful rather than a positive experience for some students. Teachers looked visibly upset when discussing the lack of support they received beyond optional training that rarely fit into their professional learning schedule. Teachers were willing to support each other but felt that they also needed the support of administrators.

Performative analysis of how participants told their stories indicated that all four participants are in favor of universal CRT implementation as the only viable means of promoting educational equity in diverse classrooms. Moreover, the performative analysis indicated that all participants care deeply about their students as unique individuals who bring rich prior knowledge and experiences into the classroom, and who deserve instruction that aligns mathematics with their lives beyond school instead of demanding that they leave their histories and cultures at the classroom door in order to become empty receptacles for rote learning.

Thematic Analysis Results

As indicated in Chapter 3, see figure 2, the thematic analysis included: reading and re-reading the interview transcripts, chunking data into initial, thematically related categories or codes, and; grouping codes into a smaller number of more comprehensive themes. The initial codes emerged through the grouping of transcript and questionnaire excerpts (i.e., data chunks) that expressed similar meanings. The formation of each code was based on the recognition of a pattern of meanings across different data chucks. Each group of similar data chunks was assigned a name to summarize the meaning its contents expressed. The initial codes are indicated in Tables 5 through 8.

Initial codes were clustered when their meanings illuminated different aspects of an overarching, emergent theme that was relevant to answering a research question. Thus, themes were formed through the identification of a cluster of codes as complementary, in that they converged on an overarching pattern of meaning relevant to the study purpose and research questions. The way in which the initial codes were clustered to form themes is also indicated in Tables 5 through 8, with each table listing the codes clustered to form a specific theme.

Next, the data were reread to review and validate the themes, and the themes were further refined to indicate their accuracy in representing common patterns of meaning across participants' narratives and their relevance to answering the research questions. Refinement of themes often indicated a need for additional refinement or reorganization of initial codes, and these revisions, in turn, often indicated that further refinements of the themes would be appropriate. This continual and iterative process of revision and refinement resulted in the identification of four major themes. Table 4 indicates the emergent themes.

Table 4

Data Analysis Themes

Emergent theme	*n* of participants contributing (*N*=4)	*n* of data chunks included
Theme 1: Cultural decontextualization of mathematics disadvantages minority learners	4	19
Theme 2: Culturally responsive teaching in mathematics is effective in promoting educational equity in diverse classrooms	4	16
Theme 3: Teaching the whole child and negotiating through the positive and academically challenging learning environment	4	21
Theme 4: Promoting student engagement and success in mathematics by connecting to students' lived experiences	4	22

The results of the thematic analysis are organized by research question, and within research question by emergent theme. The discussion of each theme includes a table indicating the initial codes grouped to form the theme. Additionally, the discussion of each theme includes direct quotations from the data as evidence to allow the reader to independently assess the confirmability of the findings.

RQ1. In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching? Two themes emerged during data analysis to answer this question, including: (1) Cultural decontextualization of mathematics disadvantages minority learners, and (2) Culturally responsive teaching is effective in promoting educational equity in diverse classrooms. The following two sub-sections include discussion and evidence of the two themes.

Theme 1: Cultural decontextualization of mathematics disadvantages minority learners. All four participants indicated the strong belief that cultural decontextualization of mathematics disadvantaged minority students. The participants suggested that seemingly culture-free mathematics instruction was not truly culture-free, and was instead neglecting with the cultural, social, and historical knowledge and experiences of ethnically diverse learners. As discussed in relation to the performative analysis results, participants were emphatic in expressing that the notion of culture-free mathematics instruction is harmful to ethnically diverse learners' cultural, social, and historical contexts. All four participants agreed that a more culturally tailored set of mathematics instructional practices were not only needed but required for all learners. Table 5 indicates the codes grouped to form this theme.

Table 5

Theme 1 Initial Codes

Initial code	*n* of participants contributing (*N*=4)	*n* of data chunks included
Cultural decontextualization of mathematics disadvantages minority students	4	4
Experiencing a need for more culturally tailored instruction	4	4
Indispensability of mathematics	4	7

Students need to be persistent and versatile problem-solvers	4	4

Participants unequivocally stated that mathematics skills were indispensable for students, such that educators were obligated to teach those skills to students of all ethnic and cultural identities equally, using every available, effective method. Cara stated that students needed to learn math because, "The world is full of challenging problems and situations that students will need to know how to solve. Mathematics is important because it transfers to all fields, especially STEM fields." Emma agreed, saying, "I believe that mathematics is all around us, and it helps with everyday functioning. It is highly important because it helps put things in order." Emma further expressed that mathematics is, "Logical and helps with problem solving both inside and outside of school. Mathematics is vital with so many jobs being created in STEM fields, and sadly I do not believe all students are being adequately prepared for these high paying careers." Raakel was particularly vehement in stating, "The importance of mathematics can't be overstated. Apparently, other countries got the memo, but us Americans haven't quite figured out that mathematics is what our students need to get ahead, not reading." Serenity expressed the same opinion with the same emphasis as other participants, stating, "I believe math literacy is just as important as reading at all levels. Mathematical practices like perseverance shape and mold children to be able to think logically and to problem solve."

However, all four participants voiced their disappointment in the instructional practices that are traditionally utilized to teach mathematics. Each participant believed that these practices were intended to be culture-free and that attempts to deliver mathematics content through culturally decontextualized instruction disadvantaged ethnically diverse learners. Cara, for example,

suggested that the cultural biases manifested in attempts to culturally decontextualize mathematics instruction disadvantaged minority students by excluding their out-of-school experiences from the classroom:

> I believe biases are included in classrooms in addition to national and state assessments. The curriculum and assessments are written with a culture-free mindset, and that is not fair to minority students. Mathematics in the classroom should be presented in an engaging way and have the ability to be applied to situations at home. Lived experiences from home should have a connection to the math inside the classroom. Saying that math is culture-free is saying that there is no connection between school and home. Culture is everywhere and in everything. Just because it is not addressed, that does not make math culture-free (Interview, Spring 2020)

Likewise, Emma indicated that abstract mathematical principles only made sense in their application to tangible, contextual conditions, and that attempts to make instruction culture-free deprived students of the conceptual foundation of real-world connectedness: “I don’t think anything can be culture-free. What does culture-free mean anyway? Math is more than just numbers and algorithms. Math helps us make sense of the world. This world is shaped by our culture and daily experiences.” Serenity agreed with the importance of a concrete, relatable application for abstract principles, stating, “Making connections to [students’] outside of school experiences can increase engagement and add the context needed to understand any given math skill. When I make connections to students’ experiences, they seem to have more enjoyment during class.”

Participants stated the importance of aligning mathematical instruction with students’ out-of-school contexts, and it merged with their independent realizations that traditional instructional methods were not adequately promoting their students’ academic success. During her early years of teaching, Cara felt that the traditional instructional practices she was implementing in her mathematics classes were not what her students needed in order to be successful:

> Something was missing in my classroom. I thought I was a good teacher, but my students were not learning. I was using all of the strategies and giving students the application problems from the textbook. I was told that the application problems would help students

> make connections with the math. I don't know whose kids made connections to those problems, but it surely wasn't my kids. Every standard I taught was completely new to them. They were not making connections from standard to standard. They did not see how the math standards related to them or each other. (Interview, Spring 2020)

Similarly, Raakel described her intuition of a need for mathematics instruction to engage students through explicitly incorporating their outside-of-school experiences: "I wanted [students] to be invested in math and have the 'real-life' problems reflect their real life, the names present in their life as well as the activities in their life." Serenity observed the same misalignment between traditional instruction and her students' lives and experiences: "Many students couldn't relate to the 'real-world' experiences that were presented within word problems. Not only did I have to change names, but I also had to change many problem contexts so that my students would focus on the math."

Participants strongly expressed the belief that mathematics was indispensable for students, and that educators were obligated to cultivate a foundation of numeracy in students of all ethnic and cultural identities. However, traditional instructional practices were inadequate for promoting the academic success of ethnically diverse students in mathematics. Instructional practices that disregarded cultures did not align with the conceptual foundation of ethnically diverse students' real-life experiences outside of school. Participants indicated that mathematics could only be equitably taught by orienting instruction toward students' cultural, historical, and social contexts.

Theme 2: Culturally responsive teaching is effective in promoting educational equity in diverse classrooms. All four participants expressed the perception that CRT was an effective and necessary means of bridging abstract mathematical concepts to their students' lived experiences in order to achieve educational equity for ethnically diverse students. Table 6 indicates the codes grouped to form this theme.

Table 6

Theme 2 Initial Codes

Initial code	*n* of participants contributing (*N*=4)	*n* of data chunks included
CRT implementation is associated with pride and fulfillment for dedicated teachers	4	7
Obligation to implement CRT in mathematics	4	6
Universal effectiveness of CRT in mathematics	3	3

All participants expressed the perception that CRT was effective in promoting success in mathematics for all students and that implementation of CRT across education organizations was, therefore, obligatory in their opinion. Cara stated, "I believe culturally responsive teaching practices are what is best for all students . . . I do believe culturally responsive teaching should be made a priority." However, Cara emphasized that teachers' making CRT a priority on an individual basis was inadequate, because only support from top leadership could result in the setting-aside of the time in the school week needed for teachers to incorporate CRT into their lesson planning. Cara also stated that CRT was appropriately student-centered because, "It allows you to teach with the student in mind. Teachers can connect with students and teach the way teaching should be done."

Emma stated, "Culturally responsive teaching is not just for students of color . . . This is a best practice for all students." Emma stated that CRT is effective in promoting academic success in mathematics for all students because, "Adding culture adds context to the math and helps students believe that they can do the math and the math is important to them and their families." In

addition to expressing that CRT should be implemented at the school level because it was effective in promoting educational equity, Emma believed CRT was needed because, "Multiple perspectives and voices need to be heard in every classroom."

Raakel expressed that CRT is effective because, "It is a form of differentiation, in a sense, as it helps the teacher become more familiar with the learner's way of comprehending." Raakel indicated that culturally differentiated instruction was needed for the same reasons that other forms of differentiated instruction were needed, namely, "Not all children learn the same. Math is abstract and requires different approaches that are tailored to the learner's needs."

Serenity described the welcoming of students' lived experiences into the classroom as necessary because, "Students cannot learn in a place where they do not feel comfortable or safe. In order to promote an academically safe environment, teachers must teach in a way that cultivates the whole student." Serenity agreed with Raakel's description of CRT as an effective form of culturally differentiated instruction in stating, "Culture plays a major role in how each person functions and learns. Both culture and learning styles are synonymous when determining the most effective teaching strategies for students."

Participants associated CRT's effective facilitation of educational equity with some of their most fulfilling teaching experiences. Emma stated:

> I feel loved and respected every time I talk to a parent and they say how much they appreciate me and how much their child enjoys being in my class . . . I enjoy supporting my students and love seeing them access the math and support each other. I feel love when my students get the math because we work through it together. I've had colleagues ask me about projects because my students talked about how much they enjoyed the activity. (Interview, Spring 2020)

Raakel stated, "I have so many positive emotions all of the time due to student growth and family engagement." One of the positive emotions Raakel experienced was pride, she stated: "The first time a student gets invested and is 100 percent engaged, and you know it's because of you

or like… through the connections. They care about the content of the course--it's a proud feeling. I've had that feeling more than once, so that's a good thing." Cara's CRT practices made her enthusiastic about the impact she had on students' lives and left her with an overwhelming feeling of gratitude. Raakel added:

> I get excited when I think about the difference I am making in the lives of so many young people. I get exhausted when planning lessons for my students, but that feeling goes away quickly because I know I will get to know all of them on a level beyond math. For that, I am grateful. That kind of gratefulness has to be earned. (Interview, Spring 2020)

RQ2. How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms? Two themes emerged during data analysis to answer this question, including: (3) Teaching the whole child in a positive and academically challenging environment, and (4) Promoting student engagement and success by in mathematics by connecting to students' lived experiences. The following two sub-sections include discussion and evidence of the two themes.

Theme 3: Teaching the whole child and negotiating through the positive and academically challenging learning environment. All four participants indicated that they negotiated CRT practices in their classroom in part by implementing strategies that allowed them to teach the whole child. Teaching the whole child involved the CRT practice categories of demonstrating caring and building learning communities, and of developing a knowledge base about cultural diversity. Participants wanted students to feel safe, so they would be engaged and actively contribute during mathematics instruction. Teachers expressed the importance they placed on teaching the whole child in part by describing the anguish they experienced when they were unable to successfully engage students by connecting challenging mathematics content to other aspects of their lives. Table 7 indicates the codes grouped to form this theme.

Table 7

Theme 3 Initial Codes

Initial code	*n* of participants contributing (*N*=4)	*n* of data chunks included
Demonstrating caring and building learning communities	4	11
Developing a knowledge base about cultural diversity	4	7
Worst experience while teaching mathematics	3	3

Participants reported that they demonstrate caring and build learning communities in their classrooms, specifically by facilitating a communal learning experience that fosters cooperation and mutual support. Cara stated that part of her strategy for creating a communal learning environment is to allow students to have input on classroom rules and expectations: "[The students and I] create classroom rules together. I am consistent. Students know what my expectations are, and I know what their expectations are as well." Cara said of the effects of creating a learning community in her classroom, "I know for a fact that it simply makes me a better teacher. Looking at my classroom as a community has completely elevated my students and me. We are in this thing called education together." Serenity's practices for building a learning community in her classroom included fostering positive interaction and bonding between her students: "I use circle talks in my classroom and try to build individual relationships and positive peer-to-peer classroom relationships." Emma reported that she used in-class games to create a cooperative, uninhibited learning space: "We play games that allow us to get to know one another better as well."

Participants reported that they develop a knowledge base about cultural diversity, specifically by learning about their students through open communication in classroom discussions and one-to-one informal interviews. Cara described speaking to students informally and one-on-one,

with the result that she was able to provide them with appropriate supports and incorporate details from their lives into lessons:

> I talk to students before and after school, mostly during club time. I talk to my students regularly because sometimes if they just get it out, they can be more alert throughout the day. After speaking to them, I always follow up to see how things are going and if there is anything I can do to assist. I might learn something that I can use for the instruction the next day. I incorporate their names and the names of their family members into word problems. (Interview, Spring 2020)

Cara added that she facilitated the open communication necessary for gaining knowledge of her students by modeling honesty and non-judgment for her students: "I am honest with them, and I encourage them to be honest with me. No judgment when they tell me personal things." When Cara was unable to conduct these practices to her satisfaction, she felt guilty and frustrated, and her distress provided her with additional motivation for getting to know her students and incorporating the knowledge she gained into her instruction: "I feel horrible when I do not devote the time needed to include my students in the curriculum."

Emma's practices for getting to know her students included a survey, the responses to which she read carefully and incorporated into instruction, in part so students would know they were being heard: "I have them complete an interest survey that I refer to all year. They know that I read their responses because lessons are tailored to the things that they enjoy." In addition to a survey at the beginning of the year, Emma conducted daily classroom discussions to familiarize herself with the needs and priorities of her students: "Our morning meetings include topics that they want to discuss as well as a well-being check on them." Emma facilitated different forums in which her students were encouraged to discuss their lived experiences: "I provide students an opportunity to share in small groups and even in whole groups about experiences they have at home during holidays or breaks. I ask students to share their sports or events with me."

Serenity spoke of learning about her students by listening to them and giving them space to express themselves. “I ask questions about their families and encourage them to share the good news with the class. We discuss things like new siblings and family members coming to visit from other states or countries.” Serenity spoke emphatically of the need to get to know her students and the ways in which her instructional practices benefitted from her doing so:

> Some people may not understand why I need to spend 15 minutes each day discussing how students are feeling. Their feelings impact how they perform and what they remember during math class. It is hard for students to be actively engaged when something else is weighing heavy on their mind. Even if the check-in just lets me know that is student is having a rough time with something, the group members will also know and will not pressure the student to speak. If I know that the majority of my students play basketball, I can add some basketball scenarios into our current skill. If I know that many of my students enjoy cooking, I can add a hands-on cooking lesson into our lesson about fractions. (Interview, Spring 2020)

Raakel stated that she implemented CRT in part, “By knowing my kids. By listening to and taking heed to what’s important to them and what matters to them.” Raakel said of the benefits of getting to know her students, “It makes me more aware of the individual needs of the learner,” and, “I’ve been able to include details about my students’ culture into the lessons — specifically, my Black students and my Hispanic students. I’ve been able to reflect their life in real-life math and thus get them excited about the math.” Results associated with Theme 4 include more details on practices participants implement to incorporate students’ lived experiences into the classroom as a means of promoting engagement.

Theme 4: Promoting student engagement and success in mathematics by teaching through students’ lived experiences. All four participants indicated that they promoted students’ success and engagement through CRT practices that included ethnic and cultural diversity

content in their instruction, responded to ethnic diversity in the delivery of instruction, and facilitated their communication with ethnically diverse students. Table 8 indicates the codes grouped to form this theme.

Table 8

Theme 4 Initial Codes

Initial code	*n* of participants contributing (*N*=4)	*n* of data chunks included
Inclusion of ethnic and cultural diversity content	4	11
Responding to ethnic diversity in the delivery of instruction	4	5
Communicating with ethnically diverse students	4	6

All four participants reported that they included ethnic and cultural diversity content in their instruction by integrating relevant word problems and including ethnically diverse knowledge and perspectives. Cara described an instance of her inclusion of a student's ethnic and historical perspective into a mathematics lesson:

> During our measurement unit, students were asked to bring in items from home for us to measure. I factored in extra time for this task, because I knew there would be items that would spark up conversations. One student brought a handmade wooden spoon. She explained that that spoon had been in her family for many years. It was made by her great great grandmother. There was a sense of pride when she was telling her story. (Questionnaire, Spring 2020)

Raakel stated of her inclusion of diverse cultural knowledge and perspectives, "I've been able to include details about my students' culture into the lessons — specifically, my Black students and my Hispanic students. I've been able to reflect their life in real-life math and thus get them excited about the math." As an example of her practices, Raakel described, "With my students, I

can make a connection with some of the terminology used in Spanish. Saying numbers and operations in Spanish gave some of my students a sense of comfort." Raakel reported that her students were engaged and even grateful when she used this CRT practice. She stated of one student's reaction to her incorporation of an ethnic, cultural perspective into her instruction, "A student once said, 'I like this more because it's not just somebody buying a bunch of watermelons.'"

One practice Serenity utilized to include ethnically diverse perspectives into instructional content was to administer a bilingual assignment. Serenity explained:

> Recently, we completed a word problem that was written in both Spanish and English. A student was given a certain about of money to purchase items from a grocery store. One list had items written in English, and the other list was written in Spanish. This was done because we had a new student join our class from Mexico who did not speak any English. While making that student comfortable, I also wanted the other students to see what it feels like when you are trying to answer questions, but you cannot read the language. (Interview, Spring 2020)

Emma utilized several strategies to integrate relevant word problems as a means of improving students' engagement with the course content. She stated as one example: "Word problems include stores that [students] shop at and items that they may purchase." Emma gave a more specific example of her integration of relevant word problems in stating, "Many of the situations are situations that the students can relate too. One of my students gets paid for babysitting. Fractional word problems are created about saving money from babysitting." In citing another example of relevant word-problem integration, Emma stated, "Another student helps his mom clean houses. We have had word problems that compare the amount of time it takes to clean a room compared to the hourly pay rate."

All four participants further indicated that they engage students to promote success in mathematics by responding to ethnic diversity in the delivery of instruction, and specifically by

integrating preferred ways of working through tasks and preferred physical and social settings for task performance. Serenity described her integration of preferred task-performance styles as follows:

> I've experienced students having more success when they were allowed to work together and hold each other accountable as teams. For instance, students (especially black boys) became a lot more vested when allowed to play "trash can basketball" while rattling off math facts. Students also love affirmation while building math fluency. Instead of immediately negating incorrect answers, students were more responsive when affirming their efforts and clarifying misconceptions. (Interview, Spring 2020)

Cara reported that she increases student engagement by integrating their interests into her delivery instruction, as the following example: "I have just recently started to include some type of basic coding through critical thinking problems because I know some of the students are interested in coding. They get really excited when we discuss anything that's code related." Raakel reported that she responds to cultural ethnic diversity in her delivery of instruction in part by grouping students according to their preferred task-performance styles, "Grouping students according to their needs when intervening and carrying out activities that are specific to how they learn."

Participants additionally stated that they engaged students in part by tailoring their communication styles for ethnically diverse learners. Serenity said she communicated with ethnically diverse students in part by incorporating culture-specific referents, as in the following example: "For many students who came from backgrounds of African-American culture, I was able to use the hip hop culture, the rich history of arts, and kinesthetic nature to infuse within my lessons." Emma fostered peer-to-peer and student-to-teacher communication with ethnically diverse learners first by providing students with different methods for expressing themselves: "Students use the post-it website to write their responses to a math problem . . . The peer letters require stu-

dents to write a letter to another student explaining how to apply the math skill." Ethnic and cultural diversity were incorporated into these communications by giving students the freedom to communicate in any format. Serenity stated that as long as the focus was on, "Reasoning and explaining . . . Students can write poems, skits, song verses, etc."

Participants referenced their lesson plans to discuss some ways that they were adding context to their lessons. Emma and Serenity included a multi-day task about commercial truck driving into their instruction. Emma said, "I have built relationships with students and know that many of them have family members who are truck drivers. This task required students to work through scheduling conflicts by adding and subtracting fractions." Serenity saw some student work from Emma's class and decided to give the task a try. Serenity stated, "The students made the task look like fun. They were talking about math with other students and at home with family. That is how all lessons should be." Cara was also excited to talk about the tasks that her students were doing. She stated, "Measurement is not my favorite unit, but my students are loving it. They worked collaboratively on either the carpenter or gardener task. My students could relate and make sense of these situations."

Summary

Two research questions were used to guide this study. The first research question was: In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching? Thematic and performative analysis results indicated that participants understood the need for CRT as arising from the belief that cultural decontextualization of mathematics instruction disadvantages minority learners. Participants expressed both verbally and performatively that they perceived CRT as effective in promoting educational equity in diverse

classrooms, but they indicated that its adequate implementation depends on school level supports such as top-down allocation of dedicated CRT planning time.

The second research question was: How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms? Data analysis results indicated that participants negotiate CRT practices in part by teaching the whole child in a positive and academically challenging environment. CRT elements associated with teaching the whole child in a positive and academically challenging environment included demonstrating caring and building learning communities and developing a knowledge base about cultural diversity. Findings further indicated that participants negotiate CRT practices by promoting student engagement and success in mathematics by connecting to students' lived experiences. CRT elements associated with connecting to students' lived experiences included building ethnic and cultural diversity content into mathematics instruction, responding to ethnic diversity in the delivery of instruction, and communicating with ethnically diverse students. Chapter 5 includes the discussion, interpretation, and implications of these findings.

CHAPTER 5 DISCUSSION

The study described and shed light on how upper elementary mathematics teachers define and negotiate culturally responsive teaching (CRT) as they incorporated these practices into their mathematics classrooms. Triangulation was accomplished through a comparison of data gathered by using five data sources: 1) questionnaire; 2) interviews; 3) classroom observations; 4) teachers' and researcher's journals; and 5) artifacts. In this chapter, I provided a discussion on my findings, connections to the literature on culturally responsive teaching, share concluding remarks, implications from the study, and suggestions for further research.

Discussion

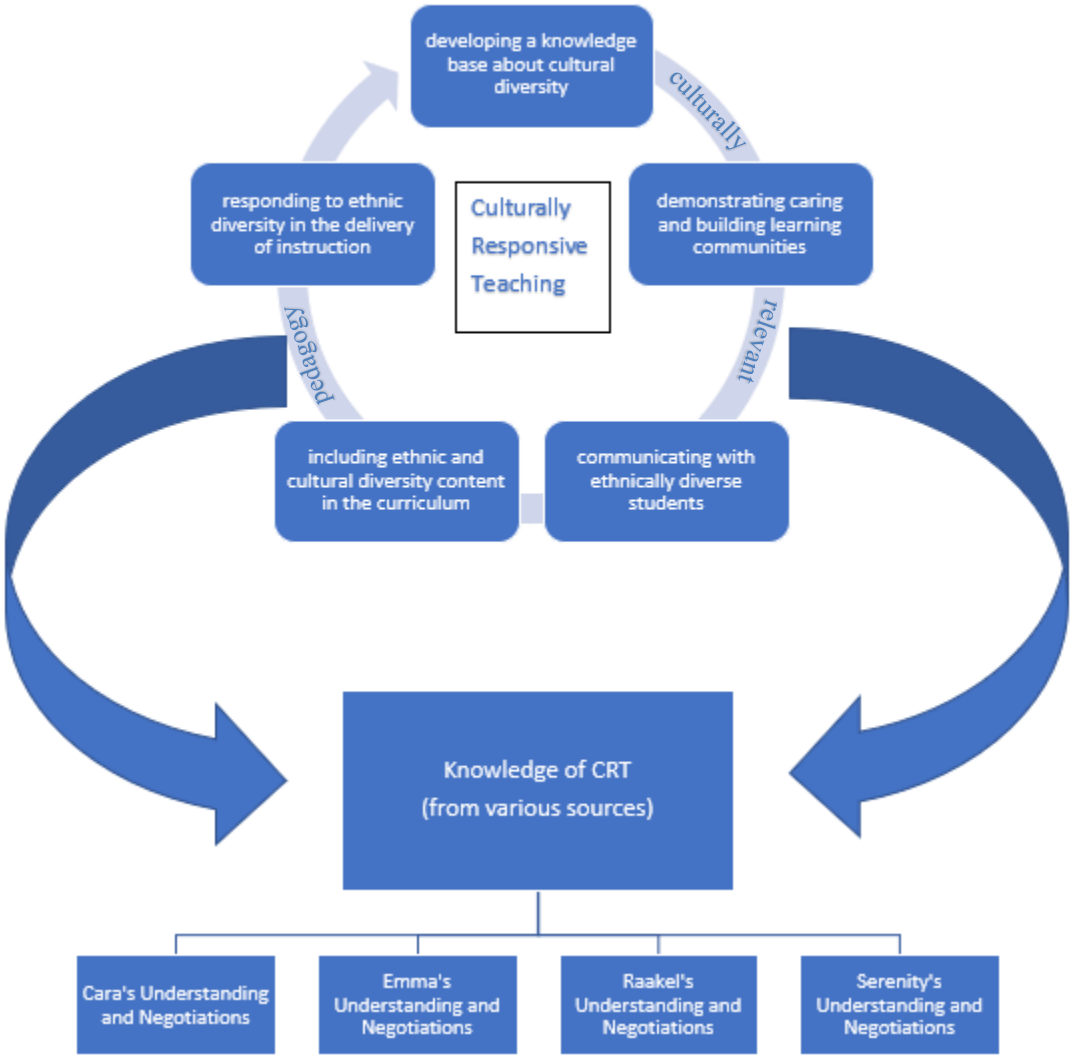
In examining the participants' understanding and negotiation of culturally responsive teaching (CRT) in mathematics classrooms, four themes emerged. Two of the emerged themes described participants' understanding of CRT: Theme 1: Cultural decontextualization of mathematics disadvantages minority learners; and Theme 2: Culturally responsive teaching in mathematics is effective in promoting educational equity in diverse classrooms. An additional two themes emerged that addressed how participants negotiated CRT in their mathematics classrooms: Theme 3: Teaching the whole child and negotiating through the positive and academically challenging learning environment; and Theme 4: Promoting student engagement and success in mathematics by connecting to students' lived experiences. For this discussion, I used the four participants' words to explore the findings of each research question: In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching? How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms?

Gaining knowledge. Participants of the study all self-identified as being culturally responsive mathematics teachers in grades 3-5, known as the upper elementary grades. Each participant also attended a district training on culturally responsive teaching (CRT) to develop a knowledge base about cultural diversity. The professional learning that participants attended took place in July, September, and November of 2019. Emma and Raakel considered themselves culturally responsive teachers, even though they gained knowledge about CRT less than six months before my study. Cara and Serenity believed they were implementing culturally responsive practices a full school year before attending the district training. Based on the findings from the study, the ways that upper elementary mathematics teachers obtained and described their understanding of culturally responsive teaching varied (see Figure 3). This shed light on how knowledge of CRT was acquired and later implemented. Although all participants engaged in a training centered on the work of Gay (2000), their understanding of CRT was wide-ranging. Theme 1: Cultural decontextualization of mathematics disadvantages minority learners; and Theme 2: Culturally responsive teaching in mathematics is effective in promoting educational equity in diverse classrooms emerged as ways that the four participants are understanding CRT.

Academic success and student achievement were subjective in my study. Both terms came up during the interviews with all the participants. There were no discussions, however, on what it meant to be academically successful or how student achievement was measured. Some participants could have been determining success and achievement based on test scores, while others took into account students' persistence in mathematics class. A culturally responsive teacher knows that not all achievement can be measured on an assessment. Participants' overall understanding of CRT varied; therefore, their understandings or definitions related to success and achievement may also vary.

Figure 3

Flow of Culturally Responsive Teaching Practices Information



Note. The arrow going through the figure represents the knowledge of culturally relevant pedagogy (Ladson-Billings, 1994) and how it flows within Gay's (2000) culturally responsive teaching practices. The side arrows in the figure are depicting the information participants are receiving from various sources.

Developing a knowledge base about cultural diversity. Serenity was a recent graduate from a program that centered on cultural competency. *Not only did we read some of the works of*

Gloria Ladson-Billings, Danny Martin, and Sonia Nieto, my professor used all of Geneva Gay's practices with our class. The professor would facilitate, and we worked collaboratively through the math. We were a learning community, not a regular cohort. I try to model my class in that same way. Everyone is heard and uplifted. During the classroom observation, I noted that Serenity's classroom practices were more aligned to Gay's (2010) more recent culturally responsive practices. Serenity was also the participant with three years of teaching experience, and her teacher preparation program prepared her for working with diverse learners and resistant teammates. *All of my school assignments required me to think about an ethnically diverse classroom. I had to differentiate by content and context as part of planning, so I know how to plan for my students and plan the math at the same time. Context is just as important as the content for my students. Honestly, I can tell that many of my coworkers did not have a similar experience. I'm guessing that's why it's hard for them to commit to culturally responsive teaching.*

Unlike Serenity, Raakel was not a recent graduate. Raakel graduated from college more than 20 years ago. All of her knowledge about CRT was gained through her being proactive and keeping up with changes in education. *You know me. If something ain't working, I want to know why. Well, even if it is working, I still want to know why. After the July training* [on CRT], *I was intrigued. I went home and started doing my own research. I realized that I was already doing things like making connections with community and school, having high expectations for all students, and valuing my students' cultures. I read some articles and watched some webinars on the edweb website about CRT.* Emma was not a recent graduate either, but like Raakel, she initially learned about CRT during a district training. *This is probably going to sound crazy, but I really discovered culturally responsive teaching as a challenge. I told you math was just math for me. I*

can easily see patterns, reason, and make connections. I knew I knew the mathematics but getting my students to see it was totally different. A colleague suggested that I look into Ms. Gay's work and attend the session that was being offered during a teacher workday. She's no longer teaching here, but we do bounce ideas off of each other pretty often. She's still in school, so she tells me about all of the latest and greatest CRT research.

Cara graduated less than five years ago, and like Serenity, she speaks highly of her Master's program. However, she first learned about CRT recently when she was earning her mathematics endorsement. *I love mathematics! I knew I would enjoy the mathematics endorsement courses because I would be doing math. One of the classes was about culturally responsive teaching, and I fell in love with that also. If I was not introduced to it during the endorsement, I really don't think I would have used it in my math class right away. When I was researching it, many of the articles just spoke about CRT in general. I know that I am doing it right because a real culturally responsive teacher can't just turn it on and off for different classes. CRT is right for all kids.*

The study solicited upper elementary mathematics teachers who self-identified as culturally responsive teachers while developing a knowledge base about cultural diversity. My findings related to research question 1: In what ways do upper elementary mathematics teachers describe their understanding of culturally responsive teaching? revealed that the four upper elementary mathematics teachers in my study believe that mathematics instruction without context puts minority students at a disadvantage; therefore, culturally responsive teaching in mathematics is needed because it is effective in promoting educational equity in diverse classrooms. An analysis of the data (interviews, observations, journals, and artifacts) indicates that this knowledge was

not gained as a result of one district professional learning session. The district professional learning on culturally responsive teaching served as a starting point for Emma and Raakel. Serenity and Cara already knew about Gay's (2000) research before the district professional learning session, but they attended to gain more knowledge. This knowledge was seen in the way each participant negotiated CRT in their mathematics classroom.

Culturally responsive teaching. The findings indicated that the four participants in my study have understandings of CRT that are similar in some aspects and differ in other aspects. The way in which teachers are exposed to and continue to explore CRT, will impact their later implementation of CRT practices (see Figure 3). Both Theme 3: Teaching the whole child and negotiating through the positive and academically challenging learning environment; and Theme 4: Promoting student engagement and success in mathematics by connecting to students' lived experiences will be further discussed. Although there is "a common set of sociohistorical experiences that connect students of particular backgrounds together, neither the students nor their needs remain the same over time" (Leonard et al., 2010, p. 267). I will describe how the similarities and differences in teachers' negotiations influenced the study's second research question: How do upper elementary mathematics teachers negotiate culturally responsive teaching practices in their classrooms?

Demonstrating caring and building learning communities. A commonality seen between all of the participants was having daily meetings with students. Cara, Emma, and Raakel all had meetings in the morning. Although all of their meetings were called morning meetings, they demonstrated caring and built learning communities differently. For Cara's meetings, students could read silently, read with a partner, or speak with her individually. The individual meetings give students time to discuss any topic with Cara. Sometimes it is something silly that

happened the day before, but oftentimes the topics are related to issues that are hindering students from learning. She wrote about these meetings in her participant's journal. *I went over time again. I have to find a way to better manage my time. Or do I? My kids need this. The 15 minutes that I just spent will be worth it, because students' minds are clear, and they are ready to engage with the math. Thankfully, there were no issues today that tugged at my heart strings. I have a few more jokes to add to my toolbox, though—nothing to report to the counselor. My plan was to follow-up with a specific student, but she was absent. That concerns me a little.* She later said that she spoke with the student the next day, and everything was okay.

Raakel showed caring and built learning communities in her classroom through her morning meetings. The morning meetings in Raakel's classroom are led by students. The students decide on the conflict that needs to be resolved. If there are no conflicts, the students talk about things that they are grateful for. Raakel wanted her students to learn how to lead as well as work collaboratively with others. The students take the conflict resolution strategies with them when they work in groups. Raakel was excited to tell me about the morning meetings and believe that these meetings set the tone for the day. *I can't just tell kids that we are a community of learners. I have to show them. I speak positively to and about them at all times. Many people have no idea what kids go through at home. Like, some of these kids just need someone to listen to them. Yes, I listen, and I also teach them to listen. Now, students are resolving conflict amongst themselves. I treat all of my students, just like my own kids. Someone has to teach them how to live in a society with others.* Raakel added that she uses mathematics sentence stems to guide all students with mathematical discourse. *In math, people always talk about making sure students are talking and having discourse. Many students come to school with no communication skills. Instead of pointing that out, I provide all students with sentence stems. The sentence stems might say, I agree*

with you because…, or I disagree with your solution because… This helps all of my students feel comfortable when responding and speaking to classmates.

I had the pleasure of observing one of Emma's morning meetings and one of Serenity's mindfulness sessions. Serenity's mindfulness sessions are similar to the morning meetings of the other participants. Serenity chose to have her meeting after lunch because she said this is the time that students tend to get in trouble. It was clear that they did some planning together because the meetings mirrored each other. Emma and Serenity displayed an Aesop quote, "I am not afraid of storms for I am learning how to sail my ship." Students were given five minutes to think about the quote, then another five minutes to write down their thoughts about the quote. Students partnered up and were given an additional five minutes to share their thoughts with a partner. This part was optional. Students could speak if they wanted to, but all students had to listen. At the end of the five minutes, Serenity collected all the writing responses; however, Emma walked around and read the responses of several students.

Communicating with ethnically diverse students. All four participants mentioned the enjoyment they have when they communicate with their students in different ways. Emma and Raakel are both from a Northern state. Emma said *it took me a while to realize that communicating with my students would be easier if I slowed down my talking. I have good relationships with them, so when I ask about ways I can improve, that is usually the first suggestion.* Raakel added *I thought some of my students were scared of me. When I talked to them, they said I yelled a lot. I was totally surprised because I don't yell at all. My voice is loud, and it projects sometimes. I assured them that I was not yelling, and they could tell me if I ever got loud again. That was something I had to work on, and I did.*

During the classroom observations of Cara and Serenity, I wrote in my researcher's journal about Cara and Serenity being patient with students when they asked questions. One student talked about an uncle being a truck driver and not being home much before asking a question that was related to the truck scheduling task. To someone who is unfamiliar with it, this type of communication "sounds rambling, disjointed, and as if the speaker never ends a thought before going on to something else" (Gay, 2000, p. 96). This is one example of the differences in ethnic communication styles. Another example was when I observed Serenity tell a student that he tried to code-switch on her, but she spoke Ebonics quite well. The student laughed, and Serenity gave him a high-five. She then turned to the class and restated the student's response. Serenity then asked a student to give her an example of a mathematics situation that incorporated a language other than English. Ethnically diverse students' cultures were validated in those classrooms. Each teacher was willing to communicate in different ways to reach their students. All participants also communicated high expectations for all students. When discussing student growth in mathematics, the participants believed lowering the standard for students would hinder them. Students are not given less to do; rather, they are given equal access to the grade-level curriculum with scaffolds when needed.

Including ethnic and cultural diversity content in the curriculum. The findings of this study suggested that Theme 3: Teaching the whole child and negotiating through the positive and academically challenging learning environment; and Theme 4: Promoting student engagement and success in mathematics by connecting to students' lived experiences were connected to teachers including ethnic and cultural diversity content in the curriculum. All four participants wanted to relate the content to all students' interests and background knowledge (school and home experiences). Serenity and Cara had a literacy center in their classrooms. It was a literacy

center with mathematics books and images of mathematicians. This looked like a collaborative effort because the images were the same. The images were of minority mathematicians, both people of color and women. Their contributions to mathematics were printed below the picture. Cara said *it's sad that many of my students don't see themselves in the curriculum. The fact that they are misrepresented might give them the wrong impression. Like a bad impression of themselves and their learning. I have to make spaces for them. I don't mind, but it would be nice if diversity was already in the curriculum*. Cara also had a mirror that said, I am a mathematician. She said she encouraged students to stand in front of the mirror when they were struggling with a concept. This was to inspire them to keep trying and know that they could do it.

Responding to ethnic diversity in the delivery of instruction. While observing Emma and Raakel, I wrote in my researcher's journal about how flawlessly they incorporated Spanish into their lessons. As Emma was teaching, I noticed two students staring at their laptops. Emma apologized for speaking too fast and said she would slow down. The students had an app downloaded on their laptops. As Emma was speaking, the app was translating her words into Spanish. One of the students had only been in her class for a week. Emma stated *I do what I can for my students. I reached out to the administration for support because I have two students who do not speak any English. I don't know if the app is okay, but it seems to be helping them. I speak Spanish phrases. I have learned some common phrases that I use during math class, and I teach them to all of my students.* Raakel also speaks Spanish during instruction when she can. She has sparked interest in some of her students to speak Spanish as well. *My students see that I am trying, so that might be all that matters. Many of my students have picked up on some Spanish words and use them interchangeably. I have to meet all of my students where they are and do my*

best to reach them. All participants also had a print-rich environment to help with language acquisition.

Connections to the Literature

This study sought to understand the ways that upper elementary mathematics teachers describe their understanding of CRT. Many studies examined the foundation of CRT in ways that clearly define the goals of applying these teaching strategies (e.g., Ladson-Billings, 1995; Gay, 2000; Aronson & Laughter, 2016). The need to understand and work from this foundation guided many of the participants in this study. In Chapter 2, many studies were reviewed that investigated the need for culturally responsive pedagogy (Howard & Rodriguez-Minkoff, 2017; Gay, 2000, 2010; Ladson-Billings, 1995, 2001). This study aligns with the literature in varied ways. One such way is the connection between teachers' acknowledged need to improve student outcomes through incorporating CRT.

This connection was seen in the finding of Cara emphasizing through caring instruction that emotional and social well-being came before mathematics achievement. This finding was reinforced through the literature when Ladson-Billings (2006) emphasized that academic achievement needs not only refer to test scores but could also refer to the development of students' engagement with content in ways that may not immediately resonate with standardized testing. This finding was also reinforced through Serenity's choice to weave cultural references into instruction, and in Raakel's frustration to include diverse terminology in her testing language. In this way, instructors take cues from listening and observing their students, finding ways to reach students where they are at while connecting their life outside the classroom.

The literature reviewed also highlighted that one of the reasons CRT was needed was due to the increased need for empowerment and self-efficacy like the ones present in models of multiculturalism (Nieto, 2000; Sleeter, 1989) to connect with minority students. This was echoed in

Serenity's insight that CRT allows mathematics instruction to be student-focused, making it adaptable to students' learning styles and relevant to their cultural, historical, and social contexts. Rather than viewing all minority students the same, CRT offers the flexibility to adapt to today's changing classroom (Nieto, 2000; Sleeter, 1989).

To show how the findings from this study connect with the literature reviewed, I shared the findings of the participants uncovered through semi-structured interviews with open-ended questions. Major themes emerged through this qualitative inquiry, including participants' perception that their students' social contexts made mathematics a prerequisite to full participation in society. Additionally, the impact of social and historical contexts cannot be separated from mathematics instruction. Another major theme revealed participants' belief that culturally responsive teaching was necessary for bridging those contexts and the mathematics content.

Bridge Between Cultural Context and Instruction. The implementation and relevance of mathematical course content to students' social contexts are obscured by culturally decontextualized or "culture-free" ideologies (Ladson-Billings, 1997). This implies that culture cannot be erased from instruction and that in the attempt to instruct without reference to race and ethnicity, some will not be able to connect with instruction. Culturally responsive teaching allows students to see themselves in the content. This was also found in studies reviewed in the literature (Bonner, 2014; Gay, 2000; Ladson-Billings, 1994; 1995). The literature reviewed referenced "culture-free" pedagogies being empowering to those students whose culture is the mainstream (Sleeter & Cornbleth, 2011; Irvine & Armento, 2000). Thus, one of the hallmarks found of CRT is the ability to empower diversity by actively engaging the full range of cultural differences to benefit all students.

Participants shared their belief that CRT made a pathway for students to express and embody their cultures. When teachers utilized this idea, all students were given ample learning opportunities. In this way, culturally responsive instruction is a form of social justice for students, as seen in the literature reviewed (Freire, 2000; Ladson-Billings, 1995, 1998; Ladson-Billings & Tate, 1995). One of the unique elements of CRT that participants shared and the literature affirmed is validating culture through displaying complex ways of knowing, interpreting, and portraying information (Gay, 2000). While this honors the many diverse ways cultures express themselves, it also honors the various ways that different students learn.

Many participants acknowledged that without administrative support, the demands to understand and incorporate CRP into their daily lessons could be overwhelming and stressful. The lack of support can also be found in other studies reviewed (Assude, 2005; Leong & Chick, 2011). School leaders can make themselves a bridge for their teachers to alleviate any barriers of connecting with students. This lack of support may account for some resistance to implementation, which researchers emphasize is needed to empower the everyday lived experiences of all students (Gutierrez & Rogoff, 2008; Lee, 2007; Nasir, 2002).

Students' Social & Historical Contexts on Instruction. This connection is deeply intertwined with the need to connect what is valued in mathematics classrooms with what is valued at home. In the case of Serenity, her growing awareness of her students' context outside of school empowered her to achieve a more contextual perspective on behaviors that might otherwise frustrate her. The culturally specific behavior that may have seemed like "acting out" is seen more clearly as a form of frustration which need not necessitate behavioral correction from a CRT mindset, as described in Serenity's findings. Serenity's interview details the reality that her students have a more difficult time relating to word problems in mathematics that do not relate to

their own lived experiences. CRT addresses this disconnect through cultivating instruction strategies drawing on students' own culture (Bonner, 2014; Lemons-Smith, 2013; Gay, 2000; Ladson-Billings, 1994; 1995). Serenity conveyed that the "teaching the whole child" approach of CRT allows her to transcend her own limited experiences through connecting with the cultures of her students.

Expecting all students to act the same in mathematics classrooms undermines the reality of their lives at home and in their communities. Findings indicate CRT honors circumstances outside of instructors' and students' control, and this is supported through the literature emphasizing that CRT improves equity and instruction for more authentic learning experiences, and higher achievement outcomes through focusing less on behavior and more on character (Gay, 2010). The literature accentuated that the knowledge CRT provides helps instructors see beyond behavior to the cultural context informing it (Gay, 2010) while offering tools to engage all students. This was reflected in the finding of this study in which Raakel emphasized that students' should be reflected in the spaces where they invest most of their time.

In the case of Emma's experiences of implementing CRT, this showed her that all students bring a rich knowledge base to mathematics classrooms that are embedded in students' cultures. Emma believes it is the instructor's responsibility to align instruction with students' foundational knowledge in such a way that allows students to successfully comprehend mathematics as a natural extension of students' positive cultural alignment. Historically, researchers like Hirsch (1987) and Ravitch (2003) questioned if including culture would lessen the content rigor, positing that students would not have access to content like reading, writing, and mathematics. The findings from this study, however, assert that CRT is needed because students can make more connections to the content when given more opportunities.

Positive Outcomes of CRT. The participants of this study all shared many positive emotional experiences with the successful adoption of CRT. The sense of being more connected to their community by connecting with their students and their families translated into cycles of positive feedback. This was echoed throughout the literature reviewed as a benefit of getting to know students through CRT (Bonner, 2014; Villegas & Lucas, 2002), valuing the cultures and individuality of all students (Gutiérrez, 2002), and empowering students who may lack the financial advantages of other students (Darling-Hammond, 2010; Gay, 2000; Ladson-Billings, 1997). As with other CRT research, participants found positive outcomes from the application of CRT in that they were encouraged to maintain high expectations and utilize inquiry-based and student-centered practices (Villegas & Lucas, 2002; Morrison et al., 2008).

CRT utilizes effective practices to engage students, such as active instruction and small group discussions (Morrison et al., 2008; Sleeter & Cornbleth, 2011). Participants in this study mentioned the use of such practices and included similar practices when planning lessons. Cara confessed that she felt guilty if she did not have enough time to transform her instruction based on the CRT tenets. This guilt is felt in part because she believes that ignoring cultures during instruction is ethically failing her students in allowing hidden disparities that affect student achievement (Ladson-Billings, 1995). Rather than becoming burned out when feeling that they are failing their students, instructors who practice CRT strive to go home with a positive reflection of building up their students. In this vein, Serenity shares that CRT helps her feel more connected to students and their families. This connection will make community engagement more natural and appreciated.

Emma's viewpoint is in alignment with Gay (2010), in that CRT utilizes the constructivist methods in which the classroom environment becomes a place of meaningful tasks that make

time for students to explore their thinking. Raakel echoed this point in the literature by emphasizing that she feels positively impacted by welcoming her students' experiences and cultural knowledge into the mathematics classroom, which allows her to contextualize instruction related to an individual learning need. The openness created in the classroom through CRT methods helps inform teachers of the broader circumstances of their students, which naturally cultivates compassion. This was seen when Serenity recalled that a student was putting his head down on the desk at the beginning of class, not because of willful disengagement, but because he had to get up early to help younger siblings get ready for school. This understanding both defuses possible confusion that may lead to unnecessary punishment and nurtures positive feelings in the mathematics classroom.

CRT in the Mathematics Curriculum. This study highlighted four upper elementary mathematics teachers who were willing to do additional work and research outside of their school building to incorporate cultural responsiveness into their classrooms. As described in this study, some efforts to include CRT can be at the surface level (e.g., adding students' names, interest inventories, or local landmarks). Although these routines may generate students' interests and help build relationships, a vital component is still amiss. These teacher moves do not get to the deeper issues of cultural responsiveness at the curricular level. Many of the documented actions reminded me of the actions that I took with my former teammates when we were trying to ensure that we were culturally responsive teachers. Although research supports the value of CRT, more development is needed around its implementation in mathematics classrooms (Leonard et al., 2010; Nasir et al., 2008). The four teachers in this study mentioned the lack of administrative support. This was also true for my team. We were putting together pieces from varied sources hoping that it would lead to positive classroom cultures and relationships.

The political nature of education has been a major reason for the slow development of culturally responsiveness in mathematics at the curricular level (Sleeter, 2012). The manner that mathematics is taught, the models that teachers choose to accept, and the information that teachers value tell students what is important in their classroom. Despite reform agendas calling for the improvement of mathematics education for all students, traditional approaches to instruction in favor of basic skills instruction and viewing mathematics as culture neutral continue to dictate classroom practice (Nasir et al., 2008). "An examination of past research, policies, and reforms in mathematics education suggests that there have always been, and remain, tensions in conceptualizing the aims and goals of mathematics teaching and learning" (Berry, 2015). The majority of mathematics education in the U.S. is based on standardized curricula, pedagogy, and testing. This one-size-fits-all approach separates students' cultural strengths and experiences from learning mathematics (Leonard et al., 2010). Using CRT to view students' cultures as an asset can expand teachers' and students' mathematical understandings.

The four teachers in my study struggled with including ethnic and cultural diversity content in the mathematics curriculum. Many teachers may want to embody CRT, but still, miss the mark. Education on culturally responsive teaching can start within teacher education programs (Ladson-Billings, 1995; Gay, 2002; Villegas & Lucas, 2002). If CRT was included in state and local mathematics curriculums, teachers might gain a more thorough understanding of it and its implementation. Professional development could then target ways to incorporate CRT in mathematics through mathematics standards. Some scholars have already begun this work. Contextual anchoring in mathematics is an approach that allows teachers to support students' home culture (Lemons-Smith, 2013). Mathematics concepts are taught using students' communities as reference points. For example, students can learn geometric terms using student-created maps. Also,

numbers and operations can be explored through a family constellation activity. CRT in mathematics is not something that teachers should have to continue their education to learn about. CRT in mathematics should be accessible to all teachers through their required curriculum, not an additional or optional resource.

Conclusions

The findings of this study provide important information into how four upper elementary mathematics teachers describe and understand culturally responsive teaching (CRT). Moreover, they provide insight into how their negotiations impact their implementation of CRT. Considering current literature, as well as findings explored in this study, teachers are seeking opportunities to examine culturally responsive teaching (CRT). The findings of this study suggested that the four participants developed a knowledge base about cultural diversity, demonstrated caring and built learning communities, communicated with ethnically diverse students, included ethnic and cultural diversity content in the curriculum, and responded to ethnic diversity in the delivery of instruction. Although Gay's (2000) five essential elements were documented throughout the study, I noticed some glaring strengths as well as areas of growth.

The strengths of all four participants were on building relationships and negotiating through positive and academically challenging learning environments. There was a lack of intentional planning as it related to the inclusion and acknowledgment of cultural differences. CRT was also not seen permeating through the mathematics content, but more so generally in mathematics classrooms. Both the strengths and areas of growth were reflective of the district training that participants received prior to this study. The professional learning sessions on CRT focused on getting to know students and their families while ensuring there was a representation of different cultures in classrooms. Furthermore, teachers were asked to incorporate students' culture

and prior knowledge, along with multiple learning preferences. The professional learning sessions did not discuss CRT in terms of mathematics, or any other content area. Including ethnic and cultural diversity content in the curriculum and responding to ethnic diversity in the delivery of instruction were areas of growth for the participants and the district's professional learning on CRT.

The findings also indicate that school leaders are needed to support teachers and the implementation of CRT for the benefit of all students. They are obtaining additional knowledge and using it to facilitate their mathematics classrooms with their students. Teachers are gaining varied understandings of CRT, which leads to a misalignment between understandings and implementation across classrooms. Teachers would benefit from opportunities to reflect on their practices and engage in discourse and collaborative planning with colleagues. A space is needed for teachers to examine their own biases and misconceptions about CRT. It is time for cultural responsiveness to be seen as an educational asset. CRT should be embraced and completely supported by stakeholders, specifically at the administrative level, as a best practice for all students. The inclusion of CRT in mathematics adds value to the mathematics content by creating positive mathematical learning experiences for all students.

Implications

While there is a growing body of qualitative research on culturally responsive teaching in elementary mathematics classrooms, there is a disconnect between frameworks related to CRT and how teachers receive and negotiate CRT. This divide can be addressed by exploring how elementary mathematics teachers understand CRT and teachers' implementation of CRT. The findings of this study have implications for school leaders and teachers who desire to support culturally responsive teachers or to become more culturally responsive in their mathematics classrooms.

First, there is a need for on-going, consistent professional learning on culturally responsive teaching practices in mathematics. All four participants in the study indicated that they participated in an optional district provided professional learning session on these practices. Participants mentioned the desire for a session that was longer than three hours. For two of the four participants, this district training was an introduction to CRT. The other two participants learned about CRT prior to the district training. As a result of initially having learned about CRT from varied sources in addition to one district session, teachers demonstrated various understandings of CRT. The professional learning could have been categorized as an overview of CRT.

A deeper dive in CRT is needed that allows teachers to explore practices as it relates specifically to mathematics and mathematics instruction. The use of CRT in mathematics classrooms encourages students to think more critically about mathematics and how it relates to them. CRT is more than knowing the neighborhood that students live in. That information could be used to transform a lesson about locating and graphing local places on a coordinate plane. What about student choice? Ask students to list some things that they would like to discuss. Maybe recess is on that list. Students could survey adults (school staff and family members) and other students about recess. Is recess a required or optional activity? How much time are students given for recess? Should the time allotted be adjusted? This mathematics activity can be scaled up or down, depending on the grade level. This cross-curriculum activity also includes persuasive writing. The teachers in the study were eager to implement CRT in mathematics, but they must be provided with on-going opportunities to learn and collaborate about the practices. Professional learning sessions on CRT should include an overview of CRT in specific content areas like mathematics and give teachers time to plan activities that go beyond changing a street or student's name in a word problem.

Secondly, a thorough examination of both teachers' and students' cultures is vital in order for CRT in mathematics to be fully enacted. Although participants received information on CRT through presentations, webinars, articles, and coursework, there is a need to expand their knowledge about other cultural groups and ways to incorporate that knowledge into their instruction, lessons, and activities. Given the multitude of cultural experiences present in mathematics classrooms, this is a lofty undertaking and cannot be done in one sitting. Culture should not get in the way of students learning and exploration of mathematics. If a teacher's culture says that the adult is the knower of mathematics and his/her job is to teach it to students, that is problematic. Some students may thrive in an environment with peer collaboration, student inquiry, goal-setting, and high expectations. Culturally responsive teachers understand that culture helps shape mathematics learning; therefore, students' cultures must be completely embraced. Embracing diversity can make mathematics accessible to all learners. An analysis of this nature could reveal potential cultural biases; therefore, additional support may be necessary.

Lastly, it is essential for teachers to be supported in CRT with time and resources from school leaders. Teaching and learning mathematics should be situated within students' experiences. Mathematics problem-solving can be in the context of social-justice or issues of power, but that cannot be done hastily. A time to reflect on the collaborative CRT professional learning that is specific to mathematics and how the practices can be or were implemented could consist of weekly planning time allotted for CRT. This time would provide a space for teachers to ask questions to each other and reach out to community members. Family and community engagement happens yearlong, but just during the first week of school. Additionally, many mathematics resources like textbooks do not connect students' cultures to the mathematical content. Most of

the resources teachers used in this study that related to CRT were created or acquired by the participants. In order for CRT to be implemented during daily instruction, meaningful mathematics resources that validate students' backgrounds are needed. This validation requires teachers to encourage students to use their higher-order thinking skills to analyze and explain their mathematical reasoning. Asking teachers to push students to think critically about mathematics also means that teachers themselves will need to think critically about mathematics.

According to research on CRT, there is no checklist that teachers must use in order to be culturally responsive. However, many researchers and educators alike have created resources that may support teachers in using culturally responsive strategies. Instruction that is culturally responsive in nature increases the number of learning opportunities for students. Professional learning communities (PLCs) centered on CRT in mathematics is a place where all three implications could be addressed further. PLCs could be a motivating factor that keeps teachers immersed in specific strategies for incorporating CRT in mathematics classrooms. There could be a streamlined process of co-planning, teaching (or co-teaching), and co-reflecting.

Suggestions for Further Research

The results of the study on how upper elementary responsive teachers understand and negotiate culturally responsive teaching in mathematics classrooms are not all-encompassing; therefore, further research is needed. First, research into the experiences of culturally responsive teachers in mathematics classrooms at all levels is essential since this study focused on the upper elementary level. The knowledge and teacher experiences vary, so getting an overall representation of how culturally responsive teachers prepare, implement, and reflect on their experiences is valuable. In addition to research at the elementary level, examining the understanding and experiences of teachers at the middle and high school levels are essential.

Secondly, more descriptive studies on schools that have on-going professional learning opportunities for culturally responsive teaching in mathematics experiences are needed. For those schools, a focus on academic success and student achievement in mathematics would be valuable. The study revealed that culturally responsive teachers desired more professional learning, content specific examples, and support from school leaders. It would also be beneficial to include school leaders' understanding and experiences with CRT. It would be interesting to compare teachers' and school leaders' understanding of CRT. A lot can be learned from the insights of teachers and school leaders. A more comprehensive view of CRT can be gleaned with more narrative studies that include teachers and school leaders at the K-12 level.

Lastly, this study focused on the understandings and negotiations of CRT in mathematics by four teachers at one school. Further research can explore the understandings and negotiations of CRT with a larger sample size in varied school districts. These future studies could include public, private, and charter schools. Having a larger sample size would provide a greater comparison of the teachers' understandings and negotiations of CRT. Gathering and analyzing data such as this could give us a glimpse into our overall strengths and areas of opportunities in regard to sustaining and being more intentional about incorporating CRT in our mathematics classrooms.

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APPENDICES

Appendix A

Interest Email

Greetings!

I am beginning my dissertation research on culturally responsive teaching practices and am looking for some teachers to participate in my study. Specifically, I am looking for teachers who self-identify as being a culturally responsive educator and has participated in the district's training on culturally responsive teaching. You were recommended to me as someone who may fit these qualifications.

My study is a narrative inquiry into the experiences of teachers as they implement culturally responsive practices in their mathematics classroom. Narrative inquiry is where the researcher constructs the stories of participants and re-tells the story using the words of the participants. I will be conducting four interviews with each teacher participant. This study would require that we meet four times outside of school to discuss the experiences and view any artifacts that are presented. The purpose of this study is to describe the experiences of teachers as they implement culturally responsive teaching in their practice.

If this study sounds like something you might participate in, please contact me at your earliest convenience at 678-760-3006 or lmorgan3@student.gsu.edu. I sincerely hope you will consider participating in this study to better understand teachers' experiences with culturally responsive practices in mathematics.

LaToya Byrd
Doctoral Candidate, Middle and Secondary Education
Georgia State University
Lmorgan3@student.gsu.edu

Appendix B

Questionnaire Name: _____

As you respond to each question or statement, please do not reveal the identity of any students.

What are your teaching credentials?

What are some of your previous mathematics teaching experiences (e.g., tutoring, etc.?)

How do you establish and foster relationships with your students?

What are some things you do to learn about students' home lives?

How do you use aspects of students' lived experiences in your mathematics classroom?

In your own words, define culturally responsive teaching.

What are some things you would expect to see in a culturally responsive classroom?

Add three sentences to this statement: I believe that all children can learn regardless of cultural diversity.

Add three sentences to this statement: Teachers who are culturally responsive implement strategies that bridge students' home and school cultures.

Adapted from "Examining the integration and use of culturally responsive mathematics pedagogy in preservice teachers reflections and practice: Implications for Black children," by N. Ramsay-Jordon, (2017), (Doctoral dissertation). Georgia State University, Atlanta, GA. https://scholarworks.gsu.edu/mse_diss/45

Appendix C

Informed Consent Form

Georgia State University
Department of Middle-Secondary Education
Informed Consent

Title: Teachers' Narratives: Navigating Culturally Responsive Teaching in Upper Elementary Mathematics Classrooms

Principal Investigator: Dr. Shonda Lemons-Smith (PI); LaToya Byrd (Student PI)

I. Purpose:

You are invited to participate in a research study. The purpose of this study is to explore upper elementary mathematics teachers' understanding and implementation of culturally responsive teaching. We will document and discuss how upper elementary mathematics teachers negotiate culturally responsive teaching (CRT) in mathematics classrooms. Four participants will be selected for this study. Participation will require a total of nine hours. This time includes four different individual interviews, one classroom observation, journaling, and document collection. During the first interview, we will discuss your completed questionnaire. The three additional 90 minute interviews will be conversational. One 1-hr classroom observation will be conducted to further document teaching practices. An additional hour each has been allotted for journaling and collection of lesson plans. The data from this study might help district and local school leaders, as well as fellow educators, better understand how teachers define and navigate the implementation of CRT in their classrooms.

II. Procedures:

If you decide to participate, LaToya Byrd will administer and collect consent forms, as well as member checks. LaToya Byrd will also conduct individual interviews. Each individual interview will take approximately 90 minutes and will take place at a convenient time and public place (i.e., coffee shop) in the months of February and March 2020. One classroom observation will be conducted by LaToya Byrd. We will also ask your permission to use your journal reflections as a part of our data collection.

III. Risks:

In this study, you will not have any more risks than you would in a typical day.

IV. Benefits:

Participants will not directly benefit. Participation in this study could benefit society. Through your reflections on your experiences, you may better understand how they are using

culturally responsive teaching (CRT), with their students and how it relates to them. People who read their narratives may also gain a better understanding of CRT.

V. Voluntary Participation and Withdrawal:

Participation in this research is voluntary. You do not have to be in this study. If you change your mind during the study, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits that you would normally have.

VII. Confidentiality:

We will keep your records private to the extent allowed by law. LaToya Byrd and Dr. Shonda Lemons-Smith will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP). We will use a pseudonym instead of your name on study records. The information you provide will be stored electronically on LaToya Byrd's password and firewall-protected computers. The audio recordings will be recorded using LaToya Byrd's personal laptop. Your name and other facts that might disclose who you are will not appear when we present this study or publish its results.

VIII. Contact Persons:

Contact Dr. Shonda Lemons-Smith at 404-413-8240 or email at slemonssmith@gsu.edu or LaToya Byrd at 678-760-3006 or email at lmorgan3@student.gsu.edu if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study.

IX. Copy of Consent Form to Participant:

We will give you a copy of this consent form to keep. If you are willing to volunteer for this research and be audio recorded, please sign below.

_____ _____

Participant Date

_____ _____

Principal Investigator or Researcher Obtaining Consent Date

Appendix D

Interview Protocol

Date_____ Participant Pseudonym_____

I) Welcome/Introduction

Good afternoon/evening. Thank you for taking the time to participate in this study and discussion of how teachers define and negotiate culturally responsive teaching in upper elementary classrooms. My name is LaToya Byrd, and I am currently an Academic Coach for Rockdale County Public Schools.

The purpose of this study is to explore upper elementary mathematics teachers' understanding and implementation of culturally responsive teaching. The data from this study might help district and local school leaders, as well as fellow educators, better understand how teachers approach and experience the implementation of culturally responsive practices in their classrooms.

Before we begin, I'd like for us to discuss the norms for our time together to ensure that we both maximize our time and make our discussion more productive. First, since this session will be recorded, please be sure to speak up to ensure that your voice is captured. Secondly, there are some safeguards in place to protect your confidentiality so feel encouraged to be completely honest with regards to your experiences with culturally responsive practices. Further, if it is okay with you, we will only use first names during each session.

During our time together, I will ask you a series of questions. I will be taking notes so please do not take my head down or lack of constant eye contact as a sign of disinterest. As you respond to each question or statement, please do not reveal the identity of any students. If there are no questions regarding procedures for today's interview or no objections, I would like to begin recording now.

II) Semi-Structured Interview Session

This session is being conducted as part of the dissertation, "Teachers' Narratives: Navigating Culturally Responsive Teaching in Upper Elementary Mathematics Classrooms", conducted by LaToya Byrd under the direction of Dr. Shonda Lemons-Smith of Georgia State University.

Today's date is [date] and the start time is [start time]. Let's begin with introductions. Please tell me your first name, the grade-level you teach, subject(s) you teach, and the number of years that you have been teaching. Now that I know a little about you, I want to shift gears and pose some questions regarding some of the responses from your questionnaire. Here is a copy of the questionnaire that you submitted on [date]. (I will begin by asking clarifying questions that I might have about the participants' responses to any questions or statements of the questionnaire.)

Looking back at the questionnaire, are there any questions that you would like to discuss or expound on?

• Describe your feelings about the importance of mathematics.

• How did you determine that culturally responsive practices were needed in your mathematics classroom?

• Describe how you planned for culturally responsive lessons or activities.

• How has the use of culturally responsive teaching in your mathematics classroom influenced your teaching?

• Tell me about a time when you were able to connect your students' cultures to mathematics.

• What has been your most enjoyable experience while teaching mathematics using culturally responsive teaching?

• What has been your worst experience while teaching mathematics using culturally responsive teaching?

• What are the characteristics of a successful mathematics student?

• Would you encourage colleagues to incorporate culturally responsive teaching practices into their daily instruction? Why or why not?

• As you reflect on your culturally responsive teaching, what are some emotions that you feel?

• Do you believe that teaching mathematics can be culture-free?

• Do you think it is important for schools or people outside of your classroom to understand the experiences of teachers as they use culturally responsive practices? Why or why not?

• What do you want people to know about culturally responsive practices in mathematics classes?